EXHIBIT B

LAKE HAVASU CITY Municipal Airport

AIRPORT MASTER PLAN

AIRPORT MASTER PLAN

for

LAKE HAVASU CITY MUNICIPAL AIRPORT
Lake Havasu City, Arizona

Prepared for
LAKE HAVASU CITY

By
Coffman Associates, Inc.

In Association With
Z&H Engineering, Inc.

Approved by
Lake Havasu City Council
On
February 10, 2009

TABLE OF CONTENTS

CONTENTS

LAKE HAVASU CITY MUNICIPAL AIRPORT
Lake Havasu City, Arizona

Airport Master Plan

INTRODUCTION

Chapter One
INVENTORY

Chapter One (Continued)

Chapter Two
AVIATION DEMAND FORECASTS

Chapter Three
AIRPORT FACILITY REQUIREMENTS

Chapter Three (Continued)

Chapter Four
AIRPORT DEVELOPMENT ALTERNATIVES

Chapter Five
RECOMMENDED MASTER PLAN CONCEPT

Chapter Six
CAPITAL IMPROVEMENT PROGRAM

EXHIBITS

EXHIBITS (Continued)

Appendix A
GLOSSARY OF TERMS

Appendix B
AIRPORT LAYOUT DRAWINGS

INTRODUCTION

INTRODUCTION

The Lake Havasu City Municipal Airport Master Plan Study 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 the demand. The ultimate goal of the Master Plan is to provide systematic guidelines for the airport's overall maintenance, development, and operation.

The Master Plan is intended to be a proactive document which identifies and then plans for future facility needs well in advance of the actual demand. As a result, Lake Havasu City can coordinate project approvals, design, financing, and construction in advance so as to avoid experiencing detrimental effects due to inadequate facilities.

An important result of the Master Plan is identifying and outlining specific development plans so that sufficient areas for future facility needs are reserved. This protects development areas and ensures they will be readily available when required to meet future aviation demand. The final product is a detailed development concept which outlines specific uses for all areas of airport property, including strategies for revenue enhancement.

The preparation of this Master Plan is evidence that Lake Havasu City recognizes the importance of the airport to the community and the associated challenges inherent in providing for its unique operating and improvement needs. The cost of maintaining an airport is an investment which yields impressive benefits to the community. With a sound and realistic Master

Plan, the Lake Havasu City Municipal Airport can maintain its role as an important link to the national air transportation system for the community and maintain the existing public and private investments in its facilities.

MASTER PLAN GOALS AND OBJECTIVES

The primary objective of the Lake Havasu City Municipal Airport Master Plan 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 be a source of employment and revenue for the City and surrounding areas.

The accomplishment of this objective requires the evaluation of the existing airport and a determination of what actions should be taken to maintain an adequate, safe, and reliable airport facility to meet the air transportation needs of the area. The completed Master Plan will provide an outline of the necessary development for the next 20 years. As a result, responsible officials will have advance notice of future needs to aid in planning, scheduling, and budgeting.

Specific goals and objectives of the Lake Havasu City Municipal Airport Master Plan Update are:

- To preserve and protect public and private investments in existing airport facilities;
- To enhance the safety of aircraft operations;
- To be reflective of community and regional goals, needs, and plans;
- To ensure that future development is environmentally compatible;
- To establish a schedule of development priorities designed to meet forecast aviation demand;
- To develop a plan that is responsive to air transportation demands of the City and region as a whole;
- To develop an orderly plan for use of the airport;
- To meet Federal Aviation Administration (FAA) and Arizona Department of Transportation (ADOT) – Aeronautics Division airport design standards;
- To coordinate this Master Plan with local, regional, state, and federal agencies, and;
- To develop active and productive public involvement throughout the planning process.

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

- Determining projected needs of airport users through the year 2027;
- Analyzing local and regional socioeconomic factors likely to affect air transportation demand for the airport;

- 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, and;
- Producing current and accurate airport base maps and Airport Layout Plan (ALP) drawings.

BASELINE ASSUMPTIONS

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

- Lake Havasu City Municipal Airport will continue to operate as a publicly owned Title 14, Code of Federal Regulation (CFR), Part 139 certificated airport through the planning period.
- Lake Havasu City Municipal Airport will continue to pursue and accommodate commercial service activities.
- Lake Havasu City Municipal Airport intends to seek general aviation and corporate business aviation based tenants and transient operations.
- The aviation industry on the national level will grow as forecast by the FAA in its annual Aerospace Forecasts.
- The socioeconomic characteristics in the Lake Havasu City Municipal Airport service area will continue to grow as forecast (see Chapter Two).
- Both federal and state grant-in-aid programs will be in place through the planning period to assist in funding capital development needs.

MASTER PLAN ELEMENTS AND PROCESS

The Lake Havasu City Municipal Airport Master Plan Update is being prepared in a systematic fashion following FAA guidelines and industry-accepted principles and practices, as shown in **Exhibit IA**. The Master Plan has six chapters that are intended to assist in the discovery 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 have relevance to the Master Plan are also collected.

Chapter Two – Aviation Demand 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 Lake Havasu City Municipal Airport through the year 2027. 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 – Airport 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 identified, 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 terminal building, hangar, apron, and support needs.

Chapter Four – Airport Development 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. An environmental overview is also included that provides a review of the potential environmental impacts associated with proposed airport projects.

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

Appendix B – Airport Layout Drawings includes the official Airport Layout Plan (ALP) and detailed technical drawings depicting related airspace, land use, and property data. These drawings are used by the FAA and ADOT in determining grant eligibility and funding.

COORDINATION

The Lake Havasu City Municipal Airport Master Plan Update is of interest

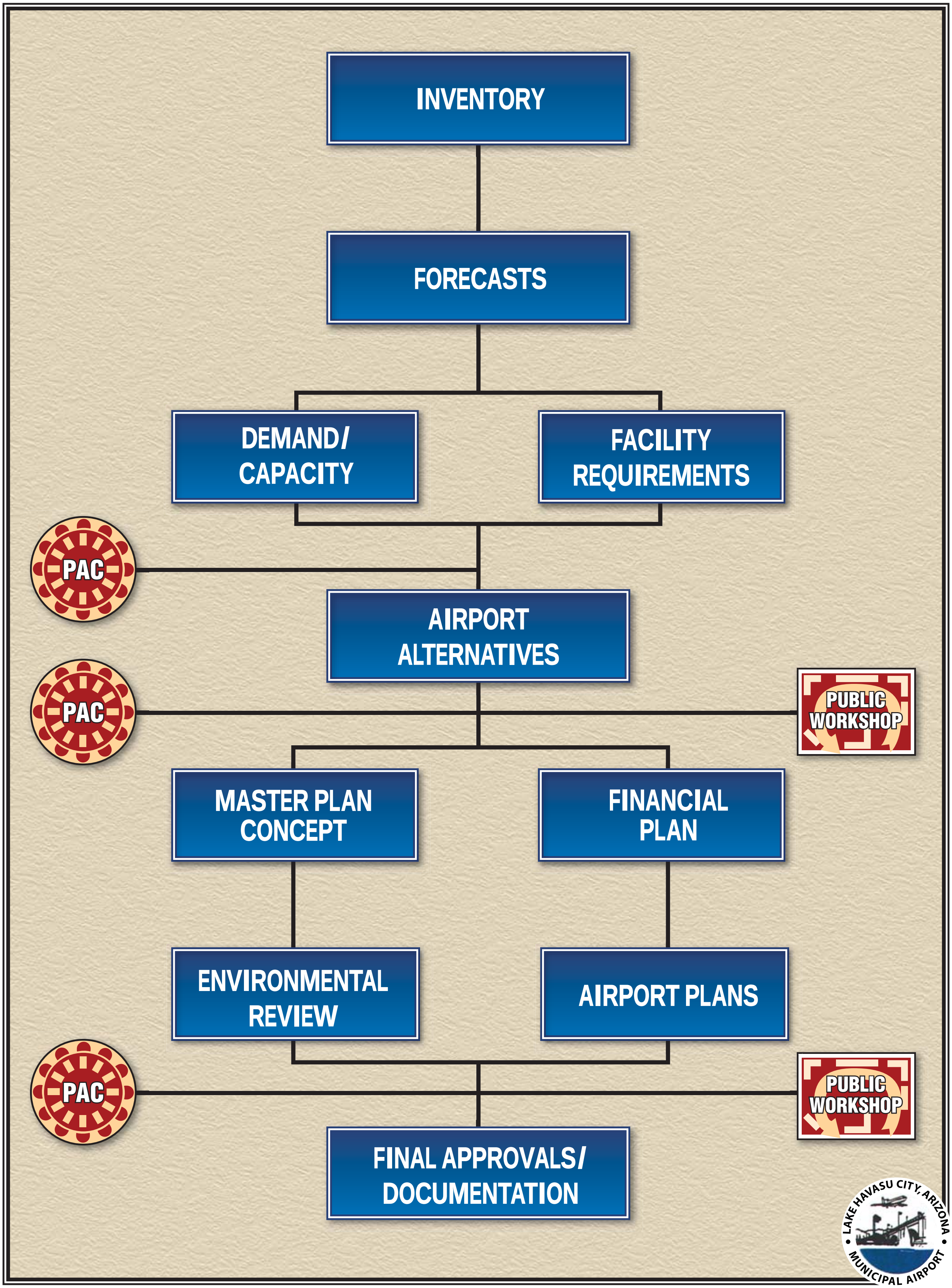


Exhibit IA
PROJECT WORK FLOW

to many within the local community. This includes local citizens, community organizations, airport users, airport tenants, area-wide planning agencies, and aviation organizations. As an important component of the regional, state, and national aviation systems, Lake Havasu City Municipal Airport is of importance to both state and federal agencies responsible for overseeing air transportation.

To assist in the development of the Master Plan, the City identified a group of community members and aviation interest groups to act in an advisory role in the development of the Master Plan. Members of the Planning Advisory Committee (PAC) reviewed phase reports and provided comments throughout the study to help ensure that a realistic, viable plan was developed.

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

The information completed was presented to the public via open-house workshops. The workshops gave the public an opportunity to view the working materials, ask questions, and provide feedback with the consultant, airport administration, and city officials. Notices of meeting times and locations were advertised through the media. The draft phase reports were also made available to the public on the Coffman Associates' website at www.coffmanassociates.com.

CONCLUSION

The Master Plan is evidence that Lake Havasu City is committed to maintaining a first-class aviation facility capable of providing passenger, cargo, and general aviation service. The City recognizes the importance of Lake Havasu City Municipal Airport to the community and the region, as well as the associated challenges inherent in providing for aviation needs in a growing regional environment. Maintaining a sound, flexible Master Plan will facilitate continued growth of the airport as a major economic asset for the community.

Chapter One

INVENTORY

Chapter One

INVENTORY

The inventory of existing conditions at Lake Havasu City Municipal Airport (HII) will serve as an overview of the airport, its facilities, its role in the regional and national aviation systems, and the relationship to development which has occurred around the airport in the past. The information delineated in this chapter attempts to provide a foundation, or starting point, for all subsequent evaluations.

This Master Plan includes a comprehensive collection and evaluation of information relating to the airport and the surrounding area, including the following:

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

- Background information pertaining to Lake Havasu City and the regional area, including descriptions of the regional climate, surface transportation systems, and Lake Havasu City Municipal Airport's role in state and national aviation systems. Descriptions of recent development which has taken place on the airport and plans for future development which may impact the airport are also included.

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

- An overview of existing local and regional plans and studies to determine their potential influence on the development and implementation of the Airport Master Plan.

An accurate and complete inventory is essential to the success of the Master Plan. The inventory of existing conditions serves primarily as a foundation upon which most of the analysis conducted in later chapters is formed. This information was obtained through on-site investigations of the airport and interviews with airport management, airport tenants, representatives of various government agencies, and local and regional economic agencies. Information was also obtained from documents prepared by the Federal Aviation Administration (FAA), Arizona Department of Transportation (ADOT) – Aeronautics Division, Lake Havasu City, Mohave County, and the State of Arizona.

REGIONAL SETTING

As depicted on **Exhibit 1A**, Lake Havasu City Municipal Airport is located on approximately 646 acres of property in Lake Havasu City, Arizona. The airport is approximately six miles to the north of Lake Havasu City's central business district. Lake Havasu City is located in the southwest corner of Mohave County, which is geographically the second largest county in Arizona. The county is mostly classified as desert, but does contain approximately 1,000 miles of shoreline to include the Colorado River and two man-made lakes: Lake Havasu and Lake Mohave.

Lake Havasu City is situated on the eastern shore of Lake Havasu on the Colorado River border of Arizona and California. It is located at the foothills of the Mohave Mountains and is part of the northern and western limits of the Sonoran Desert. The city's elevation ranges from 450 feet above sea level at the Lake Havasu shoreline to more than 1,500 feet above sea level at the foothills of the Mohave Mountains. The city was established in 1963 and is home to the historic London Bridge. Each year hundreds of thousands of visitors frequent the area to take part in recreational activities associated with Lake Havasu.

Lake Havasu City Municipal Airport is located on the north side of Lake Havasu City. It is bounded on the north by Arizona State Highway 95 and the Mohave Mountain Range, to the east by the Mohave Mountain Range, to the south by vacant terrain, and to the west by State Highway 95. The properties adjacent to the south end of the airport are owned by private, city, and state agencies. Immediate access to the airport is provided by Airport Centre Boulevard, which is accessed directly from State Highway 95. Retail Centre Boulevard also provides access to the airport via State Highway 95.

Regionally, Lake Havasu City Municipal Airport is located approximately 150 miles southeast of Las Vegas, Nevada; 200 miles northwest of Phoenix, Arizona; and 320 miles northeast of Los Angeles, California. U.S. Interstate 40 can be accessed via State Highway 95 approximately 15 miles north of the airport while State High-

05MP08-1D-2/22/06

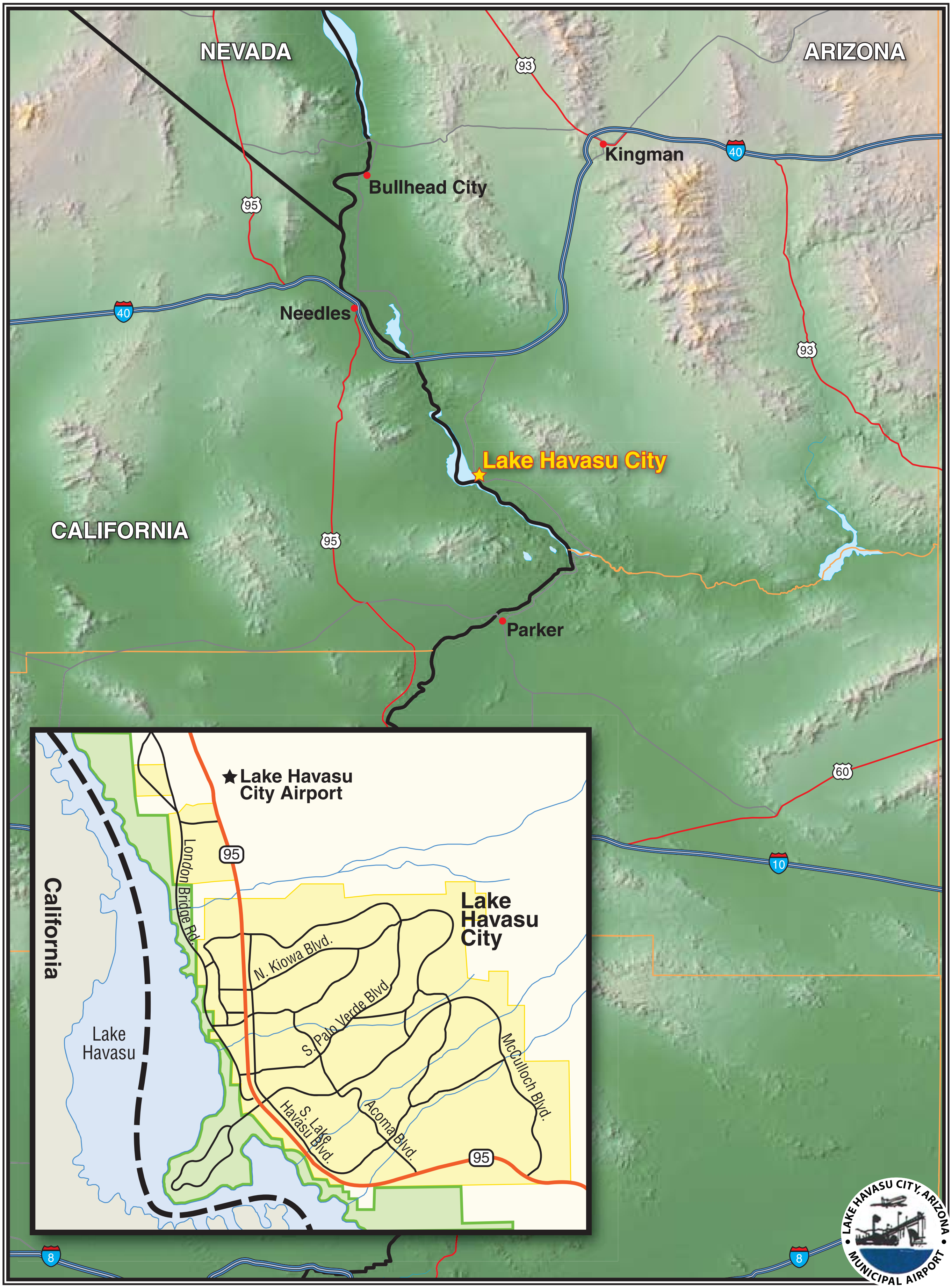


Exhibit 1A
VICINITY MAP

way 95 leads to U.S. Interstate 10 approximately 70 miles south of the airport.

OTHER TRANSPORTATION MODES

Local ground transportation for the general public within Lake Havasu City is available through Havasu Area Transit (HAT). This fixed route transit service operates five routes that originate from a central transfer station. Each bus makes up to 24 stops along the fixed route. HAT services are provided Monday – Friday from 6:00 a.m. to 7:00 p.m. and Saturday from 6:00 a.m. to 6:00 p.m. Arizona Road Runner Shuttle, Amore Shuttle, Best Ride Shuttle, and Commuter Services also provide ground transportation services to Lake Havasu City residents using a taxi-type shuttle service throughout the local area and across the State of Arizona, including service to Las Vegas, Nevada.

REGIONAL CLIMATE

Weather conditions must be considered in the planning and development of an airport, as daily operations are affected by local weather. Temperature is a significant factor in determining runway length needs, while local wind patterns (both direction and speed) can affect the operation and capabilities of the runway.

The regional climate is typical of the desert southwest: warm and dry. The normal daily minimum temperature ranges from 43 degrees in January and December to 83 degrees in July. The normal daily maximum temperature ranges from 65 degrees in January and December to 108 degrees in July. The region averages approximately 6.25 inches of precipitation annually. On average, Lake Havasu City experiences sunshine 84 percent of the year. The monthly average wind speed is 7.8 miles per hour (mph), and the predominant wind direction is from the north to south. A summary of climatic data is presented in **Table 1A**.

TABLE 1A
Climate Summary
Lake Havasu City, AZ

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
High Temp. Avg. (F)	65	71	76	85	93	103	108	106	100	88	74	65
Low Temp. Avg. (F)	43	47	52	59	68	77	83	81	75	63	50	43
Precip. Avg. (in.)	1.06	0.90	0.86	0.21	0.12	0.05	0.41	0.67	0.55	0.43	0.40	0.59
Wind Speed (mph)	6.2	7.3	8.5	9.0	9.1	9.0	8.7	8.1	7.7	7.0	6.6	6.2
Sunshine (%)	77	80	82	86	88	90	85	85	89	85	80	77

Source: www.weather.com and www.city-data.com

AIRPORT HISTORY

In 1989, Lake Havasu City acquired land from the Bureau of Land Management (BLM) when it was determined that a private airport on the south side of Lake Havasu City would be unable to accommodate the aviation demand in the region. As a result, a City-owned, public use airport was constructed on the north side of the City. Upon completion of the Lake Havasu City Municipal Airport in 1991, a 5,500-foot runway, parallel taxiway system, aircraft apron area, and terminal building were provided to pilots and passengers utilizing the airport. Initial development of the airport also included a non-directional beacon (NDB), Automated Weather Observation System (AWOS), Airport Rescue and Firefighting (ARFF) facility, and a fuel storage facility consisting of three 12,000-gallon underground fuel storage tanks. Since this time, several projects have been undertaken to improve and expand services at the airport.

RECENT CAPITAL IMPROVEMENTS

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

Table 1B summarizes federal grants for Fiscal Year (FY) 1997 through FY 2007. The FAA has provided approximately $14.58 million for airport improvements at Lake Havasu City Municipal Airport over the past ten years.

Between 1997 and 2007, ADOT invested more than $1.91 million in improvements at Lake Havasu City Municipal Airport. **Table 1C** summarizes these projects and their total expenditures over this ten-year period.

AIRPORT ADMINISTRATION

Lake Havasu City Municipal Airport is owned, operated, and maintained by Lake Havasu City. The City employs a full-time Airport Manager who reports to the Director of Community Services within the City's administrative structure. In addition, there are employees who serve in administrative, operational, and maintenance capacities. The airport staff maintains a presence on the airport seven days per week. The airport is an independent business service within the City's Community Services Department.

A seven-member committee of citizen volunteers makes up the Airport Advisory Board. This group meets monthly to consider various airport matters and makes recommendations concerning these matters to the City Council. Airport Board members serve three-year terms and elect a chairperson and vice-chairperson amongst themselves.

TABLE 1B
Federal Grants
Lake Havasu City Municipal Airport

Fiscal Year	Grant Number	Project Description	Total Grant Funds
1997/98	AIP02	Land Acquisition	$3,200,185
1998/99	AIP08	Runway/Taxiway Extension	$253,300
1999/00	AIP02	Land Acquisition	$25,676
1999/00	AIP08	Runway/Taxiway Extension	$628,615
1999/00	AIP09	Runway Extension Maintenance	$969,538
1999/00	AIP10	Runway/Taxiway Extension	$1,904,828
1999/00	AIP11	Runway/Taxiway Extension	$34,294
2000/01	AIP02	Land Acquisition	$307,038
2000/01	AIP09	Runway Extension Maintenance	$30,462
2000/01	AIP10	Runway/Taxiway Extension	$95,172
2000/01	AIP11	Runway/Taxiway Extension	$829,370
2000/01	AIP12	Runway/Taxiway Extension	$794,723
2001/02	AIP12	Runway/Taxiway Extension	$3,196
2001/02	AIP13	Pavement Preservation	$69,576
2001/02	AIP14	Taxilanes	$17,047
2001/02	DTFA01	Airport Security Program	$5,469
2002/03	AIP12	Runway/Taxiway Extension	$407
2002/03	AIP13	Pavement Preservation	$537,141
2002/03	AIP14	Taxilanes	$2,113
2002/03	AIP15	Fire Truck / Security Access	$350,575
2002/03	DTFA01	Airport Security Program	$72,173
2003/04	11590-160	Air Service Subsidy	$281,479
2003/04	AIP13	Pavement Preservation	$18,888
2003/04	AIP14	Taxilanes	$105,462
2003/04	AIP15	Fire Truck / Security Access	$450,106
2004/05	11590-160	Air Service Subsidy	$34,933
2004/05	AIP13	Pavement Preservation	$41,518
2004/05	AIP15	Fire Truck / Security Access	$1,047,755
2005/06	AIP15	Fire Truck / Security Access	$196,841
2005/06	AIP16	Terminal C – Apron	$83,233
2005/06	AIP17	Terminal C – Apron	$2,194,586
2006/07	AIP18	Master Plan Update Study	$475*
2006/07	AIP19	Electrical and Signage Upgrade	$3845*
Total Grant Funds			**$14,585,699**

* Grant money received to date for project; does not signify total grant amount

Source: Lake Havasu City

TABLE 1C
State Grants
Lake Havasu City Municipal Airport

Fiscal Year	Grant Number	Project Description	Total Grant Funds
1998/99	N207	Planning, Development, and Land	$94,873
1998/99	N307	Runway/Taxiway Extension	$203,479
1998/99	N707	Runway/Taxiway	$97,737
1998/99	N826	Northwest Access Road	$290,159
1999/00	E9061	Runway/Taxiway Extension	$91,822
1999/00	N207	Planning, Development, and Land	$1,261
1999/00	N707	Runway/Taxiway	$34,228
1999/00	N826	Northwest Access Road	$6,700
1999/00	N828	Runway/Taxiway Extension	$47,591
1999/00	N850	Master Plan Update	$34,200
2000/01	E0155	Runway/Taxiway Extension	$40,714
2000/01	E9061	Runway/Taxiway Extension	$4,672
2000/01	N707	Runway/Taxiway	$261,635
2000/01	N826	Northwest Access Road	$9,051
2000/01	N828	Runway/Taxiway Extension	$1,495
2000/01	N850	Master Plan Update	$1,800
2001/02	E1139	Pavement Preservation	$3,416
2001/02	E1151	Taxilanes	$836
2001/02	E156	Runway/Taxiway Extension	$39,012
2001/02	N307	Runway/Taxiway Extension	$219,999
2002/03	E1139	Pavement Preservation	$24,169
2002/03	E1151	Taxilanes	$104
2002/03	E3F33	Fire Truck / Security Access	$17,209
2002/03	E9061	Runway/Taxiway Extension	$1,683
2002/03	N307	Runway/Taxiway Extension	$76,522
2003/04	E0155	Runway/Taxiway Extension	$1,683
2003/04	E1139	Pavement Preservation	$3,124
2003/04	E1151	Taxilanes	$5,176
2003/04	E3F33	Fire Truck / Security Access	$22,095
2003/04	E3S60	Air Service Subsidy	$139,533
2004/05	E1139	Pavement Preservation	$2,038
2004/05	E3F33	Fire Truck / Security Access	$51,433
2004/05	E3S60	Air Service Subsidy	$17,317
2005/06	E3F33	Fire Truck / Security Access	$9,663
2005/06	E5F68	Terminal C - Apron	$4,086
2005/06	E5F69	Terminal C - Apron	$57,752
2006/07	N/A	Master Plan Update Study	$13*
2006/07	N/A	Electrical and Signage Upgrade	$101*
Total Grant Funds			**$1,918,267**

* Grant money received to date for project; does not signify total grant amount

Source: Lake Havasu City

ECONOMIC IMPACTS

The last formal economic impact study of the airport was completed by ADOT in 2002. This study analyzed the direct, indirect, and induced economic impacts of all public use airports in Arizona, including Lake Havasu City Municipal Airport. At the time, it was estimated that Lake Havasu City Municipal Airport had an impact of $35.5 million annually on the local economy.

The total economic impact of the airport includes the direct-effect employment, payroll, and sales. Indirect benefits would include visitor spending, which leads directly to off-airport employment, payroll, and sales. The cumulative economic benefit of an airport includes a multiplier effect which is essentially the recycling of money within the local economy to create more jobs in nearly every economic sector.

On-airport direct economic benefits include 82 jobs, with a direct payroll of $2.9 million and sales of over $7 million. Visitor spending accounts for 119 additional jobs, $2.4 million in payroll, and $5.8 million in sales. When the multiplier effect is applied, economic activity generated at Lake Havasu City Municipal Airport accounts for 361 local jobs, $10 million in payroll, and $25.4 million in sales.

STORMWATER POLLUTION PREVENTION PLAN (SWPPP)

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

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

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

Under the regulations, separate permits are required for construction activities that disturb one or more acres of land and for general stormwater permits. Airports are included as an industrial facility under the AZDES and must obtain a Multi-Sector General Permit. This permit requires the development of a SWPPP.

The airport is currently in the process of updating its SWPPP. The SWPPP for the airport includes airport tenants, and Lake Havasu City provides annual training and inspection services. The airport has a Multi-Sector General Permit.

SPILL PREVENTION CONTROL AND COUNTER-MEASURES (SPCC) PLAN

Title 40 of the Code of Federal Regulations (CFR), Part 112, defines the Environmental Protection Agency's (EPA) *Oil Pollution Prevention Plan*. The purpose of the rule is to prevent the discharge of oil into the navigable waters of the United States or adjoining shorelines as opposed to response and cleanup after a spill occurs. The EPA revised these prevention rules on July 17, 2002, to establish the SPCC Plan to meet the purpose of this rule. The EPA has recently approved a final rule to extend compliance dates for SPCC Plans to July 1, 2009.

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

1) it must be non-transportation related,

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

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

By definition within the rule, an airport is considered a non-transportation-related facility. In using this wording, the EPA is trying to distinguish between oil delivery vehicles using public roadways from those facilities that store or handle oil products. The airport has 20,000 gallons of above-ground fuel storage and 36,000 gallons of below-ground fuel storage, exceeding the minimums for above-ground storage capacities. Finally, there are a number of existing washes and ditches on the airport that lead to navigable waters of the United States. Therefore, the airport meets all three criterion.

The airport does have a SPCC Plan in place to address issues related to the discharge of oils. As stated earlier, the SPCC has extended the compliance deadline to July 1, 2009 for owners and operators of facilities to prepare or amend and implement their SPCC Plan.

AVIATION ACTIVITY

Records of airport operational activity are essential for determining required facilities (types and sizes), as well as eligibility for federal funding. Airport staff and the FAA record key operational statistics including aircraft operations and enplaned passengers. Analysis of historical activity levels aid in determining trends which will enhance the airport's ability to meet facility demands in a timely manner. The following sections detail specific operational activities.

AIRCRAFT OPERATIONS

Aircraft operational statistics at Lake Havasu City Municipal Airport are reported annually on the FAA Form 5010 Airport Master Record. This information is generally estimated by the airport due to the lack of an airport traffic control tower (ATCT). An aircraft operation is defined as either a takeoff or a landing. **Table 1D** presents a summary of operations since 1998. The number of total operations has remained relatively constant during this time period.

TABLE 1D
Historical Aircraft Operations
Lake Havasu City Municipal Airport

Year	Total Operations
1998	55,344
1999	50,270
2000	49,600
2001	49,853
2002	49,733
2003	51,996
2004	53,892
2005	51,078
2006	50,956

Source: 1998-1999 - FAA Terminal Area Forecast
2000-2004 - Cost Recovery Analysis Study
2005-2006 - Airport 5010 Master Record

PASSENGER ENPLANEMENTS

Passenger enplanements are collected and analyzed by recording the number of passengers who depart (enplane) commercial service aircraft. Passenger enplanement records are utilized to determine terminal building space capacities, automobile parking requirements, automobile access capacities, etc. Also, the FAA provides annual entitlement funds based upon the level of enplanements reached at the airport. Passenger levels on each flight are recorded by the airlines and reported to the airport and the FAA on a monthly basis. **Table 1E** presents historical enplanement levels at Lake Havasu City Municipal Airport since 1998.

As of May 6, 2007, Mesa Airlines operating under Air Midwest ceased operations at the airport. Prior to that time, they were providing two daily non-stop flights to Phoenix Sky Harbor International Airport on Monday through Friday and one daily non-stop flight to Phoenix Sky Harbor International Airport on Saturday and Sunday using Beech 1900 aircraft that are capable of carrying up to 19 passengers.

Although there is currently no commercial airline service at Lake Havasu City Municipal Airport, the City is actively seeking to regain commercial services in the future. This potential will be taken into consideration when preparing forecasts and facility requirements for the airport.

TABLE 1E
Annual Passenger Activity
Lake Havasu City Municipal Airport

Year	Passenger Enplanements
1998	9,633
1999	9,223
2000	8,266
2001	7,427
2002	7,317
2003	9,475
2004	10,761
2005	8,618
2006	6,085
2007*	1,626

Source: Airport records; *Commercial service operations ceased on May 6, 2007

FUEL SALES

D2 Aero General Aviation Services and Desert Skies Executive Air Terminal are the fixed base operators (FBOs) on the airfield that currently provide Avgas and Jet A fueling services. As shown in **Table 1F**, fuel sales decreased significantly from 2002 through 2004. In 2005, there was a dramatic increase in fuel sales. This can be attributed to the addition of a second FBO operating at the airport. Fuel sales through April 2007 indicate similar totals to what was experienced in 2005. Havasu Air Center, an FBO that has recently been constructed on the north side of the airport, also provides aircraft fueling services.

TABLE 1F
Historical Fuel Sales
Lake Havasu City Municipal Airport

Year	Fuel Sales (gallons)
2002	474,944
2003	377,467
2004	359,044
2005	526,245
2006	475,529
2007*	177,243

Source: Airport records; * January-April fuel sales

AIRPORT SYSTEM PLANNING ROLE

Airport planning exists on three primary levels: local, state, and national. Each level has a different emphasis and purpose. An Airport Master Plan is the primary local airport planning document. This Master Plan will provide a vision of both the airfield and landside facilities over the course of the next 20 years.

STATE PLANNING

At the state level, Lake Havasu City Municipal Airport is included in the *Arizona State Aviation System Plan* (SASP). The purpose of the SASP is to ensure that the state has an adequate and efficient system of airports to serve its aviation needs. The SASP defines the specific role of each airport in the state's aviation system and establishes funding needs. Through the state's continuous aviation system planning process, the SASP is updated every five years. According to records, the most recent update to the SASP was in 2000 when the *State Aviation Needs Study* (SANS) was prepared. The SANS provides policy guidelines that promote and maintain a safe aviation system in the state, assess the state's airports' capital improvement needs, and identify resources and strategies to implement the plan.

Lake Havasu City Municipal Airport is one of 112 airports included in the 2000 SANS, which includes all public and private airports and heliports in Arizona that are open to the public, including American Indian and recreational airports. The SANS classifies Lake Havasu City Municipal Airport as a commercial service airport.

NATIONAL PLANNING

At the national level, the airport is included in the FAA *National Plan of Integrated Airport Systems* (NPIAS). This plan includes a total of 3,431 existing airports that are significant to national air transportation and are, therefore, eligible to receive grants under the FAA AIP. 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 grant-in-aid assistance from the FAA.

The 2007-2011 NPIAS identifies $41.2 billion for airport development across the country. Of that total, approximately 74 percent is designated for the 517 commercial service airports identified. Lake Havasu City Municipal Airport is classified as a non-primary commercial service airport in the NPIAS. These airports have between 2,500 and 10,000 annual passenger enplanements and account for 22 percent of the nation's total active aircraft fleet.

AIRSIDE FACILITIES

Airport facilities can be functionally classified into two broad categories: airside and landside. The airside category includes those facilities which are needed for the safe and efficient movement of aircraft, such as runways, taxiways, lighting, and navigational aids. 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 on the ground. Existing airside facilities at Lake Havasu City Municipal Airport are identified on **Exhibit 1B**. **Table 1G** summarizes airside facility data.

TABLE 1G Airside Facility Data Lake Havasu City Municipal Airport	Runway 14-32
Runway Length (feet)	8,001
Runway Width (feet)	100
Runway Surface Material	Asphalt
Surface Treatment	None
Condition	Good
Runway Load Bearing Strength (pounds):	
Single Wheel Loading (SWL)	100,000
Runway Lighting	MIRL
Runway Marking	Non-precision
Taxiway Lighting	MITL on Taxiway A and entrance/exit taxiways
Taxiway Marking	Centerline striping and hold positions
Visual Approach Aids:	
Approach Slope Indicators	PAPI-4
Approach Lighting	REILs
Instrument Approach Aids	VOR/DME or GPS-A
Visual Aids	Segmented Circle, Lighted Wind Cones, Rotating Beacon
Weather or Navigational Aids	AWOS-III

MIRL - Medium Intensity Runway Lights
MITL - Medium Intensity Taxiway Lights
PAPI - Precision Approach Path Indicator
REIL - Runway End Identifier Lights
GPS - Global Positioning System
VOR/DME - Very High Frequency Omnidirectional Range / Distance Measuring Equipment
AWOS - Automated Weather Observation System

Source: Airport Facility Directory - Southwest U.S. (July 2007); FAA Form 5010-1, Airport Master Record

RUNWAY

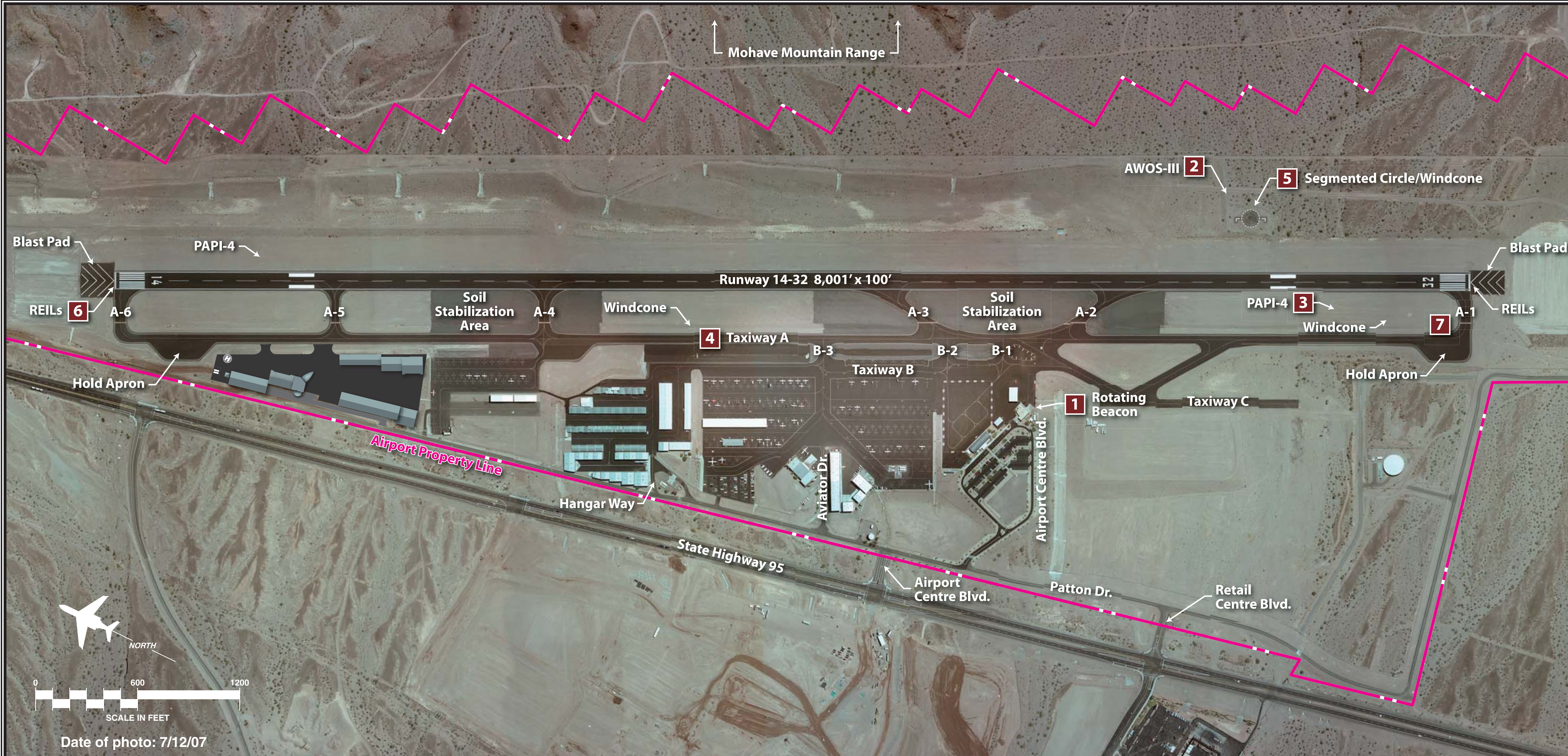
Lake Havasu City Municipal Airport is served by a single runway orientated in a northwest/southeast manner. Runway 14-32 is 8,001 feet long by 100 feet wide and is in "good" condition. Runway 14-32 has been strength-rated at 100,000 pounds single wheel loading (SWL). SWL refers to the design of aircraft landing gear which has one wheel on each landing gear strut. This weight-bearing strength is adequate to generally accommodate all aircraft in the general aviation fleet today.

TAXIWAYS

The taxiway system at Lake Havasu City Municipal Airport includes a full-length parallel taxiway. Taxiway A serves as the parallel taxiway for Runway 14-32 and is located 340 feet west of the runway centerline. A large hold apron is located at the north and south ends of Taxiway A which allow pilots to perform preflight checks and/or bypass other aircraft which are ready for departure.

There are six entrance/exit taxiways on the west side of Runway 14-32 designated as A-1, A-2, A-3, A-4, A-5, and

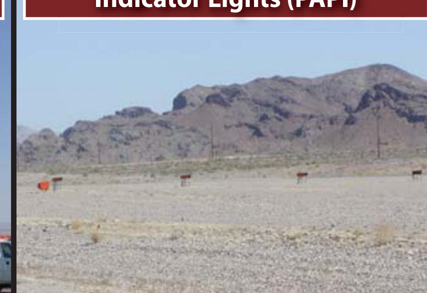
05MP08-1B-9/27/07



1. Rotating Beacon

2. Automated Weather Observation System (AWOS)

3. Precision Approach Path Indicator Lights (PAPI)



4. Taxiway A

5. Segmented Circle/Windcone

6. Runway End Identification Lights (REIL)

7. Taxiway Lighting, Markings, and Signage

Exhibit 1B
EXISTING AIRSIDE FACILITIES

A-6 as one moves from south to north. Taxiways A-2 and A-3 provide high-speed exits from the runway. Taxiway A-2 is located approximately 2,100 feet from the Runway 32 threshold and Taxiway A-3 is located approximately 4,500 feet from the Runway 14 threshold. High-speed taxiways are angled to allow aircraft to exit the runway at a higher rate of speed than if the taxiway were at a right angle. This configuration increases the overall capacity of the airfield and improves aircraft movement efficiency.

Further to the west are taxiways that provide access to aircraft parking areas. Taxiway B is located approximately 200 feet west of Taxiway A. Taxiways B-1, B-2, and B-3 connect Taxiways A and B. Located to the south of the main terminal area, Taxiway C provides access to vacant property that will be utilized for future aviation development. All active taxiways with their associated dimensions are listed in **Table 1H**. There are several taxilanes that serve more remote areas of the airfield such as individual hangars and T-hangar complexes.

TABLE 1H
FAA Designated Taxiways
Lake Havasu City Municipal Airport

Taxiway	Length (feet)	Width (feet)
A	8,001	50
A-1	250	65
A-2	500	50
A-3	500	50
A-4	250	65
A-5	250	50
A-6	250	65
B	1,500	35-70
B-1	150	65
B-2	150	65
B-3	150	65
C	1,500	50-65

Source: Airport records

PAVEMENT MARKINGS

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. Runway 14-32 has non-precision markings to include the runway designations, centerline, edges, touchdown point, and landing thresholds.

Taxiway and taxilane centerline markings are provided to assist pilots in maintaining proper clearance from pavement edges and objects near the taxiway/taxilane edges. Taxiway markings also include aircraft holding positions located on the connecting taxiways. Aircraft movement areas on the apron are also identified with centerline markings. Aircraft tiedown positions are identified on various apron surfaces, and pavement edge markings are present on Taxiway A and certain portions of Taxiway B.

RUNWAY BLAST PAD

The blast pad is a surface adjacent to the ends of the runway provided to reduce the erosive effect of jet blast and propeller wash. Runway 14 is equipped with a 200-foot long by 200-foot wide blast pad and Runway 32 is equipped with a 200-foot long by 140-foot wide blast pad.

AIRFIELD LIGHTING

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

Identification Lighting

The location of the airport at night is universally identified by a rotating beacon. The rotating beacon projects two beams of light, one white and one green, 180 degrees apart. The rotating beacon at Lake Havasu City Municipal Airport is located directly south of the terminal apron area adjacent to the fire station.

Runway/Taxiway Lighting and Signage

Runway and taxiway edge lighting utilizes light fixtures placed near the edge of the pavement to define the lateral limits of the pavement. This lighting is essential for safe operations during night and/or times of low visibility in order to maintain safe and efficient access to and from the runway and aircraft parking areas.

Runway 14-32 is equipped with medium intensity runway lights (MIRL). These lights are set atop a pole that is approximately one foot above the ground. The light poles are frangible, meaning if one is struck by an object, such as an aircraft wheel, they can easily break away, thus limiting the potential damage to an aircraft.

Each runway end is equipped with threshold lighting. Threshold lighting consists of specially designed light fixtures that are red on the departure side and green on the arrival side.

Medium intensity taxiway lighting (MITL) is taxiway lights which are mounted on the same type of structure as the runway lights. MITL is currently available on Taxiway A and the entrance/exit taxiways leading to Runway 14-32.

The airport also has a runway/taxiway signage system. The presence of runway/taxiway signage is an essential component of a surface movement guidance control system necessary for the safe and efficient operation of the airport. The signage system installed at Lake Havasu City Municipal Airport, which is lighted, includes runway and taxiway designations, holding positions, routing/directional, runway exits, and noise abatement procedures. It should be noted that the airport is planning to have its runway and taxiway signage upgraded in 2008.

Visual Approach Lighting

On the left side of Runway 14 and Runway 32 is a four-box precision approach path indicator (PAPI-4L). The PAPI consists of a system of lights located approximately 800 feet from the Runway 14-32 thresholds at Lake Havasu City Municipal Airport. When interpreted by pilots, these lights give an indication of being above, below, or on the designated descent path to the runway. A PAPI system has a range of five miles during the day and up to 20 miles at night.

Runway End Identification Lights

Runway end identification lights (REILs) provide rapid and positive identification of the approach ends of a runway. A REIL consists of two synchronized flashing lights, located laterally on each side of the runway end, facing the approaching aircraft. A REIL system has been installed on both ends of Runway 14-32. There are no sophisticated approach lighting systems prior to the runways.

Pilot-Controlled Lighting

At nighttime, runway and taxiway lighting can be controlled through a pilot-controlled lighting system. This allows pilots to increase or decrease the intensity of the airfield lighting system from the aircraft, with use of the aircraft's radio transmitter. Pilots utilizing the Lake Havasu City Municipal Airport can tune their radio to the common traffic advisory frequency (CTAF) 122.7 MHz to utilize the pilot-controlled lighting system.

WEATHER AND COMMUNICATION AIDS

Lake Havasu City Municipal Airport has three wind cones, one inside the segmented circle and the other two located closer to each of the runway ends. Two of the three wind cones are lighted, including the one inside the segmented circle. The wind cones provide information to pilots regarding wind conditions, such as direction and speed. The segmented circle provides traffic pattern information to pilots. Having three wind cones spread out along the runway system is advantageous because wind indications can be determined from anywhere along the runway.

The airport is equipped with an Automated Weather Observation System III (AWOS-III). An AWOS automatically records weather conditions such as wind speed, wind gusts, wind direction, temperature, dew point, altimeter setting, and density altitude. In addition, the AWOS-III will record visibility, precipitation, and cloud height. This information is then transmitted at regular intervals on radio frequency 119.025 MHz. In addition, the same information is available through a dial-in telephone number (928-764-2317). The AWOS is located approximately 500 feet east of Runway 14-32 adjacent to the segmented circle and wind cone.

Lake Havasu City Municipal Airport also utilizes a CTAF, which was briefly discussed in the previous section. This radio frequency (122.7 MHz) is used by pilots in the vicinity of the airport to communicate with each other about approaches to, or departures from, the airport. In addition, a UNICOM frequency, which shares the same frequency as the CTAF, is also available where a pilot can obtain fixed base operator (FBO) information.

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. The types of electronic navigational aids available for aircraft flying to or from Lake Havasu City Municipal Airport include a very high frequency omnidirectional range (VOR) facility, global positioning system (GPS), and Loran-C.

The VOR, in general, provides azimuth readings to pilots of properly equipped aircraft transmitting a radio signal at every degree to provide 360 individual navigational courses. Frequently, distance measuring equipment (DME) is combined with a VOR facility (VOR/DME) to provide distance as well as directional information to the pilot. Military tactical air navigation aids (TACANs) and civil VORs are commonly combined to form a VORTAC. The VORTAC provides distance and direction information to both civil and military pilots. The Needles VORTAC is located approximately 13 nautical miles (nm) northwest of the airport and the Parker VORTAC is located approximately 32 nm to the southwest of the airport.

GPS is an additional navigational aid for pilots. GPS was initially developed by the United States Department of Defense for military navigation around the world. GPS differs from a VOR in that pilots are not required to navigate using a specific ground-based facility. GPS uses satellites placed in orbit around the earth to transmit electronic radio signals, which pilots of properly equipped aircraft use to determine altitude, speed, and other navigational information. With GPS, pilots can directly navigate to any airport in the country and are not required to navigate using a specific ground-based navigational facility.

The civilian GPS has been improved with the wide area augmentation system (WAAS), which was launched on July 10, 2003. The WAAS uses a system of reference stations to correct signals from the GPS satellites for improved navigation and approach capabilities. The present GPS provides for enroute navigation and instrument approaches with both course and vertical navigation. The WAAS upgrades are expected to allow for the development of approaches at most airports with cloud ceilings as low as 250 feet above the ground and visibilities as low as three-quarters-of-a-mile, after 2015.

Loran-C is another point-to-point navigation system available to pilots. Where GPS utilizes satellite-based transmitters, Loran-C uses a system of ground-based transmitters.

Another type of navigational aid includes a nondirectional beacon (NDB). The NDB transmits nondirectional radio signals whereby the pilot of an aircraft equipped with direction-finding equipment can determine their bearing to or from the NDB facility in order to track to the beacon station. There are no NDBs at or in the vicinity of Lake Havasu City Municipal Airport.

INSTRUMENT APPROACH PROCEDURES

Instrument approach procedures are a series of predetermined maneuvers established by the FAA, using electronic navigational aids to assist pilots in locating and landing at an airport during low visibility and/or cloud ceiling conditions. The capability of an instrument approach is defined by the visibility and cloud ceiling minimums associated with the approach. Visibility minimums define the horizontal distance that the pilot must be able to see to complete the approach. Cloud ceilings define the lowest level a cloud layer (defined in feet above ground level) can be situated for a pilot to complete the approach. If the observed visibility or cloud ceiling is below the minimums prescribed for the approach, the pilot cannot complete the instrument approach.

One instrument approach has been approved for Lake Havasu City Municipal Airport. The details for the VOR/DME or GPS-A approach is presented in **Table 1J**.

TABLE 1J
Instrument Approach Data
Lake Havasu City Municipal Airport

	Weather Minimums by Aircraft Type					
	Category A		Category B		Categories C and D	
	Cloud Height (feet AGL)	Visibility (miles)	Cloud Height (feet AGL)	Visibility (miles)	Cloud Height (feet AGL)	Visibility (miles)
VOR/DME or GPS-A						
Straight-In	N/A					
Circling	1,017	1.25	1,017	1.5	1,017	3

Aircraft categories are established based on 1.3 times the stall speed in landing configuration as follows:
Category A: 0-90 knots
Category B: 91-120 knots
Categories C and D: 121-166 knots
AGL – Above Ground Level

Source: U.S. Terminal Procedures, Southwest SW-4 (July 2007)

There is no straight-in instrument approach approved for the airport at this time. The VOR/DME or GPS-A approach is considered a circling approach only, which allows pilots to approach the airport and then land on the runway most closely aligned with the current winds.

The airport has approved circling approaches for aircraft with approach speeds up to and including 166 knots. This means that the airport has a design capacity for some larger aircraft, such as the family of Gulfstream business jets.

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, fixed base operators (FBOs), aircraft storage hangars, aircraft maintenance hangars, aircraft parking aprons, and support facilities such as fuel storage, automobile parking, utilities, and aircraft rescue and firefighting. Landside facilities at Lake Havasu City Municipal Airport are identified on **Exhibit 1C**.

PASSENGER TERMINAL BUILDING

The passenger terminal building at Lake Havasu City Municipal Airport was built in 1991 and totals approximately 5,700 square feet. Located west of Runway 14-32 near midfield, the terminal building houses airport administration, Hertz Car Rentals, Avis Car Rentals, waiting areas for passengers, a vending area, and restrooms.

The terminal building also has areas set aside for commercial airline operations which include an office for airline management, airline ticketing, baggage claim, a screening area for commercial passengers, and a security checkpoint area for the Transportation Security Administration (TSA). These areas are currently vacant as no airline is providing commercial service to and from the airport. The terminal building layout is depicted on **Exhibit 1D**.

The passenger terminal building and parking lot are accessible via Airport Centre Boulevard to the west. The terminal access roadway provides a one-way traffic lane to the terminal building, parking lots, and City Fire Station #6.

TERMINAL APRON

The terminal ramp apron is located directly to the east of the terminal building and encompasses approximately 11,000 square yards. This space is designated for commercial aircraft to park, deplane, and board passengers. There are currently two marked parking areas for commercial aircraft.

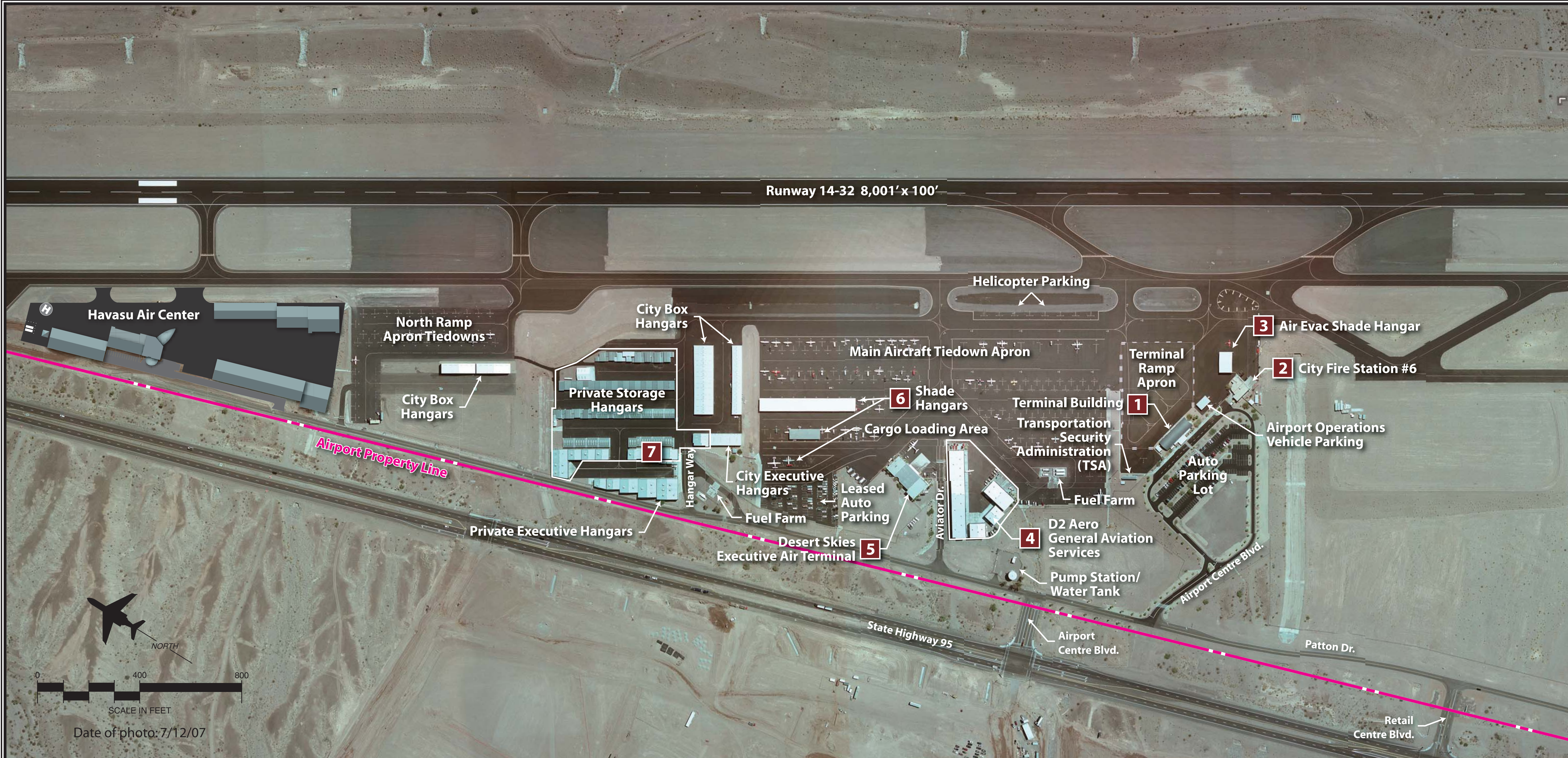
TERMINAL AUTOMOBILE PARKING

Lake Havasu City Municipal Airport has three designated parking areas for automobiles near the passenger terminal building. The paved parking lot closest to the terminal building is dedicated for 24-hour parking and includes 65 marked automobile parking spaces plus four handicap positions. There are also 20 marked rental car parking spaces in this area, with ten belonging to Avis Car Rentals and ten belonging to Hertz Car Rentals.

A second paved parking lot is located further west and includes an additional 82 marked automobile positions. This parking lot is considered for 72-hour parking as indicated by signage.

Still further to the west is a third automobile parking area that is unpaved. This area has no marked automobile parking spaces and is considered for overflow parking only. In total, there are approximately 170

05MP08-1C-10/5/07



1. Terminal Building

2. City Fire Station #6

3. Air Evac

4. D2 Aero General Aviation Services

5. Desert Skies Executive Air Terminal

6. City Shade Hangars

7. Private Storage Hangars

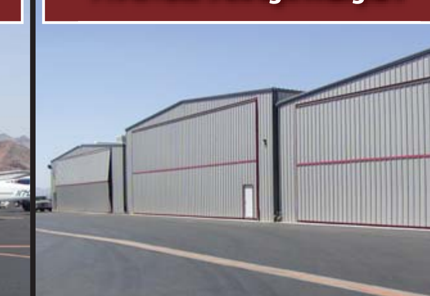


Exhibit 1C
EXISTING LANDSIDE FACILITIES

05MP08-1D-10/22/07

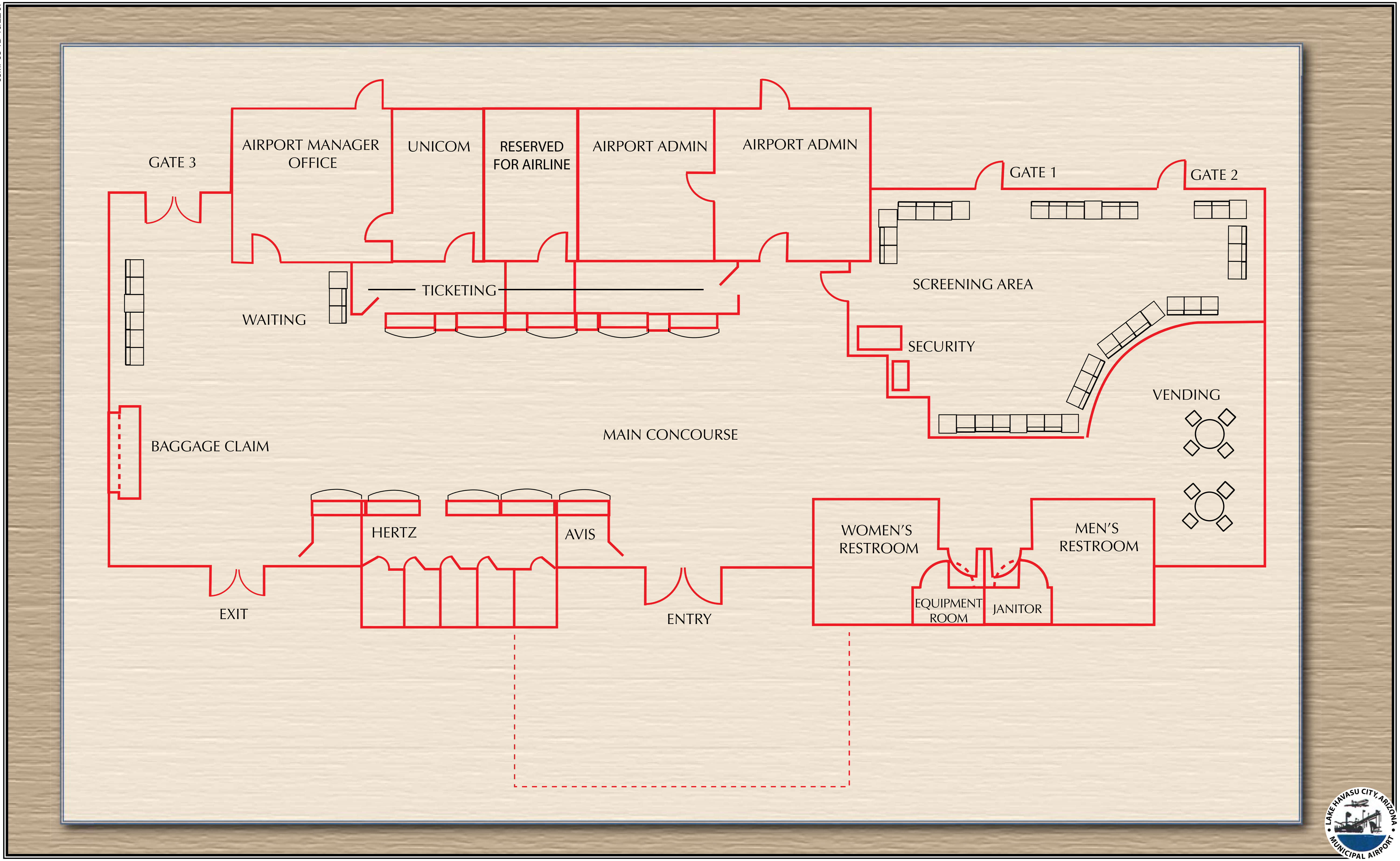


Exhibit 1D
TERMINAL BUILDING LAYOUT

marked automobile spaces to the west of the airport terminal building, with four being handicap accessible.

GENERAL AVIATION SERVICES

Lake Havasu City Municipal Airport currently has three full-service FBOs – D2 Aero General Aviation Services, Desert Skies Executive Air Terminal, and Havasu Air Center. The following is a list of services provided by each business.

D2 Aero General Aviation Services

- Aviation fuel (Avgas and Jet A)
- Aircraft parking and tiedowns
- Pilot services
- Crew car
- Catering
- Full service maintenance facility
- Aircraft charter
- Aircraft detailing
- Hangar space
- Pilot supplies
- Flight instruction and aircraft rental
- Scenic bi-plane rides

D2 Aero General Aviation Services operates out of a 6,600 square-foot main hangar and also utilizes a 3,000 square-foot hangar. It employs seven people and provides full-service Jet A and Avgas from 6:30 a.m. to 6:30 p.m., seven days per week. Self-service Avgas is available 24 hours per day, seven days per week.

D2 Aero General Aviation Services currently has seven individual hangars on its lease parcel totaling approximately 33,300 square feet with an additional 6,000 square feet of office space. It leases some of its hangars and office space to private individuals/companies that perform various aviation-related services listed above. Businesses that sub-lease hangar/office space from D-2 Aero include Arizona Aircraft Maintenance, Wing Waxers, Wing West Aviation, Bi-Plane Rides, Havasu Sea Plane Adventure, and Edgewater Aviation.

Desert Skies Executive Air Terminal

- Aviation fuel (Avgas and Jet A)
- Aircraft parking and tiedowns
- Pilot services
- Flight instruction and aircraft rental
- Aircraft charter
- Aircraft parts
- Pilot supplies
- Oxygen service
- Catering

Desert Skies Executive Air Terminal operates out of a 5,600 square-foot hangar with additional office space. Eight people are currently employed and provide full service Avgas and Jet A fueling services between the hours of 6:00 a.m. and 6:00 p.m., seven days per week.

Desert Skies Executive Air Terminal currently owns several other hangars on the airport that it leases to private individuals/companies that perform aviation-related activities. Aviation-related businesses that sub-lease from Desert Skies include Cinema Aircraft Restorations, Aviation Support Services, and BH Aviation. In all, approximately 24,000 square feet of hangar space is owned by Desert Skies at the airport.

Havasu Air Center

- Aircraft fuel (Avgas and Jet A)
- Aircraft parking and tiedowns
- Hangar storage
- Catering
- Full service maintenance
- Pilot services
- Pilot supplies
- Aircraft charter
- Flight instruction and aircraft rental
- Aircraft brokerage

Havasu Air Center employs approximately eight people while operating out of an 11,200 square-foot hangar. Several additional executive-style hangars are being constructed in different phases, totaling approximately 100,000 square feet of hangar space.

GENERAL AVIATION HANGARS

General aviation hangars include shade hangars, Port-A-Port hangars, and box hangars. Shade hangars are tiedown spaces with a protective roof covering. Port-A-Port hangars provide for separate, single-aircraft storage areas. Box hangars provide a larger enclosed space that can accommodate larger multi-engine piston or turbine aircraft.

There are currently three shade hangar complexes at the airport. One is located on the south end of the terminal ramp apron and houses the AirEvac aircraft. The other two complexes are located further north. One complex contains 16 individual aircraft spaces and the other has seven marked aircraft spaces. In total, there are 24 shade hangar spaces at the airport providing approximately 27,200 square feet of aircraft storage.

There are 21 Port-A-Port hangar facilities on the airport, providing approximately 30,000 square feet of aircraft storage space. These hangars are located in the private aircraft storage area. 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 53 individual box hangars encompassing approximately 103,400 square feet of aircraft storage space at Lake Havasu City Municipal Airport. These hangars range in size from approximately 1,500 square feet to 6,000 square feet. The box hangars are located on the north side of the airport. The airport currently owns 26 of these hangars, with the remainder being privately owned.

GENERAL AVIATION APRONS

There are two separate general aviation aprons at Lake Havasu City Municipal Airport, encompassing a total of approximately 97,500 square yards and providing approximately 218 designated aircraft parking positions.

The main general aviation apron is located to the north of the terminal ramp apron in the midfield area of the airport. This apron area encompasses approximately 80,000 square yards and provides 169 aircraft parking positions. Included on the main general aviation apron are eight marked positions designated for helicopter parking. This area is located on the southeast side of the apron and on the east side of Taxiway B. Currently, D2 Aero General Aviation Services and Desert Skies Executive Air Terminal each lease 26 tiedown spaces from the airport. The remainder of the tiedowns is for transient and permanent aircraft parking.

The north ramp apron is located north of the private storage hangar area. This apron area encompasses approximately 17,500 square yards and provides 49 marked aircraft parking positions.

CARGO AIRCRAFT APRON

There is an area located on the main general aviation apron that is used primarily as a cargo loading area. This area is located between the shade hangars and leased automobile parking. Approximately 3,500 square yards of apron space and seven marked aircraft positions encompass this area. Current cargo operators at the airport include Ameriflight and Empire Airlines, which fly under contract with Federal Express, UPS, and DHL. They utilize a variety of aircraft including the Cessna Caravan, Beechcraft King Air, Piper Chieftan, Fairchild Metroliner, and Fairchild Merlin.

GENERAL AVIATION AUTOMOBILE PARKING

There are several parking lots available for vehicle parking at Lake Havasu City Municipal Airport. As previously mentioned, the airport terminal building provides for a large majority of the automobile parking on the airport.

The two major FBOs located on the airport, D2 Aero General Aviation Services and Desert Skies Executive Air Terminal, also have designated parking spaces. D2 Aero has approximately ten marked parking spaces plus some additional unmarked parking in certain areas adjacent to its facility. Desert Skies has 16 total parking spaces, one of which is reserved for handicap access. Another aviation-related business on the airport that provides parking for their employees and customers includes Arizona Aircraft Maintenance, with five marked parking spaces.

North of the FBOs is an area that encompasses approximately 4,500 square yards that is dedicated for leased automobile parking. There are 128 total parking spaces available. A controlled access gate located adjacent to Patton Drive leads to this area. There are approximately 160 total marked automobile parking spaces located in these areas. Lake Havasu City Municipal Airport has a total of approximately 330 automobile parking spaces that serve a variety of aviation-related activities when taking into account terminal building parking, general aviation parking, and leased automobile parking areas.

FUEL FACILITIES

There are two fuel farms located on the airport that currently store aviation fuel. D2 Aero General Aviation

Services owns and operates a fuel farm that consists two above-ground fuel storage tanks located approximately 200 feet south of its facility. One 10,000-gallon capacity tank is dedicated for the storage of Avgas, and one 10,000-gallon capacity tank is dedicated for Jet A fuel. Fuel is delivered to aircraft via two refueling trucks. These consist of one Avgas fuel truck that stores 1,500 gallons of fuel and one Jet A fuel truck that has a storage capacity of 2,200 gallons. Self-service Avgas fueling capability is also offered by D2 Aero. This facility consists of a fuel dispenser that is connected to the Avgas fuel storage tank and a credit card reader.

Desert Skies Executive Air Terminal also operates a fuel storage area on the airport. It leases the fuel farm from the Lake Havasu City Municipal Airport. The fuel farm consists of three underground fuel storage tanks. Two 12,000-gallon capacity tanks are dedicated for Avgas storage, and one 12,000-gallon capacity tank is used for Jet A fuel storage. Desert Skies has four fuel trucks that deliver fuel to aircraft. Avgas is delivered via an 1,100-gallon and a 1,200-gallon capacity fuel truck, while Jet A fuel is delivered by a 1,700-gallon and a 2,200-gallon capacity truck.

SUPPORT FACILITIES

Several support facilities serve as critical links in providing the necessary efficiency to aircraft ground operations such as the aircraft rescue and firefighting (ARFF) capabilities, airport maintenance, and perimeter fencing.

Part 139 Certification

Title 14, Code of Federal Regulations (CFR), Part 139 prescribes rules governing the certification and operation of land airports that serve any scheduled or unscheduled passenger operation of an air carrier that is conducted with an aircraft having a seating capacity of more than nine passengers.

Under this certification process, airports are reclassified into four new classes, based on the type of air carrier operations served. The classes include:

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

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

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

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

Although the airport currently does not have scheduled operations by air carrier aircraft, it is actively pursuing commercial airline service. As a result, the airport is maintaining its Part 139 certification.

Aircraft Rescue Fire and Firefighting Facilities (ARFF)

Part 139 airports are required to provide aircraft rescue and firefighting (ARFF) services during air carrier operations that require a Part 139 certificate. Each certified airport maintains equipment and personnel based on an ARFF index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, designated as A through E, with A applicable to the smallest aircraft and E to the largest (based on wingspan). Lake Havasu City Municipal Airport is categorized within ARFF Index A. As such, the airport is required to maintain equipment and properly trained personnel consistent with this standard.

The Lake Havasu City Municipal Airport ARFF facility is located to the south of the airport terminal building. Designated as City Fire Station #6, the facility has approximately 4,400 square feet and includes an office area, living quarters, and an equipment storage area. A primary ARFF vehicle and a fire engine are kept at the facility. The ARFF vehicle is a 1999 Emergency One Titan and has 1,640 gallons of storage capacity and is capable of carrying 223 gallons of AFFF foam and 500 pounds of Purple K dry chemical. A 750-gallon capacity fire engine is also stationed at the facility.

ARFF equipment at the airport meets Index B level ARFF capability; however, the airport operates under Index A requirements. There are 12 ARFF-certified personnel working for the Lake Havasu City Fire Department.

Snow and Ice Control Plan

Due to weather conditions and patterns at Lake Havasu City Municipal Airport, snow and ice control is not required for its Part 139 certification.

Maintenance Facilities

The Lake Havasu City Municipal Airport does not have a dedicated maintenance facility on the airport. Maintenance equipment is stored inside a hangar and at various outside locations.

Security Fencing / Gates

Lake Havasu City Municipal Airport operations areas (AOAs) are completely enclosed by an eight-foot chain link fence topped by three-strand barbed wire. The fence does not always follow the airport boundary due to the layout of physical features and actual boundary lines.

There are currently five controlled access gates located at the airport. The locations include one south of the airport terminal building, one at Aviator Drive, one at the entrance of the lease automobile parking area, one at Hangar Way, and one at the north end of the airport leading to the north ramp apron tiedown area.

UTILITIES

The availability and capacity of the utilities serving the airport are factors in determining the development potential of the airport, as well as the land immediately adjacent to the facility. Utility availability is a critical element when considering future expansion capabilities of an airport, both airside and landside components.

The airport is supplied by electricity, water, and sanitary sewer. Electric service is provided by Unisource. Lake Havasu City provides water, sanitary sewer, and stormwater services. Telephone and communications services are provided by Frontier. There is currently no natural gas service to the airport.

PAVEMENT MANAGEMENT PROGRAM

The Arizona Department of Transportation – Aeronautics Division (ADOT) has implemented the Arizona Pavement Preservation Program (APPP) to assist in the preservation of the Arizona airport system infrastructure. Public Law 103-305 requires that airports requesting Federal Airport Improvement Program (AIP) funding for pavement rehabilitation or reconstruction have an effective pavement maintenance management system. To this end, ADOT has completed and is maintaining an Airport Pavement Management System (APMS) which, coupled with monthly pavement evaluations by the airport sponsor, fulfills this requirement.

The 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 condition in accordance with the most recent FAA Advisory Circular 150/5380-6 and range from 0 (failed) to 100 (excellent). Every three years a complete database update, with new visual observations, is conducted. Individual airport reports from the update are shared with all participating system airports. ADOT ensures that the APMS database is kept current, in compliance with FAA requirements.

Every year ADOT, 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 to participate in the APPP.

Lake Havasu City Municipal Airport participates in the State's pavement maintenance program for AIP eligible pavement rehabilitation projects. On a daily basis, airport personnel complete an operations log for the airport, a portion of which includes visual observations of the pavement conditions. Lake Havasu City will perform routine pavement maintenance such as crack sealing and repair on an as-needed basis.

AREA AIRSPACE AND AIR TRAFFIC CONTROL

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

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 for categories of airspace, controlled and uncontrolled, and identifies them as Classes A, B, C, D, E, and G as described below. **Exhibit 1E** generally illustrates each airspace type in three-dimensional form.

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

- Class B airspace is controlled airspace surrounding high-activity commercial service airports (i.e., Phoenix Sky Harbor International Airport). Class B airspace is designed to regulate the flow of uncontrolled traffic, above, around, and below the arrival and departure airspace required for high performance, passenger-carrying aircraft at major airports. In order to fly within Class B airspace, an aircraft must be equipped with special radio and navigation equipment and must obtain clearance from air traffic control. A pilot is required to have at least a private pilot's certificate or be a student pilot who has met the requirements of F.A.R. Part 61.95, which requires special ground and flight training for the Class B airspace. Aircraft are also required to utilize a Mode C transponder within a 30 nm range of the center of the Class B airspace. A Mode C transponder allows the ATCT to track the location and altitude of the aircraft.

- Class C airspace is controlled airspace surrounding lower-activity commercial service (i.e., Tucson International Airport) and some military airports. The FAA has established Class C airspace at 120 airports around the country, as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at major airports. To operate inside Class C airspace, the aircraft must be equipped with a two-way radio, an encoding transponder, and the pilot must have established communication with ATC.

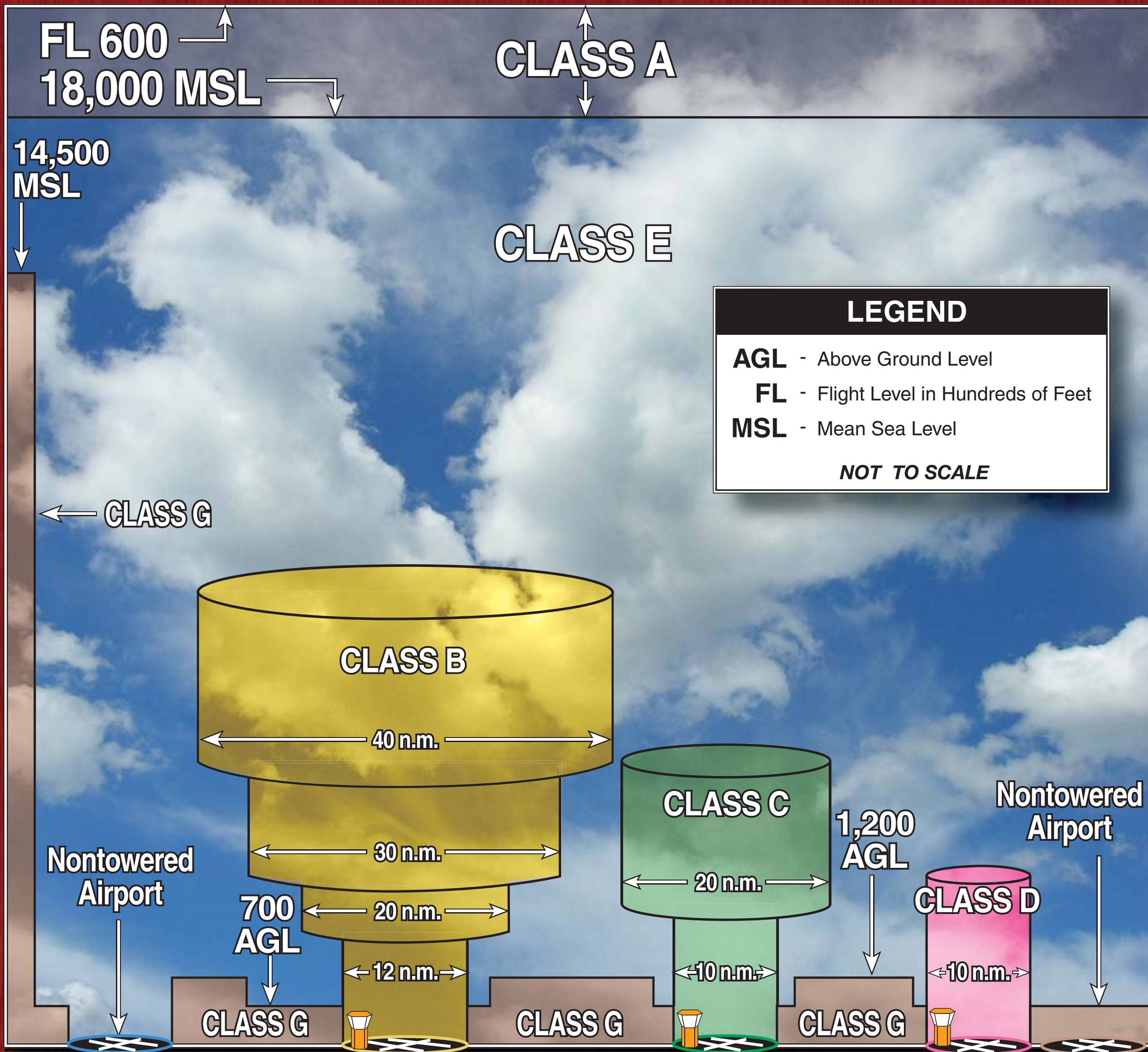
- Class D airspace is controlled airspace surrounding most airports with an operating ATCT and not classified under B or C airspace designations. The Class D airspace typically constitutes a cylinder with a horizontal radius of four or five nm from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. If an airport has an instrument approach or departure, the Class D airspace sometimes extends along the approach or departure path.

All aircraft operating within Classes A, B, C, and D airspace must be in constant contact with the air traffic control facility responsible for that particular airspace sector.

- Class E airspace is controlled airspace surrounding an airport that encompasses all instrument approach procedures and low-altitude federal airways. Only aircraft conducting instrument flights are required to be in contact with the appropriate air traffic control facility when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio contact with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist.

- Class G airspace is uncontrolled airspace typically in overtop rural areas that does not require communication with an air traffic control facility. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet above ground level [AGL]). While aircraft may technically operate within this Class G airspace without any contact with ATC, it is unlikely that many aircraft will operate this low to the ground. Furthermore, F.A.R. Part 91.119, *Min-*

05MP08-1E-10/8/07



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

Source: "Airspace Reclassification and Charting Changes for VFR Products," National Oceanic and Atmospheric Administration, National Ocean Service. Chart adapted by Coffman Associates from AOPA Pilot, January 1993.

LAKE HAVASU CITY, ARIZONA • MUNICIPAL AIRPORT •

Exhibit 1E
AIRSPACE CLASSIFICATION

imum Safe Altitudes, specify minimum altitudes for flight.

Airspace within the vicinity of Lake Havasu City Municipal Airport is depicted on **Exhibit 1F**. The airport is located in Class G airspace, with Class E airspace directly to the south with a floor 700 feet above the surface extending to Class A airspace.

SPECIAL USE AIRSPACE

Special use airspace is defined as airspace where activities must be confined because of their nature or where limitations are imposed on aircraft not taking part in those activities. These areas are depicted on **Exhibit 1F**.

Victor Airways

Victor Airways are designated navigational routes extending between VOR facilities. Victor Airways have a floor of 1,200 feet AGL and extend upward to an altitude of 18,000 feet MSL. Victor Airways are eight nm wide.

As previously discussed, there are two VOR facilities within the airport's region. Although not labeled, V135 is located approximately 12 nm west of Lake Havasu City Municipal Airport.

Military Operations Areas (MOAs)

Lake Havasu City Municipal Airport is located inside the Turtle MOA. An MOA is an area of airspace designated for military training use. This is not restricted airspace; however, pilots who use this airspace should be on alert for the possibility of military traffic. A pilot may need to be aware that military aircraft can be found in high concentrations, conducting aerobatic maneuvers, and possibly operating at high speeds and/or at lower elevations. The activity status of an MOA is advertised by a Notice to Airmen (NOTAM) and noted on sectional charts. The Turtle MOA typically will have activity from 11,000 feet MSL to 18,000 feet MSL. It is published in use from 6:00 a.m. to 5:00 p.m. Monday through Friday.

Military Training Routes

A Military Training Route, or MTR, is a long, low-altitude corridor that serves as a flight path for military aircraft. The corridor is often ten miles wide, 70 to 100 miles long, and may range from 500 feet to 1,500 feet AGL and can be higher. There are several MTRs located in the vicinity of the airport, with the closest being approximately 12 nm to the northeast. General aviation pilots should be aware of the locations of the MTRs and exercise special caution if they need to cross them.

LOCAL OPERATING PROCEDURES

Lake Havasu City Municipal Airport is situated at 781 feet MSL. The traffic pattern at the airport is maintained to provide the safest and most efficient use of the airspace surrounding the airport. The airport utilizes a non-standard right-hand traffic pattern for

Runway 14 in order to keep a safe distance between aircraft and the Mohave Mountain Range directly to the east of the airport. A standard left-hand traffic pattern is used for Runway 32. The traffic pattern altitude for high performance aircraft, including jets, is 2,303 feet MSL. The traffic pattern altitude for smaller turbine and piston aircraft is 1,803 feet MSL.

Pilots operating in and out of Lake Havasu City Municipal Airport are encouraged to follow noise abatement procedures, which prohibit the straight-in and straight-out departure of aircraft. Aircraft should enter the traffic pattern using a 45-degree entry to downwind. The procedures are designed so that residential areas to the southwest of the airport can be avoided.

Obstructions

There are power lines, towers, and rising terrain to the north and northeast of the airport. A hill, located approximately 1,255 feet from Runway 32, is 255 feet right of the runway extended centerline. A 28:1 approach slope angle is required to clear the obstruction.

REGIONAL AIRPORTS

A review of public use airport facilities with at least one paved runway within a 50-nm radius of Lake Havasu City Municipal Airport was conducted to identify and distinguish the types of air service provided in the region, as indicated on **Exhibit 1F**. Information pertaining to each airport was obtained from FAA Form 5010, *Airport Master Record*. **Table 1K** identifies the major characteristics of each airport.

Chemehuevi Valley Airport (49X) is located approximately 4 nm southwest of Lake Havasu City Municipal Airport in Havasu Lake, California. It is a public use airport owned by the Chemehuevi Indian Tribe. The airport is served by one runway which is 5,000 feet long and rated in fair condition. Four aircraft are reported to be based at the airport. The airport reported 4,000 operations in 2004. The airport is unattended and provides only aircraft tiedowns. There are no published instrument approach procedures that serve the airport.

Needles Airport (EED), located approximately 18 nm northwest of Lake Havasu City Municipal Airport, is owned and operated by San Bernardino County, California. The airport is equipped with two runways, with the longest being 5,005 feet in length and rated in good condition. Approximately 24 aircraft are based at the airport. There were approximately 10,500 operations reported in 2006. One FBO on the field provides aviation services including full-service fueling and minor aircraft maintenance. There are two non-precision instrument approaches that serve the airport, with one being a circling approach.

05MP08-1F-10/8/07

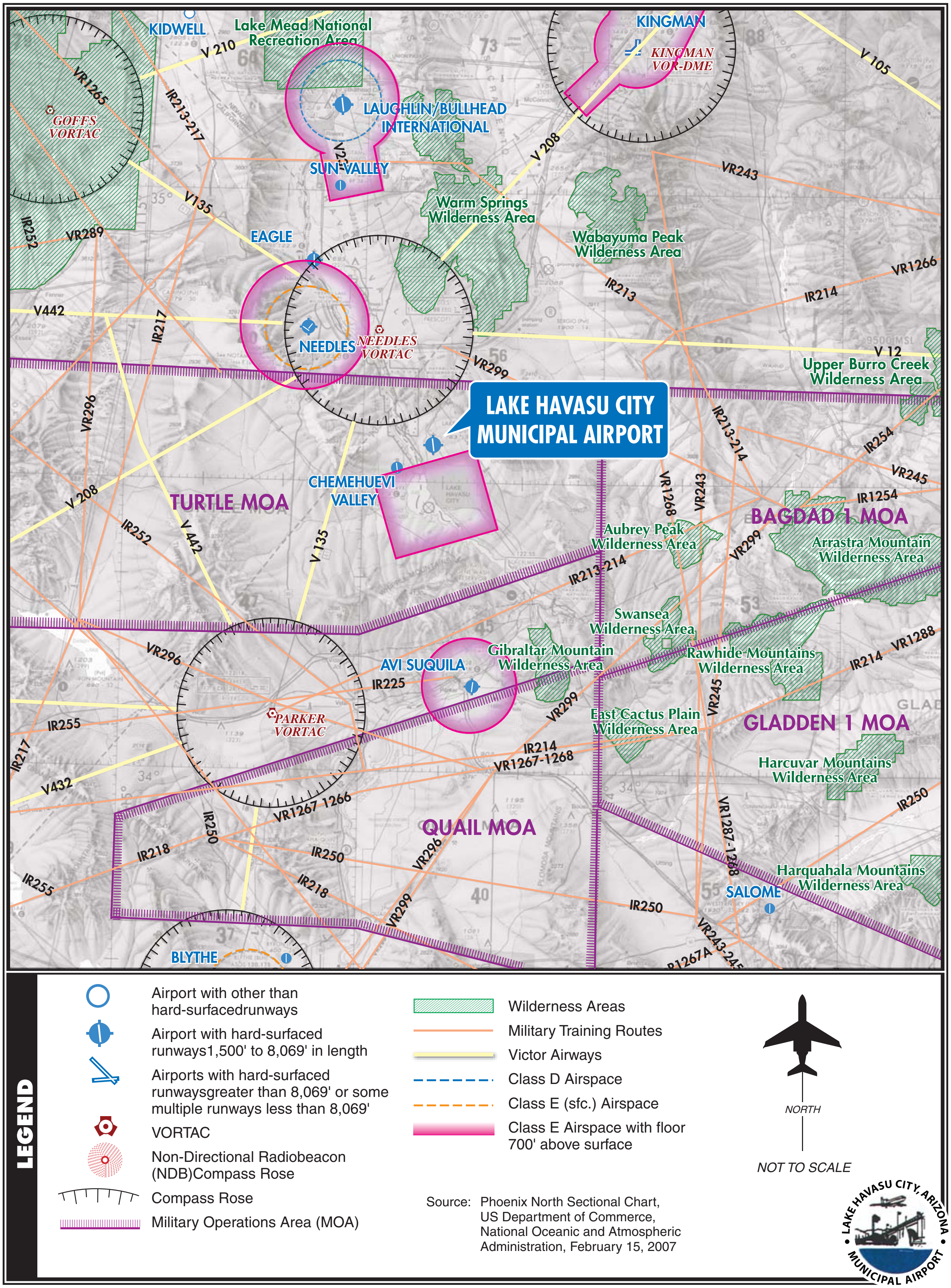


Exhibit 1F
AREA AIRSPACE

TABLE 1K
Regional Airport Data
Lake Havasu City Municipal Airport

Airport Name	FAA Classification	Distance (nm)	Longest Runway (feet)	Based Aircraft	Annual Operations
Chemehuevi Valley	General Aviation	4	5,000	4	4,000
Needles	General Aviation	18	5,005	24	10,500
Eagle Airpark	General Aviation	23	4,800	58	16,000
Avi Suquilla	General Aviation	26	4,780	42	10,200
Laughlin/Bullhead International	Commercial	37	7,520	63	27,126
Kingman	Commercial	46	6,827	273	61,305

Source: FAA Form 5010-1, Airport Master Record; FAA Air Traffic Activity System (ATADS)

Eagle Airpark (A09) is located approximately 23 nm northwest of Lake Havasu City Municipal Airport in Mohave Valley, AZ. It is a privately owned, public use airport served by one runway that is 4,800 feet long. Approximately 58 aircraft are reported on the airport, including four multi-engine aircraft and two jets. The airport reported approximately 16,000 operations in 2006. FBO services at the airport include Jet A and Avgas fuel, aircraft hangars, tiedowns, and aircraft maintenance. There are no published instrument approach procedures that serve the airport.

Avi Suquilla Airport (P20), located approximately 26 nm south of Lake Havasu City Municipal Airport in Parker, AZ, is a public use airport owned and operated by the Colorado River Indian Tribes. One runway that is 4,780 feet long serves the airport. Approximately 42 aircraft are considered to be based at the airport, including one multi-engine aircraft and one helicopter. The airport reported 10,200 aircraft operations in 2006. The local FBO provides Jet A and Avgas fuel, aircraft maintenance, and tiedowns to its customers. One circling non-precision approach serves the airport.

Laughlin/Bullhead International Airport (IFP) is located 37 nm north of Lake Havasu City Municipal Airport and is owned and operated by Mohave County. It has one runway which is 7,520 feet long and rated in good condition. A control tower is located on the field which reported approximately 27,126 aircraft operations in 2006. The airport reports 63 based aircraft, including two helicopters and three jets. One FBO is located on the field, providing a variety of aviation services, including full-service fuel, aircraft maintenance, oxygen service, a pilot's lounge, courtesy transportation, and catering. The airport is served by three non-precision instrument approaches. The airport also provides scheduled and unscheduled commercial service operations.

Kingman Airport (IGM), located approximately 46 nm northeast of Lake Havasu City Municipal Airport, is owned and operated by the City of Kingman. Two runways are provided at the airport, with the longest being 6,827 feet and rated in good condition. Approximately 273 aircraft are reported at the airport, including 95 multi-engine aircraft and 17 jets. There were 61,305 operations reported in 2005. FBO services are provided at the airport, including full-service fuel, aircraft parking and tiedowns, aircraft maintenance, avionics sales and services, aircraft modifications, and aircraft parts. There are three non-precision instrument approaches approved for use into the airport. Commercial service operations are also present at the airport.

AREA LAND USE AND ZONING

The area land use surrounding Lake Havasu City Municipal Airport can have a significant impact on airport operations and growth. The following sections identify baseline information related to both the existing and future land uses in the vicinity of Lake Havasu City Municipal Airport. By understanding the land use issues surrounding the airport, more appropriate recommendations can be made for the future of the airport.

EXISTING LAND USES

Lake Havasu City Municipal Airport is located within the corporate boundaries of Lake Havasu City. Existing land uses immediately surrounding the airport include mainly vacant land to the north and east. These areas are part of the Mohave Mountain Range and include uninhabitable land due to steep terrain and other physical features. There is a small parcel of Bureau of Land Management property north of the airport that is used for temporary RV camping. To the southeast of the airport is the Unisource Electrical Sub-Station. Approximately three-quarters-of-a-mile south of the airport is 40 acres of land utilized for an RV park. There is a large area of vacant land southwest of the airport that is currently State Trust Land. Land west of State Highway 95 is currently being utilized for commercial business development. The majority of developed property in this area is located a few miles to the south of the airport.

FUTURE LAND USES AND ZONING

Under ideal conditions, the development immediately surrounding the airport can be controlled and limited to compatible uses. Compatible uses would include light and heavy industrial development and some commercial development.

There are a number of methods by which governmental entities can ensure that land uses in and around airports are developed in a compatible manner. The objective of enforcing land use restrictions is to protect designated areas for the maintenance of operationally safe and obstruction-free airport activity.

Land use zoning is the most common land use control. Zoning is the exercise of the jurisdictional powers granted to state and local governments to designate permitted land uses on each parcel. Typically, zoning is developed through local ordinances and is often included in comprehensive plans. The primary advantage of zoning is that it can promote compatibility with the airport while leaving the land in private ownership. Zoning is subject to change; therefore, any potential alterations to the zoning code near the airport should be monitored closely for compatibility.

Title 14 of the Lake Havasu City Code of Ordinances establishes the Airfield Overlay District. This district is intended to protect the public health, safety, and general welfare of the area surrounding the airport by minimizing exposure to hazards generated by airport operations. Also, it is to further the development of compatible land uses around the airport. In addition to the restriction of the Airfield Overlay District, existing zoning surrounding the airport calls for general commercial to the west of the airport (west of State Highway 95) and industrial and heavy manufacturing to the south and southeast. This zoning is considered compatible with airport activity.

The future land uses in Lake Havasu City are shown on **Exhibit 1G**. Land to the north and east of the airport are shown as vacant in the future due to physical constraints associated with the Mohave Mountain Range. Areas to the southeast, south, and southwest are shown as employment centers that could support industrial and manufacturing activities. Finally, land to the west of State Highway 95 is designated for commercial land use, similar to the activities currently being implemented in this area.

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 zone, 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. Current Lake Havasu City ordinances adhere to and support the height restriction guidelines as set forth in 14 CFR, Part 77. Height restrictions can be accomplished through height and hazard zoning, avigation easements, or fee simple acquisition.

PUBLIC AIRPORT DISCLOSURE MAP

Arizona Revised Statutes (ARS) 28-8486, *Public Airport Disclosure*, provides for a public airport owner to publish a map depicting the "territory in the vicinity of the airport." The territory in the vicinity of the airport is defined as the traffic pattern airspace and the property that experiences 60 day-night noise level (DNL) or higher in counties with a population of more than 500,000, and 65 DNL or higher in counties with less than 500,000 residents. The DNL is calculated for a 20-year forecast condition. ARS 28-8486 provides for the State Real Estate Office to prepare a disclosure map in conjunction with the airport owner. The disclosure map is recorded with the county. As part of this Master Plan, a Public Airport Disclosure Map will be prepared.

SOCIOECONOMIC CHARACTERISTICS

Socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the study area. This information is essential in determining aviation demand level requirements, as most aviation demand can be directly related to the socioeconomic condition of the area. Statistical analysis of population, employment, and income trends define the economic strength of the region and the ability of the region to sustain a strong economic base over an extended period of time.

Whenever possible, local or regional data is used for analysis. Historical data was obtained from the Arizona Department of Economic Security, U.S. Census Bureau, Bureau of Labor Statistics, as well as pertinent internet sites including Lake Havasu City's website.

POPULATION

Population is one of the most important socioeconomic factors to consider when planning for future needs of an airport. Historical and forecast trends in population provide an indication of the potential of the region to sustain growth in aviation activity. Historical population data for Lake Havasu City, Mohave County, the State of Arizona, and the United States is shown in **Table 1L**.

TABLE 1L
Historical Population Statistics

	1990	2000	2005	2006	Average Annual Growth Rate
Lake Havasu City	24,363	41,045	53,204	55,338	5.26%
Mohave County	93,497	155,157	188,035	194,920	4.70%
State of Arizona	3,665,228	5,130,632	5,829,839	6,239,482	3.38%
United States	248,709,873	281,421,906	296,507,061	299,398,484	1.17%

Source: Arizona Department of Economic Security; U.S. Census Bureau

The table indicates that Lake Havasu City, Mohave County, and the State of Arizona have all grown at a greater rate than the national average over the past 16 years. Lake Havasu City has shown very strong growth during this time period, increasing at an average annual growth rate (AAGR) of

05MP08-1G-8/26/08

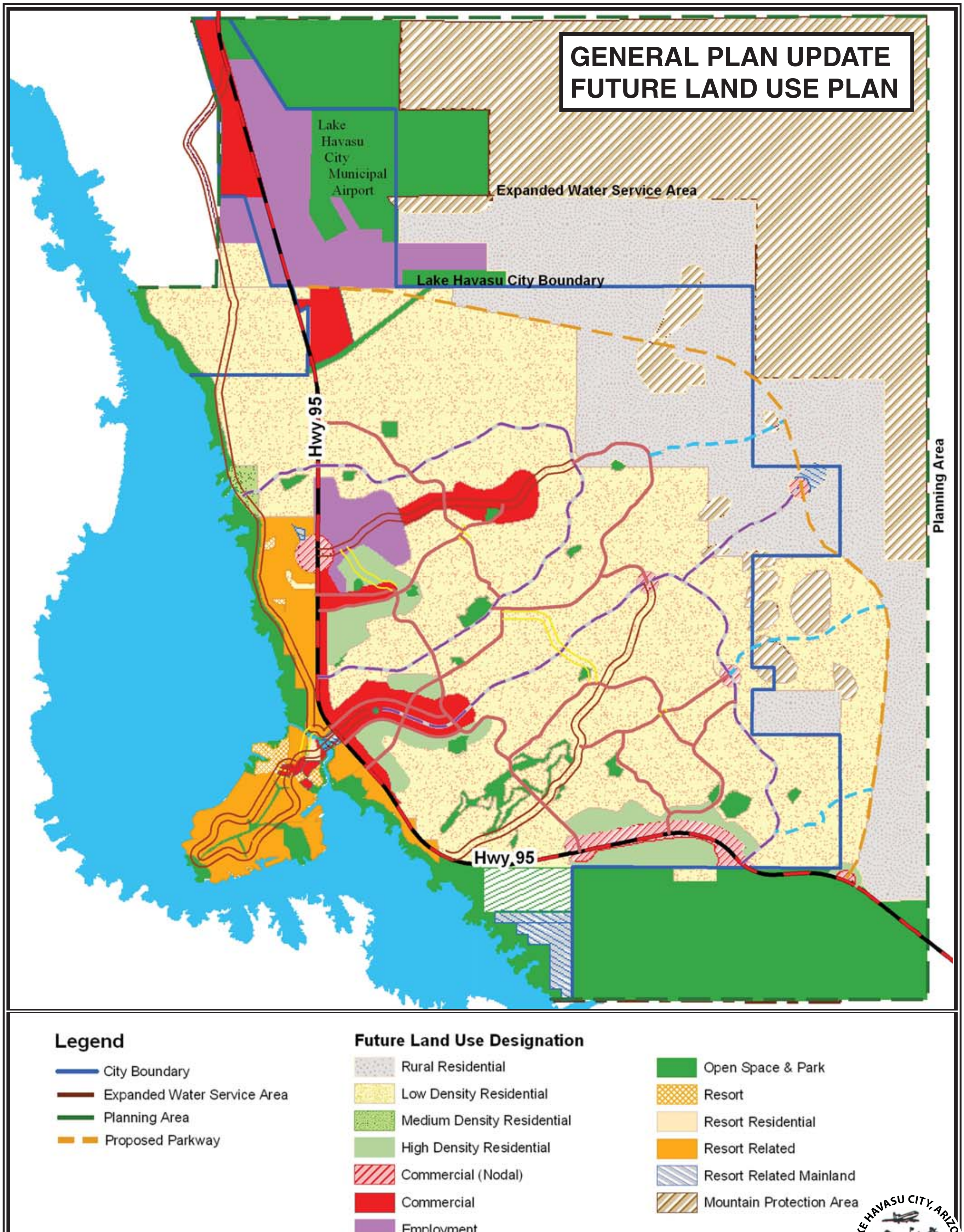


Exhibit 1G
FUTURE LAND USE

5.26 percent. This translates into the addition of approximately 31,000 new residents to the City over this time period. Mohave County, as a whole, has shown strong growth since 1990, with a 4.70 percent AAGR.

Since 1990, Arizona is regularly at the top of the list of states with the highest growth rates. It has shown strong growth rates over the period, at 3.38 percent annually.

The overall U.S. population grew at a 1.17 percent AAGR as a point of comparison. These positive growth trends have been attributed to the availability of affordable quality homes, excellent educational institutions, and enjoyable recreational amenities.

EMPLOYMENT

Analysis of a community's employment base can be valuable in determining the overall well-being of that community. In most cases, the community's makeup and health is significantly impacted by the availability of jobs, variety of employment opportunities, and types of wages provided by local employers. **Table 1M** provides historical employment characteristics from 1990 to 2006 in four analysis categories.

TABLE 1M
Historical Employment Statistics

	1990	2000	2005	2006	Average Annual Growth Rate
Lake Havasu City	12,149	17,928	22,902	24,375	4.45%
Mohave County	37,260	54,640	69,930	72,140	4.22%
State of Arizona	1,707,287	2,404,916	2,727,003	2,854,400	3.26%

Source: US Bureau of Labor Statistics; Lake Havasu City Chamber of Commerce

Total employment in the region has grown at a very strong rate similar to that of population over the past 15 years. Mohave County's employment base has grown 4.22 percent annually since 1990. Lake Havasu City has shown an even stronger AAGR, adding jobs at a rate of approximately 4.45 percent annually since 1990. Both the City and County have an AAGR that is greater than the State of Arizona. These statistics reveal a long-term, positive employment growth trend for the City, County, and State. These numbers are impressive given the national economic slowdown coupled with the impacts of 9/11.

The major employers in Lake Havasu City are presented in **Table 1N**. Understanding the types of employment opportunities will aid in identifying demand for aviation services. The largest employer in the City is Havasu City Medical Center. The second largest employer is Lake Havasu City. As is common in most cities, the Lake Havasu School District supports a large number of employees. As presented in the table, the largest employers are diverse, providing opportunities for a wide array of economic sectors.

TABLE 1N
Major Employers
Lake Havasu City

Employer	Description	Employees
Havasu City Medical Center	Hospital / Medical Services	695
Lake Havasu City	Government	671
Lake Havasu School District	Education	530
Sterilite Corporation	Household Plastics	425
London Bridge Resort	Tourism	315
Wal-Mart	Retail Variety Store	259
Shugrue's Restaurant	Restaurant	250
Mission of Nevada, Inc.	Laundry	200
Mohave Community College	Higher Education	183
Bradley Chevrolet & Ford	Auto Sales	160
New Horizons Center	Nursing/Care Services	160

Source: Lake Havasu City

PER CAPITA PERSONAL INCOME

Table 1P compares the per capita personal income (PCPI) for Lake Havasu City, Mohave County, the State of Arizona, and the United States. As illustrated on the table, Lake Havasu City's and Mohave County's PCPI has historically been well below that of the State of Arizona and United States. Over the period, Lake Havasu City's and Mohave County's PCPI has increased at an AAGR of approximately 2.68 percent, compared to the state and national PCPI increasing at an AAGR of approximately 3.87 percent.

TABLE 1P
Historical Per Capita Personal Income (PCPI) Statistics

	1990	2000	2005	2006	Average Annual Growth Rate
Lake Havasu City	$13,777	$18,280	$21,316	$21,025	2.68%
Mohave County	$14,859	$18,326	$22,055	$22,643*	2.67%
State of Arizona	$17,005	$25,656	$30,019	$31,178	3.86%
United States	$19,477	$29,843	$34,471	$35,808	3.88%

* Extrapolated

Source: Lake Havasu City Partnership for Economic Development; Bureau of Economic Analysis

ENVIRONMENTAL INVENTORY

Available information about the existing environmental conditions at Lake Havasu City Municipal Airport has been derived from previous environmental studies, internet resources, agency maps, and existing literature. The intent of this task is to inventory potential environmental sensitivities that might affect future improvements at the airport. These resources are discussed further within the following sections.

SOCIAL RESOURCES

Compatible Land Use

The compatibility of existing and planned land uses in the vicinity of an airport is usually associated with the extent of the airport=s noise impacts. Typically, significant impacts will occur over noise-sensitive areas within the 65 DNL noise contour.

Land uses surrounding the Lake Havasu City Municipal Airport consist predominantly of open space. The airport is bounded to the west by State Route 95. As depicted within the *Lake Havasu City General Plan 2001*, the land immediately surrounding the airport is identified as Employment. West of the airport is identified as Commercial and north and east of the airport is identified as Open Space and Park.

The *Lake Havasu City General Plan 2001* encourages the expansion of employment-related uses around the airport and the relocation of industrial uses along the lakeshore to the airport area. A goal within the general plan is to minimize the impact of noise by supporting public awareness programs regarding compatible land use planning in the vicinity of the airport.

Noise

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 Federal Aviation Administration (FAA), Environmental Protection Agency (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. No residences or other noise-sensitive development are located in the immediate vicinity of the airport. A small residential area is located approximately three-quarters-of-a-mile to the south of the airport. Another residential development, Desert Hills, is located approximately one mile west/southwest of the airport across State Route 95.

NATURAL RESOURCES

Department of Transportation Act: Section 4(f)

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. There are no Section 4(f) resources located on airport property. However, the Havasu National Wildlife Refuge (NWR) is located approximately 1.5 miles west of the airport. This NWR stretches 30 miles from Needles, CA to Lake Havasu City, AZ along the Colorado River.

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 Amay affect@ a federally endangered or threatened species. The *Sikes Act* and various amendments authorize states to prepare statewide wildlife conservation plans for resources under their jurisdiction. To determine whether impacts would occur to protected resources, internet research was undertaken.

According to the U.S. Fish and Wildlife Service (FWS) website, a number of species are listed in Mohave County as being threatened or endangered. **Table 1Q** lists these species.

TABLE 1Q
Threatened or Endangered Species in Mohave County, Arizona

Species	Federal Status[1]
Arizona cliffrose	Endangered
Bonytail chub	Endangered
California Brown pelican	Endangered
California condor	Endangered
Desert Tortoise	Threatened
Holmgren milk vetch	Endangered
Hualapai Mexican vole	Endangered
Humpback chub	Endangered
Jones cycladenia	Threatened
Mexican spotted owl	Threatened
Razorback sucker	Endangered
Siler pincushion cactus	Threatened
Southwestern willow flycatcher	Endangered
Virgin River chub	Endangered
Woundfin	Endangered
Yuma clapper rail	Endangered
Fickeisen plains cactus	Candidate
Relict leopard frog	Candidate
Yellow-billed cuckoo	Candidate
Virgin spinedance	Conservation Agreement

Source: [1] FWS online listed species database

No known threatened or endangered species are located on airport property. The desert scrub habitat found in the vicinity of the airport is suitable habitat for listed plant and mammal species. The Havasu NWR, located approximately 1.5 miles west of the airport along the Colorado River and Lake Havasu, contains habitat for many listed species. Within the NWR, several areas have been set aside within Lake Havasu specifically for the use of raising two native endangered fish: the bonytail chub and razorback sucker.

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.

There are no known historic or cultural resources located on airport property. A search of the National Register of Historic Places did not retrieve any data for the area.

Wetlands/Waters of the U.S.

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." 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.

To assess potential wetland impacts, the National Wetlands Inventory (NWI) map was reviewed. According to the map, two washes traverse airport property from east to west. Coordination with the airport confirmed these washes and identified them as being previously identified as jurisdictional waters.

DOCUMENT SOURCES

As mentioned earlier, 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 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 and tenants contributed to the inventory effort.

Airport/Facility Directory, Southwest, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, July, 2007 Edition.

Phoenix Sectional Aeronautical Chart, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, May, 2007.

National Plan of Integrated Airport Systems (NPIAS), U.S. Department of Transportation, Federal Aviation Administration, 2007-2011.

U.S. Terminal Procedures, Southwest U.S., U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, July, 2007 Edition.

Lake Havasu City General Plan 2001. Lake Havasu City. 2001.

Lake Havasu City Municipal Airport: Airport Certification Manual (ACM) Class III Airport. Federal Aviation Administration. June 2005.

Airport Operating Regulations. Lake Havasu City. Resolution No. 91-697, Ordinance No. 91-347, Amending Ordinance No. 93-411.

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

Lake Havasu City: www.lhcaz.gov

Lake Havasu City Partnership for Economic Development: www.lakehavasu.org

Lake Havasu Chamber of Commerce: www.havasuchamber.com

FAA 5010 Airport Master Record Data: http://www.airnav.com

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

Mohave County, Arizona: www.co.mohave.az.us

Arizona Department of Economic Security: http://www.de.state.az.us/ASPNew/default.asp

Arizona Workforce Informer: http://www.workforce.az.gov/

Bureau of Economic Analysis, U.S. Department of Commerce: http://www.bea.gov/bea/regional/data.htm

Chapter Two

AVIATION DEMAND FORECASTS

AVIATION DEMAND 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 Lake Havasu City Municipal Airport, this involves projecting potential aviation demand for a 20-year timeframe. In this Master Plan, forecasts of passenger enplanements, based aircraft, and operations (takeoffs and landings) will be considered which will serve as the basis for facility planning.

The aviation demand forecasts presented in this chapter have been prepared using airport-specific data provided by airport management, as well as data compiled by the Arizona Department of Transportation (ADOT) – Aeronautics Division and the Federal Aviation Administration (FAA). In addition, updated national forecasts in the publication *FAA Aerospace Forecasts – Fiscal Years 2007-2020* were referenced for industry trends.

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

As stated in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*, dated December 4, 2004, forecasts should be:

- Realistic
- Based on the latest available data
- Reflect current conditions at the airport
- Supported by information in the study
- Provide adequate justification for airport planning and development

Recognizing this, it is intended to develop a Master Plan for Lake Havasu City Municipal Airport that will be demand-based rather than time-based. As a result, the reasonable levels of activity potential that are derived from this forecasting effort will be related to the planning horizon levels rather than dates in time. These planning levels will be established as levels of activity from which specific actions for the airport to consider will be presented.

The demand-based manner in which this Master Plan is being prepared is intended to accommodate variations in demand at the airport. Demand-based planning relates capital improvements to demand factors such as based aircraft operations, instead of points in time. This allows the airport to address capital improvement needs according to actual demand occurring at the airport. Therefore, should growth in aircraft operations or based aircraft slow or decline, it may not be necessary to implement some improvement projects. However, should the airport experience accelerated growth, the plan will have accounted for that growth and will be flexible enough to respond accordingly.

In order to fully assess current and future aviation demand for Lake Havasu City Municipal Airport, an examination of several key factors is needed. These include national and regional aviation trends, historical and forecast socioeconomic and demographic information of the area, and competing transportation modes and facilities. Consideration and analysis of these factors will ensure a comprehensive outlook for future aviation demand at Lake Havasu City Municipal Airport.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, air cargo, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs of the constituent units of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public.

The current edition when this chapter was prepared was *FAA Aerospace Forecasts – Fiscal Years 2007-2020*, published in March 2007. The forecasts 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.

In the seven years prior to the events of September 11, 2001, the U.S. civil aviation industry experienced unprecedented growth in demand and profits.

The impacts to the economy and aviation industry from the events of 9/11 were immediate and significant. The economic climate and aviation industry, however, has been on the recovery.

The Office of Management and Budget (OMB) expects the U.S. economy to continue to grow in terms of Gross Domestic Product (GDP) at an average annual rate of 2.9 percent through 2020. This will positively influence the aviation industry, leading to passenger, air cargo, and general aviation growth throughout the forecast period (assuming there will be no new successful terrorists incidents against either U.S. or world aviation).

The FAA forecasts for commercial aviation projects a return to growth, and, over time, the industry is expected to grow significantly. System capacity, the yard stick for measuring the health of the aviation industry, is projected to increase 2.8 percent in 2007, following a decline of 0.2 percent in 2006. In domestic markets, capacity is expected to increase 2.1 percent annually, as legacy network capacity stabilizes and low-cost carriers continue to grow. Regional carrier capacity is forecast to increase 2.9 percent annually, as legacy carriers transfer routes to regional partners and the regionals offer more point-to-point service. Revenue passenger miles (RPMs) are forecast to increase 2.8 percent annually, while enplanements are expected to increase faster, up 3.6 percent annually.

U.S. airline passenger enplanements (combined domestic and international) have now exceeded pre-9/11 levels and are projected to grow at an average of 3.5 percent annually through 2020. Mainline air carriers are forecast to grow 3.7 percent annually, while the regional/commuter airlines are forecast to level off at 3.1 percent annually, after having experienced unprecedented 11.2 percent annual growth from 2000-2006.

Growth in the general aviation sector is expected to continue to be strong, particularly with the introduction of very light jets (VLJs) to the fleet. These relatively inexpensive microjets may redefine "on-demand" air taxi service. In 2008, over 350 VLJs are forecast to enter the fleet, with that figure growing to 400-500 per year through 2020. Overall, general aviation hours flown are projected to increase an average of 3.4 percent per year through 2020. The number of active general aviation aircraft is expected to grow at 1.4 percent annually.

U.S. airline air cargo revenue-ton-miles (RTMs) are projected to grow at 5.6 percent annually.

GENERAL AVIATION

In the 13 years since the passage of the *General Aviation Revitalization Act of 1994* (federal legislation which limits the liability on general aviation aircraft to 18 years from the date of manufacture), it is clear that the Act has successfully infused new life into the general aviation industry. This legislation sparked an interest to renew the manufacturing of general aviation aircraft due to the reduction in product liability, as well as renewed optimism for the industry.

After the passage of this legislation, annual shipments of new aircraft rose every year between 1994 and 2000. According to the General Aviation Manufacturers Association (GAMA), between 1994 and 2000, general aviation aircraft shipments increased at an average annual rate of more than 20 percent, increasing from 928 shipments in 1994 to 3,140 shipments in 2000. As shown in **Table 2A**, the growth in the general aviation industry slowed considerably after 2000, negatively impacted by the national economic recession and the events surrounding 9/11. In 2003, there were over 450 fewer aircraft shipments than in 2000, a decline of 14 percent.

TABLE 2A
Annual General Aviation Airplane Shipments
Manufactured Worldwide and Factory Net Billings

Year	Total	SEP	MEP	TP	J	Net Billings ($ millions)
2000	3,140	1,862	103	415	760	13,497.0
2001	2,994	1,644	147	421	782	13,866.6
2002	2,687	1,601	130	280	676	11,823.1
2003	2,686	1,825	71	272	518	9,994.8
2004	2,963	1,999	52	321	591	11,903.8
2005	3,580	2,326	139	365	750	15,140.0
2006	4,042	2,508	242	407	885	18,793.0

SEP - Single Engine Piston; MEP - Multi-Engine Piston; TP - Turboprop; J - Turbofan/Turbojet

Source: GAMA

In 2004, the general aviation production showed a significant increase, returning to near pre-9/11 levels for most indicators. With the exception of multi-engine piston aircraft deliveries, deliveries of new aircraft in all categories increased. In 2006, total aircraft deliveries increased 12 percent. The largest increase was in single engine piston aircraft deliveries that increased seven percent or by over 180 aircraft. Turbojet and multi-engine piston aircraft also increased significantly from the previous year. As evidenced in the table, new aircraft deliveries in 2006 exceeded pre-9/11 levels by approximately 1,000 aircraft.

On July 21, 2004, the FAA published the final rule for sport aircraft: The *Certification of Aircraft and Airmen for the Operation of Light-Sport Aircraft* rules, which went into effect on September 1, 2004. This final rule establishes new light-sport aircraft categories and allows aircraft manufacturers to build and sell completed aircraft without obtaining type and production certificates. Instead, aircraft manufacturers will build to industry consensus standards. This reduces development costs and subsequent aircraft acquisition costs. This new category places specific conditions on the design of the aircraft, to limit them to "slow (less than 120 knots maximum) and simple" performance aircraft. New pilot training times are reduced and offer more flexibility in the type of aircraft the pilot would be allowed to operate.

Viewed by many within the general aviation industry as a revolutionary change in the regulation of recreational aircraft, this new rule is anticipated to significantly increase access to general aviation by reducing the time required to earn a pilot's license and the cost of owning and operating an aircraft. Since 2004, there have been over 30 new product offerings in the airplane category alone. These regulations are aimed primarily at the recreational aircraft owner/operator. By 2020, there are expected to be 13,200 of these aircraft in the national fleet.

While impacting aircraft production and delivery, the events of 9/11 and economic downturn have not had the same negative impact on the business/corporate side of general aviation. The increased security measures placed on commercial flights have increased interest in fractional and corporate aircraft ownership, as well as on-demand charter flights. According to GAMA, the total number of corporate operators increased by approximately 1,500 between 2000 and 2005. Corporate operators are defined as those companies that have their own flight departments and utilize general aviation aircraft to enhance productivity. **Table 2B** summarizes the number of U.S. companies operating fixed-wing turbine aircraft between 1991 and 2005.

TABLE 2B
U.S. Companies Operating Fixed-Wing Turbine Business Aircraft and Number of Aircraft, 1991-2005

Year	Number of Operators	Number of Aircraft
1991	6,584	9,504
1992	6,492	9,504
1993	6,747	9,594
1994	6,869	10,044
1995	7,126	10,321
1996	7,406	11,285
1997	7,805	11,774
1998	8,236	12,425
1999	8,778	13,148
2000	9,317	14,079
2001	9,709	14,837
2002	10,191	15,569
2003	10,661	15,870
2004	10,735	16,369
2005	10,809	16,867

Source: GAMA/NBAA

The growth in corporate operators comes at a time when fractional aircraft programs are experiencing significant growth. Fractional ownership programs sell a share in an aircraft at a fixed cost. This cost, plus monthly maintenance fees, allows the shareholder a set number of hours of use per year and provides for the management and pilot services associated with the aircraft's operation. These programs guarantee the aircraft is available at any time, with short notice. Fractional ownership programs offer the shareholder a more efficient use of time (when compared with commercial air service) by providing faster point-to-point travel times and the ability to conduct business confidentially while flying. The lower initial startup costs (when compared with acquiring and establishing a flight department) and easier exiting options are also positive benefits.

Since beginning in 1986, fractional jet programs have flourished. **Table 2C** summarizes the growth in fractional shares between 1986 and 2005. The number of aircraft in fractional jet programs grew rapidly from 2001 to 2005, increasing by approximately 250. Although there is no data available, it can be projected that fractional shares and aircraft have increased even more since 2005.

TABLE 2C
Fractional Shares and Number of Aircraft in Use

Year	Number of Shares	Number of Aircraft
1986	3	N/A
1987	5	N/A
1988	26	N/A
1989	51	N/A
1990	57	N/A
1991	71	N/A
1992	84	N/A
1993	110	N/A
1994	158	N/A
1995	285	N/A
1996	548	N/A
1997	957	N/A
1998	1,551	N/A
1999	2,607	N/A
2000	3,834	N/A
2001	3,415	696
2002	4,098	776
2003	4,516	826
2004	4,765	865
2005	4,691	949

Source: GAMA

Very light jets (VLJs) entered the operational fleet in 2006. Also known as microjets, the VLJ is commonly defined as a jet aircraft that weighs less than 10,000 pounds. There are several new aircraft that fall in this category including the Eclipse 500 and Adams 700 jets. While not categorized by Cessna Aircraft as a VLJ, the Cessna Mustang is a competing aircraft to many of the VLJs expected to reach the market. These jets cost between $1 and $2 million, can takeoff on runways less than 3,000 feet, and cruise at 41,000 feet at speeds in excess of 300 knots. The VLJ is expected to redefine the business jet segment by expanding business jet flying and offering operational costs that can support on-demand air taxi point-to-point service. The FAA projects 350 VLJs in service in 2007. This category of aircraft is expected to grow by 400 to 500 aircraft per year, reaching 6,300 aircraft by 2020.

The FAA forecast assumes that the regulatory environment affecting general aviation will not change dramatically. It is expected that the U.S. economy will continue to expand through 2007 and 2008, and then continue to grow moderately (near three percent annually) thereafter. This will positively influence the aviation industry, leading to passenger, air cargo, and general aviation growth throughout the forecast period (assuming that there will not be any new successful terrorist incidents against either the U.S. or world aviation). The FAA does recognize that a major risk to continued economic growth is upward pressure on commodity prices, including the price of oil. However, FAA economic models predict a 4.8 percent decrease in the price of oil in 2007, followed by a 7.1 percent increase in 2008. The price of oil is expected to become somewhat less volatile through the remainder of the forecast period.

The FAA projects the active general aviation aircraft fleet to increase at an average annual rate of 1.4 percent over the 14-year forecast period, increasing from 226,422 in 2006 to 274,914 in 2020. This growth is depicted on **Exhibit 2A**. FAA forecasts identify two general aviation economies that follow different market patterns. The turbine aircraft fleet is expected to increase at an average annual rate of 6.0 percent, increasing from 18,058 in 2006 to 31,558 in 2020. Factors leading to this substantial growth include expected strong U.S. and global economic growth, the continued success of fractional-ownership programs, the growth of the VLJ/microjet market, and a continuation of the shift from commercial air travel to corporate/business air travel by business travelers and corporations. Piston-powered aircraft are projected to show minimal growth through 2020 at 0.3 percent annually. Single engine piston aircraft are projected to grow at 0.3 percent annually while multi-engine piston aircraft are projected to decrease in number by 0.2 percent annually. Piston-powered rotorcraft aircraft are forecast to increase by 5.7 percent annually through 2020.

Aircraft utilization rates are projected to increase through the 14-year forecast period. The number of general aviation hours flown is projected to increase at 3.4 percent annually. Similar to active aircraft projections, there is projected disparity between piston and turbine aircraft hours flown. Hours flown in turbine aircraft are expected to increase at 6.1 percent annually, compared with 1.3 percent for piston-powered aircraft. Jet aircraft are projected to increase at 9.4 percent annually over the next 14 years, being the largest increase in any one category for total aircraft hours flown.

The total pilot population is projected to increase by 51,000 in the next 14 years, from an estimated 455,000 in 2006 to 506,000 in 2020, which represents an average annual growth rate of 0.8 percent. The student pilot population is forecast to increase at an annual rate of 1.2 percent, reaching a total of 100,181 in 2020. Growth rates for other pilot categories over the forecast period are as follows: recreational pilots declining 0.1 percent; commercial pilots increasing 0.8 percent; airline transport pilots increasing 0.2 percent; rotorcraft-only pilots increasing 3.1 percent; glider-only pilots increasing 0.4 percent; and private pilots showing no change. The sport pilot is expected to grow significantly through 2020 at 22.6 percent annually. The decline in recreational pilots and no increase in private pilots is the result of the expectation that most new general aviation pilots will choose to obtain the sport pilot license instead.

Over the past several years, the general aviation industry has launched a series of programs and initiatives whose main goals are to promote and assure future growth within the industry. The "No Plane, No Gain" is an advocacy program created in 1992 by

GAMA and the National Business Aircraft Association (NBAA) to promote acceptance and increased use of general aviation as an essential, cost-effective tool for businesses. Other programs are intended to promote growth in new pilot starts and introduce people to general aviation. "Project Pilot," sponsored by the Aircraft Owners and Pilots Association (AOPA), promotes the training of new pilots in order to increase and maintain the size of the pilot population. The "Be A Pilot" program is jointly sponsored and supported by more than 100 industry organizations. The NBAA sponsors "AvKids," a program designed to educate elementary school students about the benefits of business aviation to the community and career opportunities available to them in business aviation. The Experimental Aircraft Association (EAA) promotes the "Young Eagles" program which introduces young children to aviation by offering them a free airplane ride courtesy of aircraft owners who are part of the association. Over the years, programs such as these have played an important role in the success of general aviation and will continue to be vital to its growth in the future.

COMMERCIAL PASSENGER AIRLINES

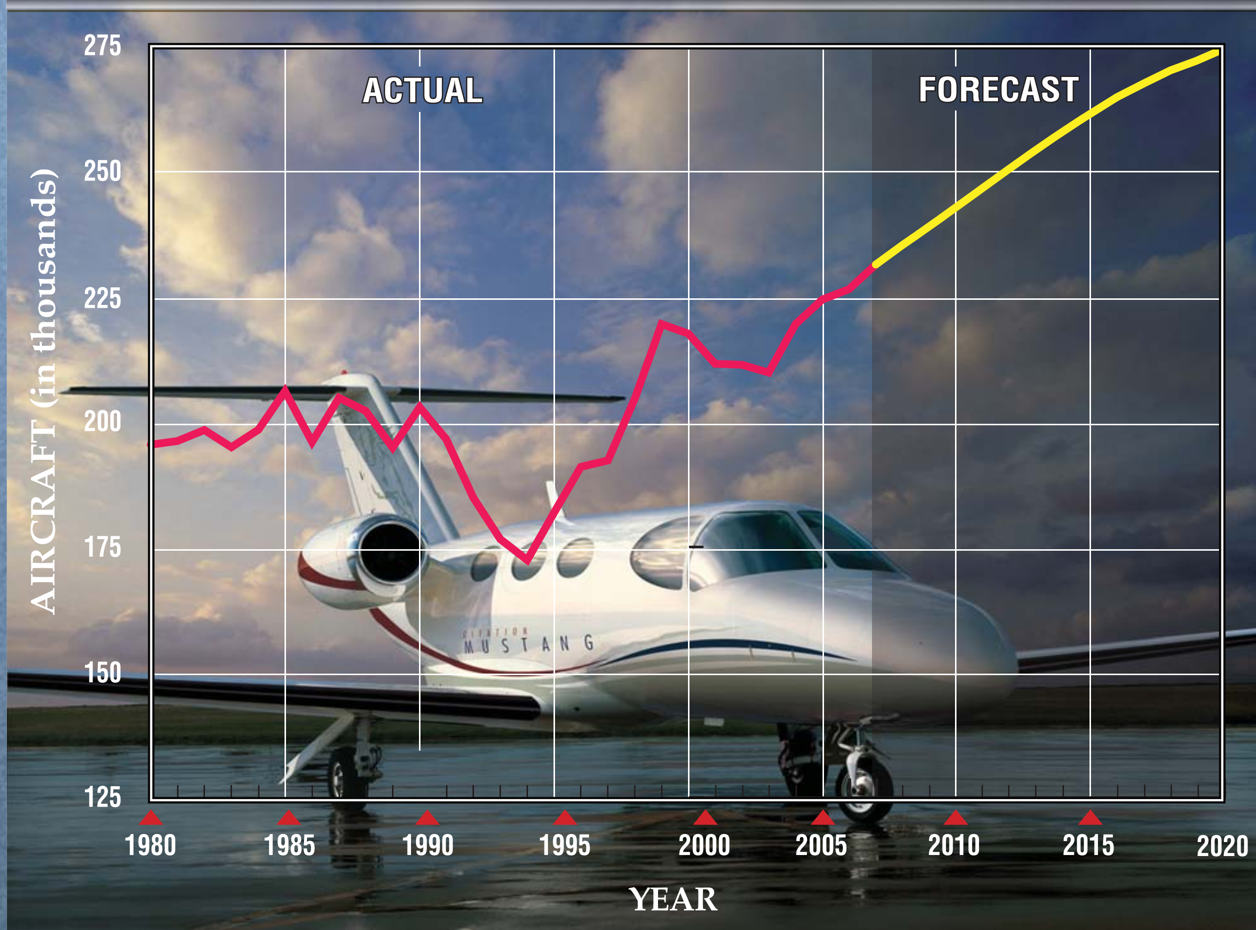
The passenger airlines in the United States are comprised of 33 mainline carriers and 81 regional carriers. The mainline carriers are airlines that primarily use passenger jets with over 90 seats, while the regional carriers are airlines that primarily use smaller propeller and jet aircraft with fewer than 90 seats. The mainline carriers have also emerged into two other groupings: legacy network carriers and low-cost carriers.

Legacy Network Carriers – This group includes the airlines established prior to deregulation in 1978 (e.g., American Airlines, Continental Airlines, Delta Airlines, Northwest Airlines, United Airlines, US Airways). The legacy airlines were the most impacted by 9/11, and now are undergoing restructuring efforts to redefine their business model in the new operating environment of the industry. These airlines operate primarily in hub-and-spoke networks and generally have higher operating costs. The legacy airlines have been downsizing and cost-cutting to become competitive with the low-cost carriers. The string of negative external events, out of the control of airlines, has made it difficult for most legacy carriers to achieve profitability.

Low-Cost Carriers – This group is comprised of established low-cost carriers, new entrants, and a few restructured legacy carriers (American Trans Air [ATA], AirTran, Frontier Airlines, JetBlue Airways, Southwest Airlines, and Spirit Airlines). These carriers typically operate point-to-point and have lower operating costs than their legacy counterparts. Their post-9/11 strategy has seen growth in airports and city-pairs served, aircraft fleet, and longer-haul flights. The recent sharp increases in oil prices have impacted the profits of the low-cost airlines.

05MP08-2A-10/8/07

U.S. ACTIVE GENERAL AVIATION AIRCRAFT



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

Year	FIXED WING				ROTORCRAFT		Experimental	Sport Aircraft	Other	Total
	PISTON		TURBINE							
	Single Engine	Multi-Engine	Turboprop	Turbojet	Piston	Turbine				
2006 (Est.)	148.2	19.4	8.0	10.0	3.4	5.9	24.5	0.4	6.6	226.4
2010	150.4	19.2	8.2	13.4	4.8	6.5	27.7	5.6	6.8	242.8
2015	154.0	19.0	8.5	18.0	6.3	7.2	31.1	10.5	6.7	261.4
2020	155.6	18.8	8.8	22.8	7.4	7.9	33.9	13.2	6.6	274.9

Source: FAA Aerospace Forecasts, Fiscal Years 2007-2020.

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

Regionals/Commuters – This group's operating strategy focuses around providing feeder traffic through code-sharing arrangements with mainline airlines. Some, like newly launched ExpressJet, are attempting point-to-point service in competition with the large carriers. Since 9/11, the regionals and commuters have benefited from the route restructuring and cost-cutting of the legacy carriers, taking over service to thinner medium-haul and long-haul markets.

Three distinct trends have occurred over the past five years that have helped shape today's U.S. commercial air carrier industry: (1) major restructuring and downsizing among mainline network carriers; (2) rapid growth among low-cost carriers, particularly in non-traditional long-distance transcontinental markets; and (3) exceptional growth among regional carriers.

After two consecutive years of strong growth in 2004 and 2005, U.S. commercial air carrier system capacity and traffic (domestic and international service) grew at much slower rates in 2006. System capacity, as measured in available seat miles (ASMs), was down 0.2 percent, while system RPMs and enplanements showed gains of 2.1 and 0.4 percent, respectively. At the end of 2006, commercial air carrier enplanements exceeded pre-9/11 levels by 6.2 percent, while RPMs were 13.9 percent higher than in 2000.

Regional air carriers have benefited from capacity cuts and corporate restructuring made by mainline carriers since 2000. Regional carriers have more than doubled revenue passengers, growing from 82.8 million in 2000 to 156.8 million in 2006. This represented an average annual growth rate of 11.2 percent. Regional carriers are forecast to grow at 3.1 percent annually through 2020.

Capacity and demand growth are forecast in 2007 to rebound from the slowdown in 2006. Capacity is projected to grow 2.8 percent as the mainline carrier domestic market capacity stabilizes (after falling almost six percent in 2006), while low-cost carriers continue to add capacity in domestic markets and legacy carriers continue to grow in international markets. Legacy carrier capacity is projected to increase 2.8 percent, while regional carrier capacity rises 3.0 percent.

Passenger demand growth also rebounds, with RPMs forecast to increase 3.4 percent as passenger enplanements rise 3.7 percent. Growth is projected to accelerate in 2008 as RPMs and enplanements increase 4.2 and 3.4 percent, respectively, while capacity increases slightly faster at 4.3 percent. For the balance of the forecast, system capacity is projected to increase an average of 4.4 percent. System-wide RPMs are projected to grow 4.5 percent per year, with regional carriers (5.1 percent) growing faster than mainline carriers (4.4 percent). System passengers are projected to increase an average of 3.5 percent annually, with mainline carriers growing faster than regional carriers (3.7 vs. 3.0 percent a year). The national enplanement history and projections for mainline and regional carriers are depicted on **Exhibit 2B**.

While mainline carriers have been reducing the size of aircraft flown domestically, regional carriers have been increasing the size of their aircraft. The most visible example of this trend is the great number of 70-90 seat regional aircraft that are entering the fleet and the on-going retrofitting of existing regional jets to add seats. The addition of these larger-capacity aircraft is reflected in the FAA forecast, as regional carriers move from an average of 50 seats in 2006, to 59 seats in 2020. This changing aircraft fleet is narrowing the gap between the size of aircraft operated by the mainline and regional carriers.

By 2020, aircraft are forecast to become fuller as load factors increase from the record high of 78.8 percent in 2006, to 80.3 percent. Passenger trip length is also forecast to increase, which reflects the faster growth in the relatively longer international trips and longer domestic trips resulting from increased point-to-point service, especially by low-cost regional carriers.

The number of passenger jets in the mainline carrier fleet fell by 39 aircraft in 2006, but is expected to increase by 92 aircraft in 2007 and 108 aircraft in 2008. Over the remaining 12 years of the FAA forecast, the mainline passenger fleet increases by an average of 163 aircraft per year, reaching a total of 6,041 aircraft in 2020. The narrow-body fleet (including the Embraer-190 at JetBlue and U.S. Airways) is projected to grow by 123 aircraft annually over the forecast period; the wide-body fleet grows by 31 aircraft per year, as the Boeing 787 and Airbus 350 enter the fleet.

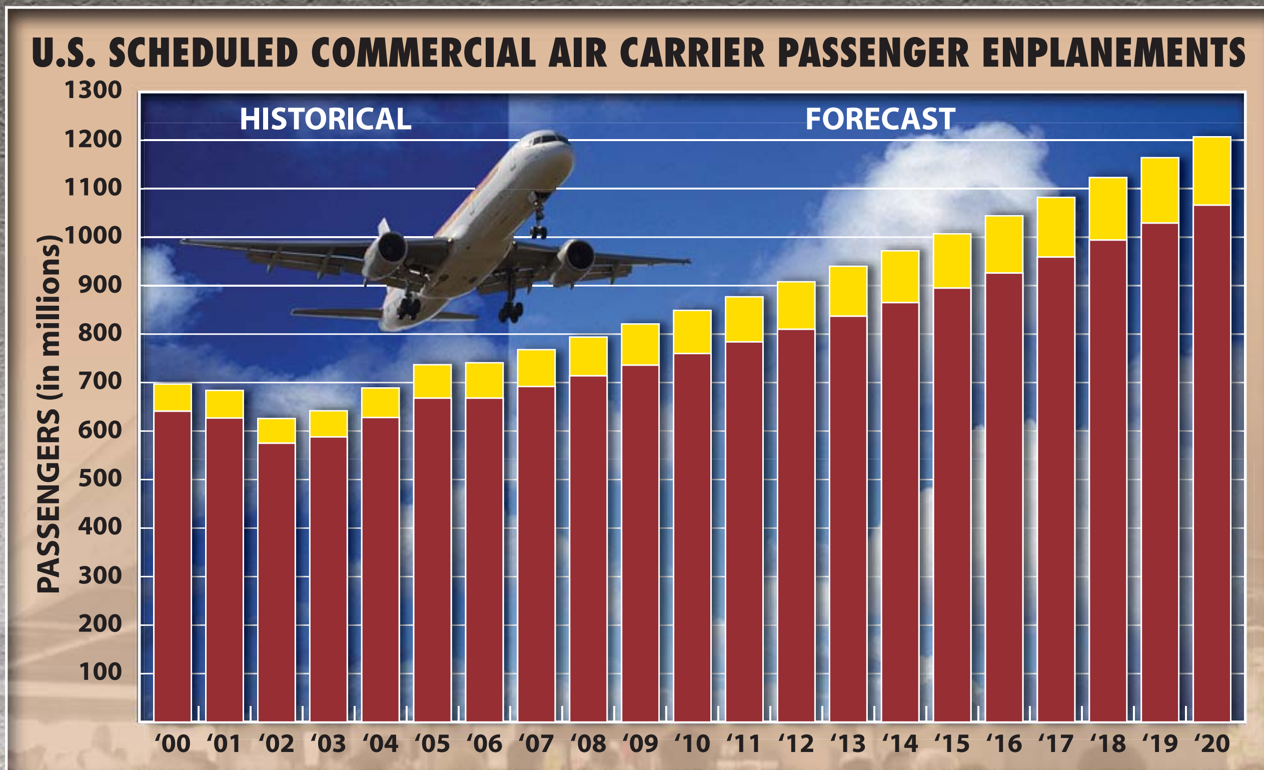
The regional aircraft fleet has been transitioning away from turboprop aircraft to jet aircraft over the past decade. From 2000 to 2006, the number of regional jets has grown nearly 20 percent annually, from 570 in 2000, to 1,687 in 2006. Over the same period, non-jet regional aircraft have decreased 7.7 percent, from 1,704 to 1,056. This trend toward regional jets is expected to continue through 2020 with the addition of 1,002 jets and the loss of 51 non-jet regional aircraft. This represents a 7.7 percent average annual growth rate for regional jets. Turboprop aircraft will account for just over 27 percent of the regional fleet in 2020, down from a 38.5 percent share in 2006.

AIRPORT SERVICE AREA

The service area of an airport is typically defined by the proximity of other airports providing a similar level of service. In determining the aviation demand for an airport, it is necessary to identify the role of that airport, as well as the specific areas of aviation demand the airport is intended to serve. The primary role of Lake Havasu City Municipal Airport is to serve general aviation and commercial airline demand. Although commercial passenger airline service is not currently provided at the airport, it has provided services in the recent past. Moreover, the City is partnered with other local agencies to regain commercial passenger airline service in the future.

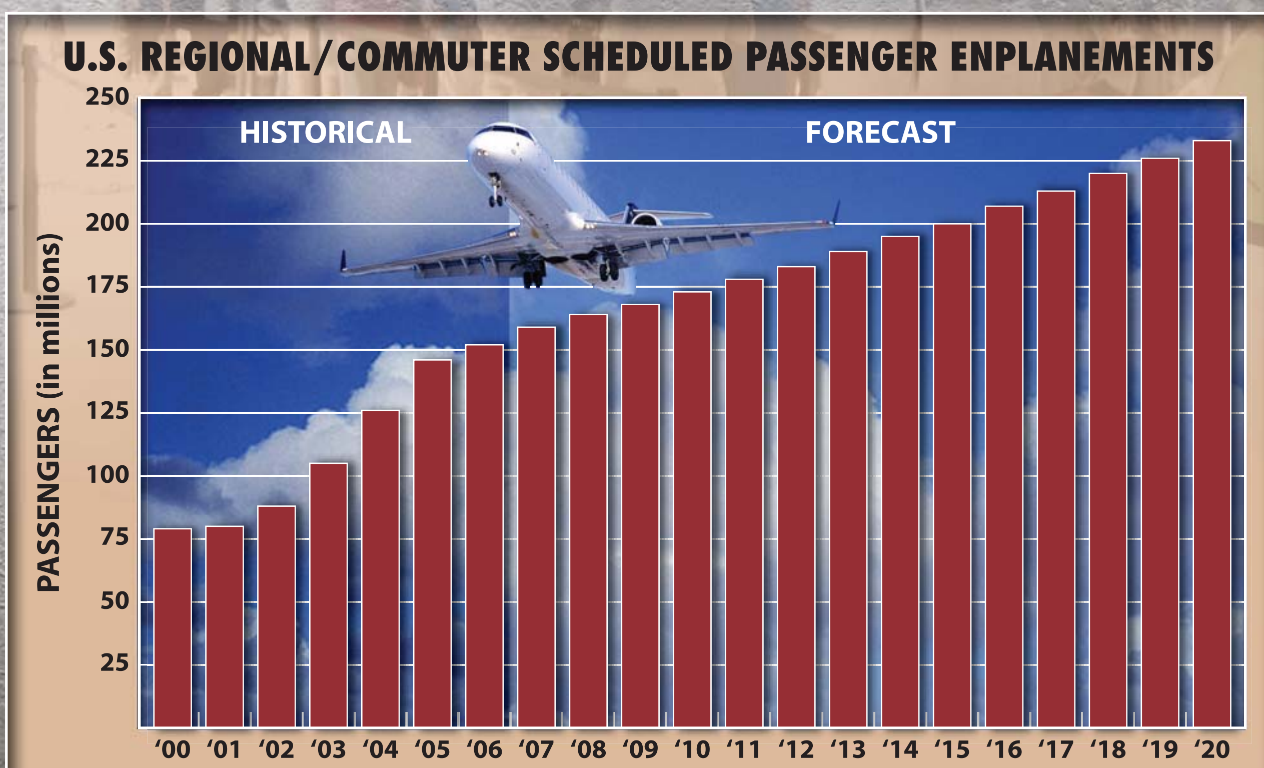
As in any business enterprise, the more attractive the facility is in ser-

05MP08-2B-10/8/07



Source: FAA Aerospace Forecasts, FY 2007-2020

Domestic International



Source: FAA Aerospace Forecasts, FY 2007-2020

LAKE HAVASU CITY, ARIZONA • MUNICIPAL AIRPORT •

Exhibit 2B
U.S. COMMERCIAL AIR CARRIER AND
REGIONAL/COMMUTER FORECASTS

vices and capabilities, the more competitive it will be in the market. If an airport's attractiveness increases in relation to nearby airports, so will the size of the service area. If facilities are adequate and rates and fees are competitive at Lake Havasu City Municipal Airport, some level of aviation activity might be attracted to the airport from surrounding areas.

Lake Havasu City Municipal Airport is one of five public use airports in Mohave County. Of these five airports, Lake Havasu City Municipal, Laughlin/Bullhead International, and Kingman serve as commercial service airports. Mohave County is geographically the second largest in Arizona, encompassing the northwest part of the state. The county is known for its water activities with the Colorado River, Lake Havasu, and Lake Mohave providing over 1,000 miles of shoreline. Much of the county has land dedicated to the U.S. Forest Service and Bureau of Land Management. Smaller portions are also owned by Indian reservations and the State of Arizona. Approximately 20 miles to the south of Lake Havasu City is La Paz County.

Lake Havasu City is one of four incorporated communities in Mohave County. According to the 2006 Arizona Department of Economic Security population estimates, the four incorporated cities support 64 percent of the county's population. The other 36 percent live in unincorporated areas, such as Indian reservations. Lake Havasu City accounts for approximately 28 percent of the total population within the county and is the largest incorporated city, with a population of 55,338.

Laughlin/Bullhead International Airport is located 37 nautical miles (nm) north of Lake Havasu City and serves approximately 89,000 passengers in 2006. Sun Country Airlines and Allegiant Airlines operate scheduled and unscheduled charter service to and from the airport using Boeing 737 and MD-80 aircraft. The local casinos attract a large number of tourists each year to this area.

Kingman Airport is 46 nm northeast of Lake Havasu City. According to available FAA records, the airport recorded approximately 1,900 enplanements in 2005. Mesa Airlines operates under contract with US Airways to provide service to Phoenix and Las Vegas with Beech 1900 aircraft.

McCarran International Airport in Las Vegas and Phoenix Sky Harbor International Airport offer significant competition for local commercial passengers. Located approximately 150 miles (by road) northwest, McCarran International Airport is served by all major airlines and many regional air carriers. Phoenix Sky Harbor International Airport, located approximately 200 miles (by road) southeast of Lake Havasu City, is also a choice for many air travelers since it is served by the major airlines. Moreover, both airports are served by low cost airlines.

With scheduled air service available at Laughlin/Bullhead International Airport and Kingman Airport in Mohave County, the service area for Lake Havasu City Municipal Airport is limited. In addition, Las Vegas and Phoenix are both within 200 miles of Lake Havasu City and draw air travelers from all areas of the county. Considering these factors, the primary catchment area for passenger enplanements at Lake Havasu City Municipal Airport is limited to Lake Havasu City and other communities in southern Mohave County.

From a commercial service perspective, the decision to fly out of Lake Havasu City Municipal Airport will be affected by numerous factors, including the drive times to McCarran International Airport and Phoenix Sky Harbor International Airport, the availability of flights, aircraft types, airfares offered, and the type of traveler (business vs. pleasure). Business travelers will generally pay higher airfares for the time savings achieved through flying to the local airport, when compared to a recreational traveler, who typically seeks low fares.

The primary attraction for commercial air service at Lake Havasu City Municipal Airport is the ground distance required to reach McCarran International Airport and Phoenix Sky Harbor International Airport. Local services provided at Lake Havasu City Municipal Airport can provide significant time savings which, in turn, provides cost savings for business travelers. Due to the limited size of the potential passenger market in Lake Havasu City, it is unlikely that the Lake Havasu City Municipal Airport could offer similar availability of flights, aircraft, or airfares for air travelers to/from Lake Havasu City as compared to McCarran International Airport or Phoenix Sky Harbor International Airport.

There will continue to be air travelers using the hub airports in Las Vegas and Phoenix rather than flying directly from Lake Havasu City. As previously discussed, this competition as well as the commercial passenger services provided at Laughlin/Bullhead International Airport and Kingman Airport limits the commercial service area of the airport to Lake Havasu City and immediate surrounding area.

The general aviation service area is more closely defined around the airport, as there are other public general aviation airports in fairly close proximity. A description of nearby general aviation airports within a 40 nm radius of Lake Havasu City Municipal Airport was presented in Chapter One – Inventory. Due to the comparable levels of facilities and services, it can be expected that the majority of general aviation demand for Lake Havasu City Municipal Airport will come from areas within and just outside of the surrounding community.

SOCIOECONOMIC TRENDS

Local and regional forecasts developed for key socioeconomic variables provide an indicator of the potential for creating growth in aviation activities at an airport. Three variables typically useful in evaluating potential for aviation growth are population, employment, and per capita personal income (PCPI).

POPULATION

Table 2D summarizes historical and forecast population estimates for Lake Havasu City and Mohave County. Historical population growth has been very strong for the city and county since 1980, averaging 4.91 percent and 4.92 percent annual average growth rate (AAGR), respectively. Lake Havasu City has averaged approximately 27 percent of the county's overall population during this same time period.

Based upon the forecast population estimates, the city population is expected to grow slightly faster than the county population during the next 20 years. A 2.78 percent AAGR is forecast for Lake Havasu City, while Mohave County is expected to grow at 2.35 percent annually.

TABLE 2D
Population Statistics
Lake Havasu City and Mohave County

Year	Lake Havasu City	Mohave County	City % of County
Historical			
1980	15,909	55,865	28.48%
1990	24,363	93,497	26.06%
2000	41,045	155,157	26.45%
2001	41,938	161,840	25.91%
2002	44,200	166,460	26.55%
2003	46,400	172,295	26.93%
2004	48,730	180,150	27.05%
2005	53,204	188,035	28.29%
2006	55,338	194,920	28.39%
Forecast			
2012	69,516	234,196	29.68%
2017	80,107	264,600	30.27%
2022	89,813	292,462	30.71%
2027	98,445	317,239	31.03%

Source: Arizona Department of Economic Security; U.S. Census Bureau

EMPLOYMENT

Historical and forecast employment data for the city and county is presented in **Table 2E**. Similar to population, the city and county's historical employment figures have grown at a strong rate since 1990. The city's employment base has grown 4.45 percent annually, while the county has seen a 4.22 percent AAGR during the same time period. Mohave County is expected to experience positive employment growth at an average annual rate of 2.38 percent through 2027. Future employment estimates for Lake Havasu City were unavailable at the time of this study.

TABLE 2E Employment Statistics Lake Havasu City and Mohave County		
Year	**Lake Havasu City**	**Mohave County**
Historical		
1990	12,149	37,260
1995	16,420	44,290
2000	17,928	54,640
2001	18,882	56,500
2002	19,736	58,760
2003	21,240	62,530
2004	22,073	65,480
2005	22,902	69,930
2006	24,375	72,140
Forecast		
2012	N/A	85,380
2017	N/A	96,228
2022	N/A	107,237
2027	N/A	118,264

Source: Arizona Department of Economic Security; Woods and Poole CEDDS 2007; Forecast Employment for Lake Havasu City was unavailable

PER CAPITA PERSONAL INCOME

Table 2F provides historical and forecast per capita personal income (PCPI), adjusted to 2004 dollars, for Mohave County. From 1990 to 2006, PCPI for the county showed minimal growth. Through 2027, Mohave County is projected to experience moderate gains in PCPI compared to the previous years.

TABLE 2F Per Capita Personal Income Statistics Mohave County	
Year	**Per Capita Personal Income ($2004)**
Historical	
1990	$20,005
1995	$17,870
2000	$20,168
2001	$20,492
2002	$20,437
2003	$20,476
2004	$21,066
2005	$21,438
2006	$21,391
Forecast	
2012	$23,045
2017	$24,696
2022	$26,554
2027	$28,627

Source: Woods and Poole CEDDS 2007

AVIATION ACTIVITY FORECASTS

The following forecast analysis examines each of the aviation-demand categories expected at Lake Havasu City Municipal 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 2027.

The need for airport facilities at Lake Havasu City Municipal Airport can best be determined by accounting for forecasts of future aviation demand. Therefore, the remainder of this chapter presents the forecasts for airport users and includes the following:

GENERAL AVIATION
- Based Aircraft
- Based Aircraft Fleet Mix
- Local and Itinerant Operations
- Peak Activity
- Annual Instrument Approaches

COMMERCIAL SERVICE
- Annual Enplaned Passengers
- Airline Fleet Mix and Operations
- Peak Activity
- Annual Instrument Approaches

AIR TAXI and MILITARY
- Annual Operations

FORECASTING APPROACH

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.

The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include market share analysis, trend line projections, and regression analysis. Comparative analysis considering other projections completed by the FAA and state/regional resources is also factored.

GENERAL AVIATION FORECASTS

General aviation is defined as that portion of civil aviation which encompasses all portions of aviation except commercial operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity, certain elements of this activity must be forecast. These indicators of general aviation demand include: based aircraft, aircraft fleet mix, annual operations, peak activity, and annual instrument approaches.

BASED AIRCRAFT

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 other general aviation activities and demands can be projected.

Determining the number of based aircraft at an airport can be a challenging task. With the transient nature of aircraft storage, it can be hard to arrive at an exact number of based aircraft, as the total can change rapidly. The aircraft owner's residence may not play a major role in the based aircraft numbers, which is the case at Lake Havasu City Municipal Airport. Aircraft basing characteristics are somewhat unusual due to tourism and the seasonal climate of the area. It was determined that 57 percent of based aircraft owners have a Lake Havasu City residence or business address, 25 percent have a California address, and five percent have an address in other areas of Arizona, primarily the Phoenix metropolitan area. The remaining 13 percent of based aircraft owners have addresses in other states including Colorado, Nevada, New Mexico, and Washington.

As indicated in **Table 2G**, based aircraft numbers at Lake Havasu City Municipal Airport did grow 1.76 percent annually from 2000 to 2005, increasing from 218 to 242 aircraft. There was a slight decline in the based aircraft number for 2006. As previously mentioned, these numbers can fluctuate with factors such as tourism and seasonal climates affecting the activity in the region. According to airport management, there is a larger number of based aircraft during the summer and winter months at Lake Havasu. As a result, the time of year that based aircraft inventories are taken can play a significant role in the number of based aircraft attributed to the airport. It can be assumed that based aircraft numbers for 2006 more closely resemble the 2005 based aircraft count during the summer and winter months.

Future based aircraft at Lake Havasu City Municipal Airport will depend on several factors, including the economy, available airport facilities, and competing airports. Forecasts assume a reasonably stable and growing economy and reasonable development of airport facilities necessary to accommodate aviation demand. Competing airports will play a role in deciding regional demand shifts; however, Lake Havasu City Municipal Airport will fare well in this competition.

Market Share of Registered Aircraft

The first method used to project based aircraft examined the Lake Havasu City Municipal Airport share of registered aircraft in Mohave County. As shown in **Table 2G**, the airport captured approximately 42 percent of aircraft registered in the county in 2006. Previous years averaged approximately 50 percent of registered aircraft in the county.

TABLE 2G
Market Share of Registered Aircraft (Mohave County)
Lake Havasu City Municipal Airport

Year	Based Aircraft	Mohave County Registered Aircraft	Market Share of Registered Aircraft
1995	181	381	47.51%
2000	218	428	50.93%
2001	238	429	55.48%
2002	226	433	52.19%
2003	230	466	49.36%
2004	240	480	50.00%
2005	242	524	46.18%
2006	229	538	42.57%
Constant Market Share			
2012	251	558	45%
2017	275	612	45%
2022	303	674	45%
2027	333	741	45%
Increasing Market Share			
2012	257	558	46%
2017	294	612	48%
2022	337	674	50%
2027	385	741	52%

Source: Based Aircraft - Airport Records, FAA TAF, Cost Recovery Analysis Study; Registered Aircraft - U.S. Census of Civil Aircraft; Forecast Registered Aircraft - SANS 2000 (2022 and 2027 extrapolated); Coffman Associates analysis

Forecasts for registered aircraft growth in Mohave County were prepared for the *2000 State Aviation Needs Study* (SANS). The 2000 SANS projected Mohave County registered aircraft to grow to 649 aircraft by 2020. For purposes of this analysis, the registered aircraft forecast was extrapolated for years 2022 and 2027. Forecasts of based aircraft were developed by projecting the Lake Havasu City Municipal Airport's share of registered aircraft through 2027. The first forecast assumes a constant market share of the previous four years' average market share of registered aircraft. This yields 333 aircraft by 2027. The second projection assumes the airport's market share will increase throughout the planning period, approaching shares captured by the airport in 2001 and 2002. This projection would yield 385 based aircraft by the year 2027.

Market Share of U.S. Fleet

Based aircraft were also examined as a percentage of U.S. active general aviation aircraft. In 1995, based aircraft at Lake Havasu City Municipal

Airport represented 0.0962 percent of U.S. active general aviation aircraft. The airport's market share increased to 0.1125 percent in 2001, and then decreased to an average of 0.1084 percent over the next four years. In 2006, the market share decreased again to 0.1000 percent.

A constant share projection was first developed. This forecast assumes the airport's share of U.S. active general aviation aircraft will remain constant at 0.1000 percent through the planning period, which yields 303 based aircraft by the year 2027. The second forecast assumes the airport's market share will increase, as it was doing in the late 1990s and early 2000s. This increasing market share projection yields 333 based aircraft by 2027. These market share projections are presented in **Table 2H**.

TABLE 2H
Market Share of U.S. Active General Aviation Aircraft
Lake Havasu City Municipal Airport

Year	Based Aircraft	U.S Active General Aviation Aircraft	% of U.S. Active General Aviation Aircraft
1995	181	188,089	0.0962%
2000	218	217,533	0.1002%
2001	238	211,535	0.1125%
2002	226	211,345	0.1069%
2003	230	209,788	0.1096%
2004	240	219,426	0.1094%
2005	242	224,352	0.1079%
2006	229	226,422	0.1000%
Constant Market Share			
2012	251	250,587	0.1000%
2017	267	267,470	0.1000%
2022	283	282,642	0.1000%
2027	303	302,926	0.1000%
Increasing Market Share			
2012	252	250,587	0.1005%
2017	278	267,470	0.1040%
2022	302	282,642	0.1070%
2027	333	302,926	0.1100%

Source: Based Aircraft - Airport Records, FAA TAF, Cost Recovery Analysis Study; Active GA Aircraft - FAA Aerospace Forecasts Fiscal Years 2007-2020 (2022 and 2027 extrapolated); Coffman Associates analysis

Ratio of City Population

Trends comparing the number of based aircraft with the Lake Havasu City population were also analyzed. **Table 2J** presents the based aircraft per 1,000 residents in Lake Havasu City. A decreasing ratio of based aircraft per 1,000 residents projection results in population increasing at a greater rate than based aircraft, which follows the trend at the airport in recent years. This is not uncommon in areas where strong population growth is occurring, which is the case at Lake Havasu City. This results in 354 based aircraft by 2027. The constant ratio of based aircraft per 1,000 residents projection results in based aircraft growing at the same rate as the local population. This yields 394 based aircraft by 2027.

TABLE 2J
Based Aircraft per Lake Havasu City Population
Lake Havasu City Municipal Airport

Year	Based Aircraft	Lake Havasu City Population	Aircraft per 1,000 Residents
1995	181	33,203	5.45
2000	218	41,045	5.31
2001	238	41,938	5.68
2002	226	44,200	5.11
2003	230	46,400	4.96
2004	240	48,730	4.93
2005	242	53,204	4.55
2006	229	55,338	4.00
Decreasing Ratio Projection			
2012	271	69,516	3.90
2017	304	80,107	3.80
2022	332	89,813	3.70
2027	354	98,445	3.60
Constant Ratio Projection			
2012	278	69,516	4.00
2017	320	80,107	4.00
2022	359	89,813	4.00
2027	394	98,445	4.00

Source: Based Aircraft - Airport Records, FAA TAF, Cost Recovery Analysis Study; Population - Arizona Department of Economic Security; Coffman Associates analysis

Comparative Forecasts

A Limited Master Plan Update completed in 1999 also contains projections of based aircraft. Interpolating the study, based aircraft projections yield 281 aircraft in 2012. Extrapolation of the trend results for years 2017, 2022, and 2027 result in 302, 326, and 351 based aircraft, respectively. This equates to a 1.49 percent average annual growth rate (AAGR).

The 2000 SANS also contains projections of based aircraft. Interpolation results in 235 based aircraft in 2012 and 260 based aircraft in 2017. Extrapolation of the trend yields 289 aircraft in 2022 and 319 aircraft in 2027. This represents a 2.06 percent AAGR.

It should be mentioned that the FAA TAF also contains projections of based aircraft for Lake Havasu City Municipal Airport. Starting in 2005, the TAF projected 379 based aircraft through the planning period. The number of current based aircraft at the airport is actually much lower than this number.

Statistical Trends and Regression

Regression analysis was also conducted on the data sets. It is optimal to have an "r^2" value near or above 0.90, which would represent a very strong correlation. The results of the regression analysis did not provide values near the 0.90 indicator. This can be directly attributed to the fluctuating nature of based aircraft since 2000, while population, employment, and other socioeconomic factors were increasing. As a result, this type of analysis was not considered reasonable for forecasting purposes.

Based Aircraft Summary

Deciding which forecast or combination of forecasts to use to arrive at a final based aircraft forecast involves more than just statistical analysis. Consideration must be given to the current and future aviation conditions at the airport in the short term. For example, it is known that Lake Havasu City Municipal Airport has a large "waiting list" for hangar space on the airport. If the airport were to have more hangars constructed, it can be assumed that it would have little difficulty occupying the hangars, and thus increasing its based aircraft numbers.

Experience indicates that when new hangars are constructed, those who rent the space are not always new based aircraft. Some of them will be aircraft owners who have used tiedowns or other facilities at the airport. Typically, a new hangar facility will attract up to 75 percent new based aircraft. Also, approximately 50-75 percent of those on the waiting list will actually sign a lease when the opportunity becomes available.

In addition, since the last Master Plan, Lake Havasu City Municipal Airport has improved in a manner to be more attractive to aircraft owners, especially those who own corporate jets. A 2,500-foot runway extension has been added to accommodate larger jets. A second major fixed base operation (FBO) has also been established on the airport that brought hangar storage space and aircraft services.

As previously discussed, tourism and seasonal climate play an important role in the number of based aircraft at Lake Havasu City Municipal Airport. Although several aircraft do not base at the airport in the traditional sense, these aircraft lease tiedowns and hangar facilities on the airport and constitute a demand level for a certain time period during the year.

Table 2L and **Exhibit 2C** provide a summary of all general aviation based aircraft forecasts previously discussed. Lake Havasu City has made a concerted and successful effort to position the airport to accept growth. The market share of U.S. active general aviation aircraft and SANS 2000 forecasts are low considering the historical growth of the airport and additional hangar facilities currently being con-

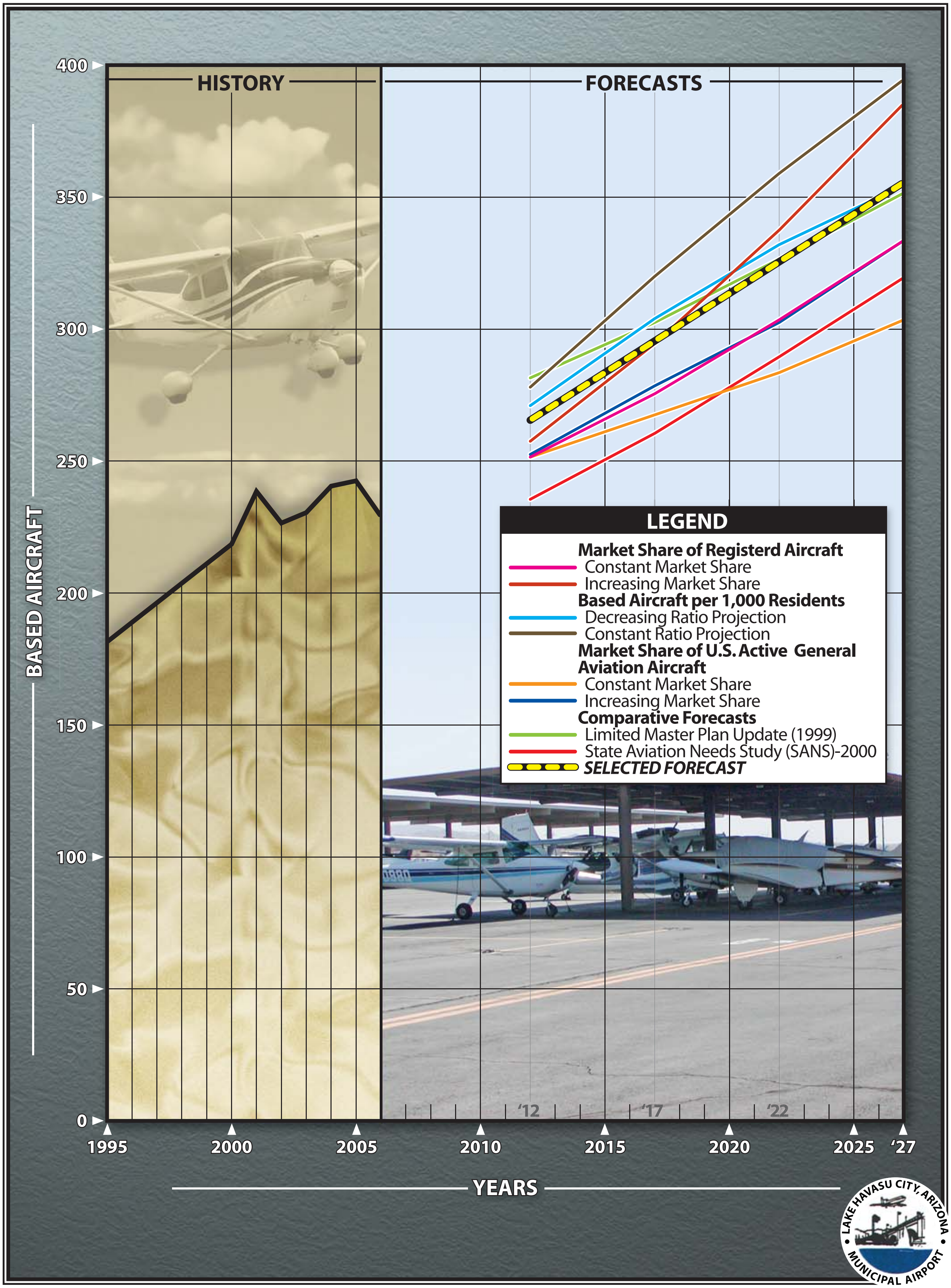


Exhibit 2C
BASED AIRCRAFT FORECASTS

structured that will only help to further expand the airport's potential. The selected planning forecast is closely related to the mid-range of the market share of registered aircraft forecast and the decreasing ratio projection of based aircraft per 1,000 residents forecast. It also is similar to the 1999 Limited Master Plan Update forecast. It accounts for the historical growth trend at the airport, and increases this growth over the planning period to account for current hangar development under construction and other areas of the airport that are primed for development already served by taxiway access. The planning forecast projects based aircraft growing at an average annual rate of 1.85 percent through the planning period.

TABLE 2L
Based Aircraft Forecasts Summary
Lake Havasu City Municipal Airport

Projections	2012	2017	2022	2027
Market Share of Registered Aircraft (Mohave County)				
Constant Market Share	251	275	303	333
Increasing Market Share	257	294	337	385
Based Aircraft per 1,000 Residents (Lake Havasu City)				
Decreasing Ratio Projection	271	304	332	354
Constant Ratio Projection	278	320	354	394
Market Share of U.S. Active General Aviation Aircraft				
Constant Market Share	251	267	283	303
Increasing Market Share	252	278	302	333
Comparative Forecasts				
Limited Master Plan Update (1999)	281*	302**	326**	351**
State Aviation Needs Study (SANS) 2000	235*	260*	289**	319**
Selected Forecast	***265***	***295***	***325***	***355***

* Interpolated; ** Extrapolated

BASED AIRCRAFT FLEET MIX

The based aircraft fleet mix at Lake Havasu City Municipal Airport is presented in **Table 2M**. The forecast fleet mix utilizes existing local trends as well as forecast U.S. general aviation trends as presented in *FAA Aerospace Forecasts – Fiscal Year 2007-2020*. The FAA projects that business jets will be the fastest growing general aviation aircraft type in the future. The number of business jets in the U.S. fleet is expected to more than double through 2020 and triple in size in 20 years. This represents an annual growth rate of 6.0 percent. Helicopters are also projected to show a strong growth rate of 3.6 percent annually through this time period. Turboprop and single engine piston powered aircraft are projected to grow, but at a much slower pace. Multi-engine aircraft are the only category expected to decrease in number through 2020.

TABLE 2M Based Aircraft Fleet Mix Lake Havasu City Municipal Airport	Current	%	2012	%	2017	%	2022	%	2027	%
Single Engine Piston	169	73.8%	202	76.2%	228	77.3%	255	78.5%	279	78.6%
Multi-Engine Piston	34	14.8%	34	12.8%	35	11.9%	35	10.8%	36	10.1%
Turboprop	9	3.9%	11	4.2%	12	4.1%	13	4.0%	15	4.2%
Jet	9	3.9%	10	3.8%	11	3.7%	12	3.7%	14	3.9%
Helicopter	6	2.6%	6	2.3%	7	2.4%	8	2.5%	9	2.5%
Ultralight	2	0.9%	2	0.8%	2	0.7%	2	0.65	2	0.6%
Totals	**229**	**100.0%**	**265**	**100.0%**	**295**	**100.0%**	**325**	**100.0%**	**355**	**100.0%**
U.S Active Aircraft (FAA Aerospace Forecasts 2006 Estimated)										
Single Engine Piston	173,177	76.5%	188,737	75.3%	199,099	74.4%	206,686	73.1%	214,562	71.6%
Multi-Engine Piston	19,364	8.6%	19,101	7.6%	18,916	7.1%	18,678	6.6%	18,444	6.2%
Turboprop	8,026	3.5%	8,352	3.3%	8,605	3.2%	8,946	3.2%	9,301	3.1%
Jet	10,032	4.4%	15,304	6.1%	19,881	7.4%	25,377	9.0%	32,393	10.8%
Helicopter	9,232	4.1%	12,308	4.9%	14,272	5.3%	16,271	5.8%	18,551	6.2%
Other	6,592	2.9%	6,785	2.7%	6,698	2.5%	6,606	2.3%	6,515	2.2%
Totals	**226,423**	**100.0%**	**250,587**	**100.0%**	**267,471**	**100.0%**	**282,564**	**100.0%**	**299,766**	**100.0%**

Note: Experimental and Sport Aircraft totals are included in Single Engine Piston category; 2022 and 2027 U.S. Active Aircraft projections extrapolated

Source: Airport records; FAA Aerospace Forecasts FY 2007-2020

The fleet mix at Lake Havasu City Municipal Airport is expected to see growth similar in make-up to that on the national level. The single engine piston category is projected to increase only slightly as a percentage of total based aircraft; however, it is projected to continue to dominate the based aircraft fleet mix, growing by 110 aircraft. The number of multi-engine piston aircraft is forecast to increase to 36, although still resulting in a percentage decline. Business jets and turboprop aircraft are expected to experience significant growth. Lake Havasu City is continuing to grow in terms of population and employment. These factors add to optimism for business jet and turboprop growth at the airport. Currently, there are nine business jets and nine turboprops based at the airport. The fleet mix indicates as many as 14 jets and 15 turboprops could base at the airport by 2027. The helicopter percentage is maintained relatively constant through the planning period, allowing for some growth in this category at the airport.

ANNUAL 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.

Due to the absence of an airport traffic control tower (ATCT), actual operation counts are not available for Lake Havasu City Municipal Airport. Instead, only estimates of operations are available. Historical estimates of aircraft operations are summarized in the FAA TAF. **Table 2N** summarizes historical general aviation operational estimates since 1998 for Lake Havasu City Municipal Airport.

TABLE 2N
Historical General Aviation Operations
Lake Havasu City Municipal Airport

Year	Local	Itinerant	Total
1998	23,360	24,640	48,000
2000	21,000	22,600	43,600
2002	23,360	22,600	45,960
2006	23,360	22,600	45,960

Source: FAA TAF

It should be noted that airport management monitors the airport's UNICOM frequency and has traditionally logged aircraft operations at the airport during the hours they are present. Over the past five years, airport staff has logged an annual average of 33,364 aircraft operations during approximately 4,400 working hours. Their counts include all types of aircraft operations. Total aircraft operations will be higher than what was logged by airport management monitoring the airport's UNICOM frequency due to limited hours of operation.

General aviation operations have been examined as a ratio of general aviation based aircraft. As shown in **Table 2P**, the 2006 estimate of 45,960 annual general aviation operations equates to 205 operations per based aircraft. Years 2000 and 2002 averaged approximately 200 operations per based aircraft.

Two different forecasts were conducted for general aviation operations. First, a constant number of operations per based aircraft was used to project aircraft operations. The second forecast increased the number of operations per based aircraft through the planning period. Operations per based aircraft typically range between 200 and 500 at general aviation airports. The higher operations per based aircraft are experienced at airports with higher numbers of local operations than itinerant operations. In 2006, it was estimated that local operations accounted for approximately 51 percent of total general aviation operations.

As shown in **Table 2P**, applying 210 operations per based aircraft yields 74,550 annual general aviation operations in 2027. Increasing the operations per based aircraft ratio yields 92,300 annual operations by 2027. The SANS 2000 and FAA TAF have been examined for comparative purposes. The SANS 2000 projected operations growing from 61,304 in 2005, to 83,320 in 2020. Extrapolating these numbers yield 96,000 general aviation operations by 2027. The FAA TAF projects annual operations to remain static at 46,632 through 2025.

TABLE 2P
Annual General Aviation Operations Forecasts
Lake Havasu City Municipal Airport

Year	Based Aircraft	Local Operations	% of Total	Itinerant Operations	% of Total	Total Operations	Operations Per Based Aircraft
1998	215	23,360	48.67%	24,640	51.33%	48,000	223
2000	218	21,000	48.17%	22,600	51.83%	43,600	200
2002	226	23,360	50.83%	22,600	49.17%	45,960	203
2006	229	23,360	50.83%	22,600	49.17%	45,960	205
Constant Operations Per Based Aircraft							
2012	265	28,938	52%	26,712	48%	55,650	210
2017	295	34,073	55%	27,878	45%	61,950	210
2022	325	37,538	55%	30,713	45%	68,250	210
2027	355	41,003	55%	33,548	45%	74,550	210
Increasing Operations Per Based Aircraft							
2012	265	31,694	52%	29,256	48%	60,950	230
2017	295	38,940	55%	31,860	45%	70,800	240
2022	325	44,688	55%	36,563	45%	81,250	250
2027	355	50,765	55%	41,535	45%	92,300	260
Selected Planning Forecast							
2012	265	30,300	52%	28,000	48%	58,300	220
2017	295	36,500	55%	29,900	45%	66,400	225
2022	325	41,100	55%	33,700	45%	74,800	230
2027	355	46,900	55%	38,300	45%	85,200	240

Source: Based Aircraft - Airport Records, Cost Recovery Analysis Study, FAA TAF; Historical Operations - FAA TAF

The FAA projects an increase in aircraft utilization and the number of general aviation hours flown nationally. This trend, along with projected growth in based aircraft, supports future growth in annual operations at Lake Havasu City Municipal Airport. Considering these factors, along with a third fixed base operator (FBO) that is to open in 2008 providing additional flight training and other aircraft services, the selected planning forecast for the airport projects the number of operations per based aircraft to gradually increase through the planning period. The selected mid-range forecast results in 85,200 annual general aviation operations by 2027. This is an average annual growth rate of 3.1 percent. Local operations are projected to increase to 55 percent of total general aviation operations as the number of flight training activities at the airport grows. **Exhibit 2D** depicts the general aviation operations forecast.

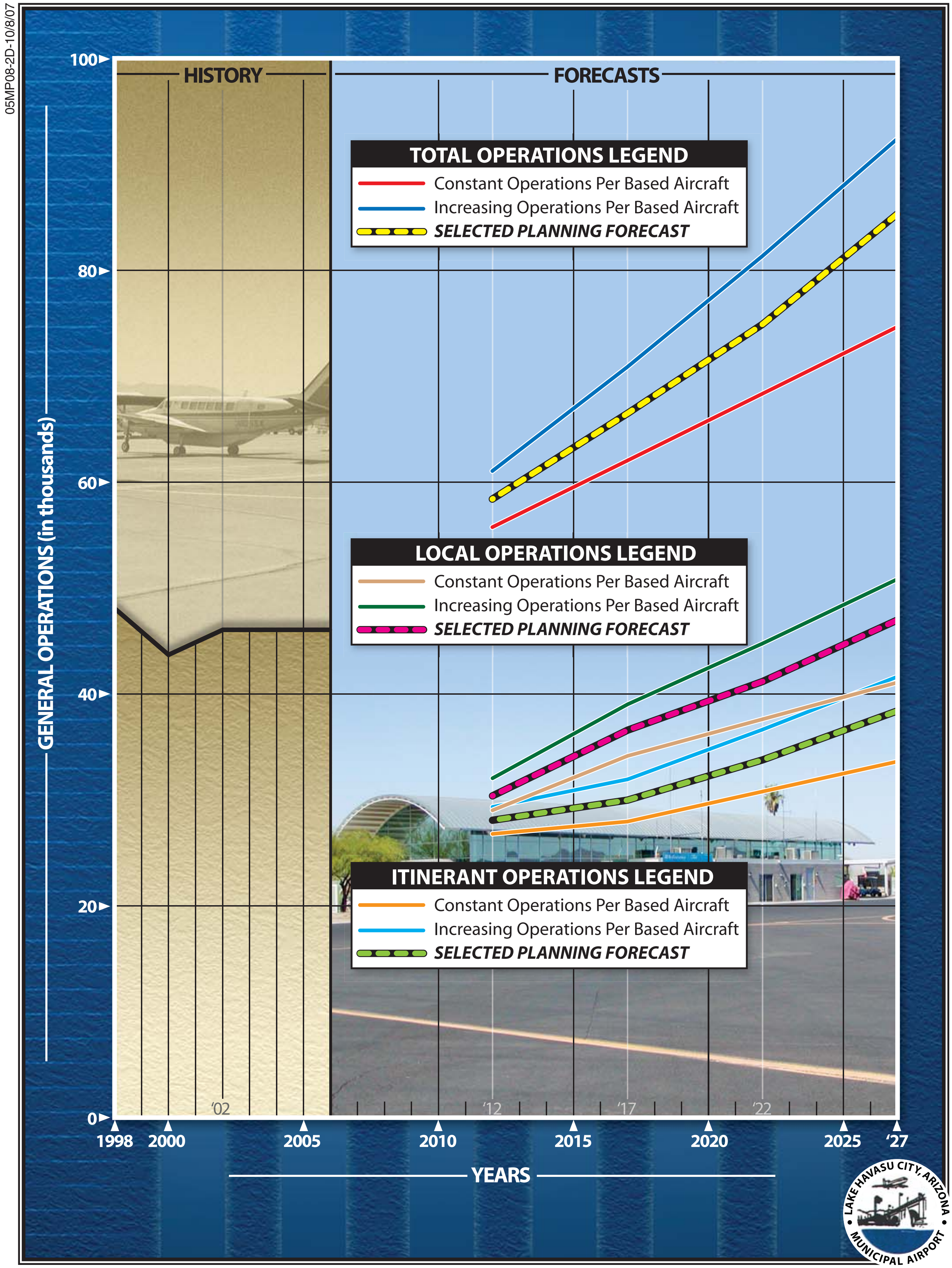


Exhibit 2D
GENERAL AVIATION
OPERATIONS FORECASTS

COMMERCIAL SERVICE FORECASTS

To determine the types and sizes of facilities necessary to properly accommodate potential future airline activity, two elements of commercial service must be forecast; annual enplaned passengers and annual aircraft operations. Of these, the number of annual enplaned passengers is the most basic indicator of demand for commercial service activity. The term "enplanement" refers to a passenger boarding an airline flight. From a forecast of annual enplanements, operations and peak period activity can be projected based on the specific characteristics of passenger demand at the airport.

LAKE HAVASU CITY MUNICIPAL AIRPORT AIR SERVICE

Mesa Airlines operating under Air Midwest had provided commercial air service to Lake Havasu City Municipal Airport until May 6, 2007, when it ceased operations. Before this time, Mesa Airlines was providing two daily non-stop flights to Phoenix Sky Harbor International Airport, Monday through Friday, as well as one daily non-stop flight to Phoenix Sky Harbor International Airport on Saturday and Sunday. Mesa Airlines utilized Beech 1900 aircraft that are configured to carry up to 19 passengers.

According to records, four separate airlines have provided passenger air service at Lake Havasu City Municipal Airport since 1998. Besides Air Midwest, which has utilized the airport during this time period, Arizona Express and Dynasty Air also provided commercial service at Lake Havasu City Municipal Airport. Their operations ceased in 2004. United Express also provided commercial service at the airport until 1999.

In May 2006, Air Midwest started providing one flight to Phoenix Sky Harbor International Airport and one flight to McCarran International Airport in Las Vegas, Sunday through Friday, as well as one flight to Las Vegas on Saturday. This flight schedule lasted until February 2007, when Air Midwest began operating exclusively to Phoenix until ceasing operations in May.

PASSENGER ENPLANEMENTS

Historical passenger enplanements since 1998 are presented in **Table 2Q**. As shown in the table, enplanements at Lake Havasu City Municipal Airport have fluctuated significantly in the past several years. Enplanements peaked at 10,761 in 2004. The lowest annual level was in 2006 with 6,085. The decline in annual enplanements in 2005 and 2006 is the result of decreased daily flights and the fact that two airlines, Arizona Express and Dynasty Air, ceased operations in 2004.

As in any case where there are differences in levels of service, Lake Havasu City Municipal Airport must compete with the air service available at McCarran International Airport and Phoenix Sky Harbor International Airport. While approximately 150 miles and 200 miles from Lake

Havasu City, respectively, each airport provides regular jet service and affordable airfares to all domestic destinations. As a result, many passengers choose to use these airports rather than fly directly to the more convenient Lake Havasu City Municipal Airport. This is referred to as leakage. The re-capture of passenger leakage will lead to growth in enplanements at the airport.

TABLE 2Q
Passenger Enplanements per Lake Havasu City Population
Lake Havasu City Municipal Airport

Year	Enplaned Passengers	Lake Havasu City Population	Enplanements per Resident
1998	9,633	37,580	0.26
1999	9,223	38,635	0.24
2000	8,266	41,045	0.20
2001	7,427	41,938	0.18
2002	7,317	44,200	0.17
2003	9,475	46,400	0.20
2004	10,761	48,730	0.22
2005	8,618	53,204	0.16
2006	6,085	55,338	0.11
Constant Ratio Projection			
2012	9,700	69,516	0.14
2017	11,200	80,107	0.14
2022	12,600	89,813	0.14
2027	13,800	98,445	0.14
Increasing Ratio Projection			
2012	10,400	69,516	0.15
2017	13,600	80,107	0.17
2022	17,100	89,813	0.19
2027	20,700	98,445	0.21

Source: Enplaned Passengers - Airport Records; Population - Arizona Department of Economic Security; Coffman Associates Analysis

The number of potential enplanements that Lake Havasu City Municipal Airport could attract depends primarily upon the level of air service at the airport. The full potential for Lake Havasu City Municipal Airport would only be realized if the airport provided services and airfares similar to McCarran International Airport and/or Phoenix Sky Harbor International Airport. This is not likely, considering the communities that these two airports serve, and the established airline operations at the airports. As such, Lake Havasu City Municipal Airport will only be capable of attracting passengers with specific needs and desires to fly from Lake Havasu City. With this being said, the type of commercial passenger most likely to utilize the airport is the business traveler and/or recreational traveler looking to enjoy the activities Lake Havasu has to offer.

Ratio of City Population

Table 2Q examines enplanements as a ratio of Lake Havasu City's population. Lake Havasu City represents the primary catchment area for the airport's enplanements. As presented in the table, the ratio of enplanements to population has declined the past two years.

Two forecasts, based on the ratio of enplanements to population, have been prepared. A constant ratio of enplanements per resident has been developed to yield an enplanement projection growing at the same rate as the Lake Havasu City population. Applying a constant ratio of 0.14 enplanements to residents yields approximately 13,800 annual enplanements by the end of the planning period. A second forecast presents an increasing ratio of enplanements to population through the planning period, reaching a level similar to the 2003 and 2004 enplanements per resident. This results in 20,700 annual enplanements by 2027.

Market Share of U.S. Regional Enplanements

A market share analysis of total U.S. regional airline enplanements was also developed to prepare an alternative forecast. **Table 2R** delineates Lake Havasu City Municipal Airport's market share since 1998.

As shown in the table, the airport's share of the U.S. market for regional airline enplanements has varied since 1998, from a high of 0.015 percent in 1998 to a low of 0.004 percent in 2006. Similar to the airport's ratio of enplanements to residents, the Lake Havasu City Municipal Airport's share of U.S regional airline enplanements has declined since 2005.

To gain an understanding of future airline enplanements at Lake Havasu City Municipal Airport based upon the growth projected for U.S. regional airline enplanements, a constant market share has been prepared. This forecast takes a constant share of 0.005 percent and applies it to forecast U.S. regional airline enplanements prepared by the FAA. This method projects annual enplanements growing at the same rate as U.S. regional airline enplanements and yields 14,500 enplanements by the end of the planning period. A second forecast projects Lake Havasu City Municipal Airport gaining market share through the planning period. This projection yields approximately 26,900 enplanements by 2027. This projection accounts for the airport recapturing a portion of passenger leakage.

Comparative Forecasts

The 1999 Limited Master Plan Update contains projections of enplaned passengers. In 2010 and 2015, approximately 20,800 and 24,900 enplanements were forecast, respectively. Overall, this equates to a 4.48 percent average annual growth rate.

The 2000 SANS also contains projections of enplaned passengers. The SANS projected 18,308 enplanements for 2010. By 2020, the study projected

21,360 enplanements. Extrapolation of the trend yields approximately 28,200 by 2027. This represents a 4.05 percent annual growth rate.

TABLE 2R
Market Share of U.S. Regional Enplanements
Lake Havasu City Municipal Airport

Year	Enplaned Passengers	U.S. Regional Enplanements	% of U.S. Regional Airline Enplanements
1998	9,633	65,700,000	0.015%
1999	9,223	73,100,000	0.013%
2000	8,266	79,700,000	0.010%
2001	7,427	80,400,000	0.009%
2002	7,317	88,600,000	0.008%
2003	9,475	105,000,000	0.009%
2004	10,761	125,900,000	0.009%
2005	8,618	146,400,000	0.006%
2006	6,085	152,100,000	0.004%
Constant Market Share			
2012	9,200	183,500,000	0.005%
2017	10,700	213,100,000	0.005%
2022	12,400	248,200,000	0.005%
2027	14,500	289,300,000	0.005%
Increasing Market Share			
2012	11,000	183,500,000	0.006%
2017	14,900	213,100,000	0.007%
2022	19,900	248,200,000	0.008%
2027	26,000	289,300,000	0.009%

Source: Enplaned Passengers - Airport Records; U.S. Regional Enplanements - FAA Aerospace Forecasts FY 2007-2020 (2022 and 2027 extrapolated); Coffman Associates analysis

Finally, the FAA TAF presents enplanement projections for all commercial service airports in the United States. The FAA TAF for Lake Havasu City Municipal Airport was developed using historical data through the year 2005 and projects a very modest increase in annual enplanements to 9,013 by 2025. The forecasts equate to a 0.13 percent AAGR.

Statistical Trends and Regression

As previously mentioned, it is optimal to have an "r^2" value near or above 0.90, which would represent a very strong correlation when projecting future activity based on previous trends. Due to the fluctuations in enplanement levels since 1998, the time-series and regression analyses yielded correlation coefficients too low to have any predictive reliability. Therefore, none of these analyses were carried forward in this study.

Passenger Enplanement Summary

Table 2S summarizes all the projections considered for this analysis. As shown on **Exhibit 2E**, the combination of the forecasts represents a "forecast envelope." The "forecast envelope" represents the area in which future enplanements should be found.

The constant ratio projection of enplanements per Lake Havasu City residents forecast represents the low end of the forecast envelope, while the increasing market share of U.S. regional enplanements projection forms the upper end of the envelope. The FAA TAF lies below the forecast envelope and the Limited Master Plan Update is substantially above the forecast envelope.

TABLE 2S
Passenger Enplanement Forecasts Summary
Lake Havasu City Municipal Airport

Projections	2012	2017	2022	2027
Enplanements per Residents (Lake Havasu City)				
Constant Ratio Projection	9,700	11,200	12,600	13,800
Increasing Ratio Projection	10,400	13,600	17,100	20,700
Market Share of U.S. Regional Enplanements				
Constant Market Share	9,200	10,700	12,400	14,500
Increasing Market Share	11,000	14,900	19,900	26,000
Comparative Forecasts				
Limited Master Plan Update (1999)	22,300*	27,100**	33,700**	42,000**
State Aviation Needs Study (SANS) 2000	18,700*	20,200*	22,200**	24,500**
FAA Terminal Area Forecast (TAF)	8,859	8,925	8,980	9,040**
Selected Planning Forecast	***9,500***	***11,000***	***13,000***	***16,000***

* Interpolated; ** Extrapolated

In examining the forecasts, it would appear that the increasing market share of U.S. regional enplanements projection is too aggressive for the airport. This forecast yields a strong annual growth rate of 5.90 percent that more than likely could not be sustained over the planning period due to competing airports in the region. The Limited Master Plan Update and SANS 2000 forecasts also appear very high for the airport. These studies forecast current enplanement levels to be over 15,000, when in actuality, last year's enplanement level was approximately 6,000. As a result, future forecasts are much higher than what can reasonably be expected.

The constant and increasing ratio projection of enplanements per Lake Havasu City residents appear to be in line with potential enplanement growth. As shown previously, enplanements grew from 2002 to 2004 when the airport sustained continual, reliable air service. If this type of service could be achieved again, enplanement growth could grow at a mid-range level of these two forecasts.

There is potential for growth in the Lake Havasu City market. The local population and economy is growing as evidenced previously. The airport serves the Lake Havasu and Colorado River region, which attracts tourism and climates suitable for summer recreation and winter retreats. These factors are important to some business travelers and visitors.

The selected forecast for Lake Havasu City Municipal Airport closely follows the constant market share of U.S. regional enplanements. This forecast yields 9,500 annual enplanements in 2012 and increases 3.54 percent annually to approximately 16,000 annual enplanements by 2027.

AIRLINE FLEET MIX AND OPERATIONS

The type of aircraft in the commercial airline fleet serving the airport is an important component of airport planning. Not only will the make-up of the commercial airline fleet mix serving the airport be helpful in determining the number of commercial airline operations that could take place at the airport, but it is also helpful in defining many of the key parameters used in airport planning; namely, critical aircraft serving the airport (used for pavement design, ramp geometry, and terminal complex layout).

As previously mentioned, Mesa Airlines (operated under Air Midwest) utilized 19-seat Beech 1900 aircraft for its commercial service operations in the past. If the airport gains commercial service in the future, it is expected that it will continue to be provided by regional/commuter airlines. The newest regional aircraft in the national fleet includes faster turboprop aircraft such as the 37-seat DeHaviland (Q-100) and smaller regional jets such as the 37-seat Embraer Regional Jet (ERJ-135). With room for additional passengers, these aircraft offer operators a significant reduction in seat-mile operating costs, while offering many amenities that the flying public has become accustomed to such as a flight attendant and restrooms on board. In the event that enplanements were to grow, it can be expected that larger aircraft would be used at the airport to serve peak time periods.

The potential number of operations is derived from the boarding load factor (BLF). The BLF is determined by dividing the number of enplanements per departure by the average number of departure seats (aircraft seating capacity). The BLF is important to an airline because it is the basis for measuring the ability to profit in a given market. When a load factor is low, an airline will generally cut back on the number of seats available by either reducing the size of the aircraft serving the market or reducing the number of flights. Similarly, when the load factor is high, an airline will begin to consider increasing the number of flights or the size of its aircraft.

In 2006, the average number of departure seats was 19, as the airport was consistently served with the Beech 1900 aircraft. The BLF at this time was 51 percent. Consistent with the national trend, the BLF is projected to increase through 2017 and then de-

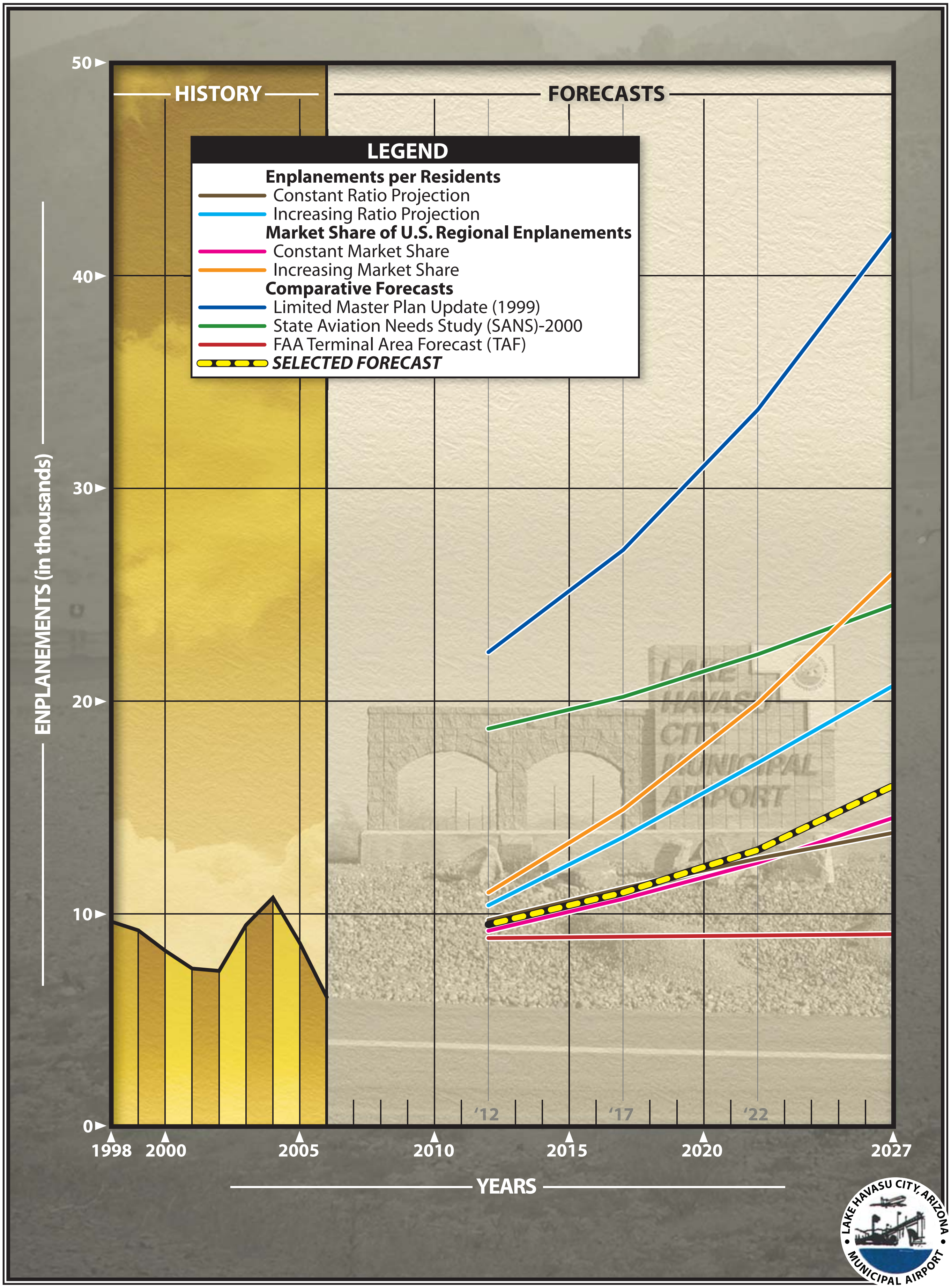


Exhibit 2E
PASSENGER ENPLANEMENT
FORECASTS

cline slightly as larger aircraft could be introduced into the market.

Annual operations are calculated by dividing the projected annual enplanements by the enplanements per departure. An increase in operations is projected through the planning period. This could be needed to serve the potential demand and accounts for schedule and frequency enhancements. **Table 2T** summarizes the fleet mix and operations forecast for Lake Havasu City Municipal Airport. As evidenced, should the airport regain commercial service, projections point toward an increase in utilization of the service in the future.

TABLE 2T
Airline Fleet Mix and Operations Forecast
Lake Havasu City Municipal Airport

Seating Range (Representative Aircraft)	2006	2012	2017	2022	2027
10-20 (Beechcraft 1900)	100%	100%	100%	80%	70%
Greater than 20 (ERJ-120, Q-100)	0%	0%	0%	20%	30%
Average Seats Per Departure	19	19	19	21	22
Boarding Load Factor	51%	58%	63%	62%	64%
Enplanements Per Departure	10	11	12	13	14
Annual Enplanements	6,085	9,500	11,000	13,000	16,000
Annual Departures	627	900	950	1,050	1,200
Annual Operations	1,254	1,800	1,900	2,100	2,400

Source: Coffman Associates analysis

AIR TAXI OPERATIONS

The air taxi category refers to those operators that are certified in accordance with Federal Aviation Regulation (F.A.R.) Part 135 and are authorized to provide on-demand, public transportation of persons and property by aircraft. Typically, air taxi operators are operating as a charter service or under a fractional-ownership program.

In the post-9/11 environment, many executives have opted to use private jets for their travel needs. Fractional-ownership programs were well positioned to meet this growing demand. There are a number of companies, including Citation Shares, NetJets, Bombardier FlexJet, and Flight Options, which provide this service. Companies or individuals are able to purchase partial ownership, typically one-sixteenth or one-eighth of an aircraft. This gives them a certain allotment of time to use an aircraft in the fractional-ownership fleet.

Analysis of air taxi operators can have a significant impact on the needs of an airport. Fractional-ownership companies utilize business jets almost exclusively. Many of these aircraft are large business jets. As larger business jets increasingly utilize the airport, the necessary design standards for the airport may change. Charter operators use a variety of piston, turboprop, and, on occasion, jet aircraft. The type of aircraft using the airport will be a critical element for the airport to prepare for in the future.

Due to the absence of an ATCT at Lake Havasu City Municipal Airport, actual air taxi operations counts are not available. Fortunately, a subscription service (*Airport IQ*) is available that provides partial operational data. The data provided represents the absolute minimum number of operations. If a flight plan is not opened prior to takeoff and/or not closed after landing, then the operation is not credited in the data set. It is common for pilots to not file a flight plan until after departure, or to close it prior to landing, if visual flight rules (VFR) apply. VFR weather conditions are very common at Lake Havasu City Municipal Airport. As a result, air taxi operations verified by *Airport IQ* were increased 50% to better account for actual activity.

The fractional-ownership industry experienced significant growth from 1998 to 2002, when the aircraft fleet grew by 182 percent, according to *Aviation Week*. The economic slowdown in 2001 and 2002 caught up to the industry in 2003, but 2004 was another growth year. According to AvData, Inc., an independent Wichita, Kansas-based aviation research and consulting firm, fractional-ownership programs are forecast to experience continued growth of approximately 15 percent per year over the next 20 years. Other industry analysts predict the growth potential to be in the single digits.

As mentioned earlier, an entire new category of VLJs are entering the general aviation market. A number of companies are proceeding with business plans to offer on-demand air taxi service utilizing these types of aircraft. The VLJs are relatively inexpensive compared to larger cabin class business jets, and they will have access to more airports as the required runway length is much less. Lake Havasu City Municipal Airport is well positioned to attract operations by VLJs with adequate runway length and forecasted growth in business opportunities in the airport service area. For planning purposes, an increasing trend of five percent per year will be applied to operations forecast for air taxi operations. Forecast air taxi operations are presented in **Table 2U**.

TABLE 2U
Air Taxi Operations Forecasts
Lake Havasu City Municipal Airport

Year	Air Taxi Operations
2006	1,600
2012	2,100
2017	2,700
2022	3,500
2027	4,400

Source: Airport IQ; Coffman Associates analysis

MILITARY OPERATIONS

Military activity accounts for the smallest portion of operational traffic at Lake Havasu City Municipal Airport. Since 2000, military operations have accounted for 360 annual itinerant operations according to the FAA TAF. There have been no local military operations. Due to the unpredictable nature of military operations, a constant of 400 total operations annually will be utilized in forecasting. This is consistent with typical industry practices for projecting military operations.

PEAKING CHARACTERISTICS

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

- **Peak Month** – The calendar month when peak passenger enplanements or aircraft operations occur.
- **Design Day** – The average day in the peak month. This indicator is derived by dividing the peak month operations or passenger enplanements 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.

AIRLINE PEAKING CHARACTERISTICS

Airline peaking characteristics have been determined by examining historical records of enplanements and operations. The average peak month for passenger enplanements since 1998 was 10.7 percent of total enplanements. Future peak month levels were estimated using this percentage. The design day enplanements were calculated by dividing the number of enplanements in the peak month by 30 to represent an average month. Design hour enplanements equal the projection of enplanements per departure developed earlier as part of the commercial operations forecast. The enplanements per departure are determined by applying a BLF to the projected number of seats available per departure.

According to airport records, the average peak month for airline operations since 1998 captured approximately 11.5 percent of annual operations. This percentage was applied to forecast operations. In 2006, the airport had two daily departures, or four total operations. This represents the design day. The design hour had one departure and landing operation, for two total operations. Average day and peak hour operations are projected to increase later in the planning period as additional daily flights could be added. A summary of the forecasts for peak period airline enplanements and operations is presented in **Table 2V**.

TABLE 2V Peak Period Forecasts Lake Havasu City Municipal Airport	2006	2012	2017	2022	2027
Airline Enplanements					
Annual	6,085	9,500	11,000	13,000	16,000
Peak Month	780	1,017	1,177	1,391	1,712
Design Day	26	34	39	46	57
Design Hour	10	17	22	27	34
Airline Operations					
Annual	1,254	1,800	1,900	2,100	2,400
Peak Month	128	207	219	241	276
Design Day	4	4	6	8	10
Design Hour	2	2	2	2	4
General Aviation Operations					
Annual	47,920	60,800	69,500	78,700	90,000
Peak Month	5,750	7,296	8,340	9,444	10,800
Design Day	192	243	278	314	360
Busy Day	240	303	348	392	450
Design Hour	29	36	42	47	54
Source: Coffman Associates analysis					

GENERAL AVIATION PEAKING CHARACTERISTICS

Without an ATCT, adequate operational information is not available to directly determine peak operational activity at the airport. Therefore, peak period forecasts have been determined according to trends experienced at similar airports and by examining the operational counts completed at the airport in 2006.

Typically, the peak month for activity at general aviation airports approximates 10 to 15 percent of the airport's annual operations. For planning purposes, peak month operations have been estimated at 12 percent of annual operations at Lake Havasu City Municipal Airport. The design day operations were calculated by dividing the peak month by 30. The design day is primarily used in airfield capacity calculations.

The busy day provides information for use in determining aircraft parking apron requirements. The busiest day of each week accounts for approximately 18 percent of weekly operations. Thus, to determine the typical busy day, the design day is multiplied by 1.25, which represents approximately 18 percent of the days in a week. Design hour operations were determined at 15 percent of the design day operations. **Table 2V** summarizes peak general aviation operations forecasts for the airport.

ANNUAL INSTRUMENT APPROACHES

An instrument approach, as defined by the FAA, is "an approach to an airport with the 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 initial approach altitude." To qualify as an instrument approach at Lake Havasu City Municipal Airport, aircraft must land at the airport after following one of the published instrument approach procedures and then properly close their flight plan on the ground. The approach must be conducted in weather conditions which necessitate the use of the instrument approach. If the flight plan is closed prior to landing, then the instrument approach is not counted in the records. Forecasts of annual instrument approaches (AIAs) provide guidance in determining an airport's requirements for navigational aid facilities. It should be noted that practice or training approaches do not count as annual AIAs.

Typically, AIAs for airports with available instrument approaches utilized by advanced aircraft will average between one and two percent of itinerant operations. In the Lake Havasu City area, weather conditions rarely necessitate an instrument approach. In environments similar to the Lake Havasu City area, five-tenths of one percent of itinerant operations has been utilized to estimate potential future instrument approaches. A forecast utilizing this percentage is shown on **Exhibit 2F**.

The increased availability of low-cost navigational equipment could allow smaller and less sophisticated aircraft to utilize instrument approaches. National trends indicate an increasing percentage of approaches given the greater availability of approaches at airports with GPS and the availability of more cost-effective equipment.

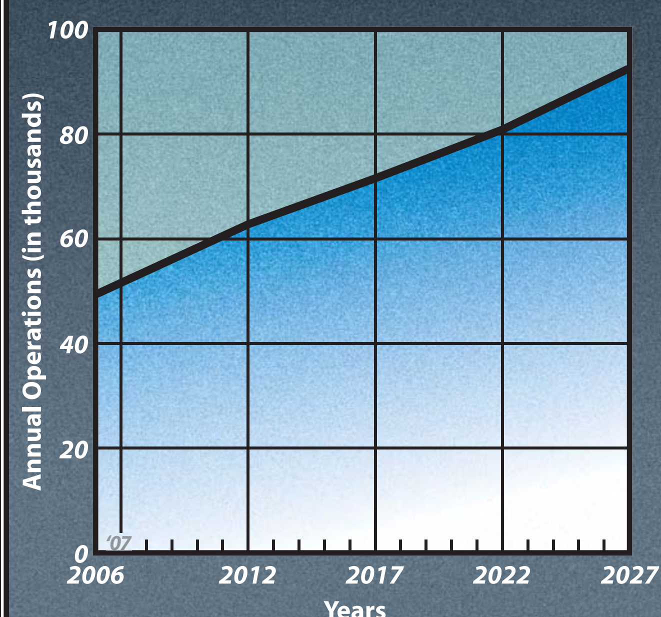
SUMMARY

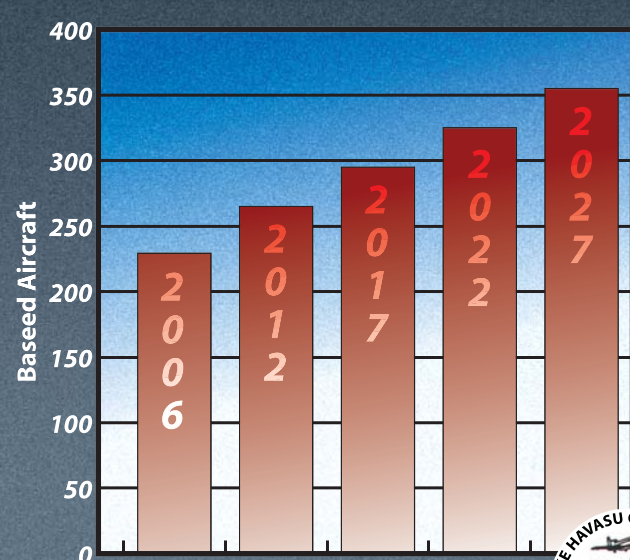
This chapter has provided demand-based forecasts of aviation activity at Lake Havasu City Municipal Airport over the next 20 years. **Exhibit 2F** presents a summary of the aviation forecasts developed for the airport. The airport is expected to experience an increase in total based aircraft, annual operations, and annual enplaned passengers throughout the planning period. The next step in this study will be to assess the capacity of existing facilities, their ability to meet forecast demand, and to identify changes to the airfield and/or landside facilities which will create a more functional aviation facility.

Forecasts for future enplaned air cargo have not been developed. A change in the role of air cargo service at the airport is not expected through the planning period. The airport is expected to continue to be served by feeder aircraft to regional hubs. It can be assumed that the airport will be served by both piston-powered and turboprop aircraft in the future. These aircraft can easily be accommodated on existing apron areas.

05MP08-2F-10/8/07

	2006	2012	2017	2022	2027
ANNUAL OPERATIONS FORECAST					
Itinerant					
Air Carrier	1,254	1,800	1,900	2,100	2,400
Air Taxi	1,600	2,100	2,700	3,500	4,400
General Aviation	22,600	28,000	29,900	33,700	38,300
Military	360	400	400	400	400
Total Itinerant	***25,814***	***32,300***	***34,900***	***39,700***	***45,500***
Local					
General Aviation	23,360	30,300	36,500	41,100	46,900
Total Local	***23,360***	***30,300***	***36,500***	***41,100***	***46,900***
Total Operations	***49,174***	***62,600***	***71,400***	***80,700***	***92,400***
ANNUAL ENPLANEMENTS					
Airport Total	***6,085***	***9,500***	***11,000***	***13,000***	***16,000***
BASED AIRCRAFT FORECAST					
General Aviation Based Aircraft					
Single Engine	169	202	228	255	279
Multi-Engine	34	34	35	35	36
Turboprop	9	11	12	13	15
Jet	9	10	11	12	14
Helicopter	6	6	7	8	9
Ultralight	2	2	2	2	2
Total GA Based Aircraft	***229***	***265***	***295***	***325***	***355***
PEAK OPERATIONS					
General Aviation					
Peak Month	5,750	7,296	8,340	9,444	10,800
Design Day	192	243	278	314	360
Busy Day	240	303	348	392	450
Design Hour	29	36	42	47	54
Air Carrier					
Peak Month	128	207	219	241	276
Design Day	4	4	6	8	10
Design Hour	2	2	2	2	4
ANNUAL INSTRUMENT APPROACHES					
Airport Total	***129***	***161***	***175***	***198***	***228***





LAKE HAVASU CITY, ARIZONA • MUNICIPAL AIRPORT •

Exhibit 2F
FORECAST SUMMARY

Chapter Three

AIRPORT FACILITY REQUIREMENTS

Chapter Three

AIRPORT FACILITY REQUIREMENTS

To properly plan for the future of Lake Havasu City Municipal Airport, it is necessary to translate forecast aviation demand into the specific types and quantities of facilities than can adequately serve this identified demand. This chapter uses the results of the forecasts conducted in Chapter Two, as well as established planning criteria, to determine the airfield (i.e., runways, taxiways, navigational aids, marking and lighting) and landside (i.e., terminal building, hangars, aircraft parking apron, and automobile parking) facility requirements.

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

The cost-effective, efficient, and orderly development of an airport should rely more upon actual demand at an airport than on 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 have been established for Lake Havasu City Municipal Airport that take into consideration the reasonable range of aviation demand projections prepared in the previous chapter.

It is important to consider that the actual activity 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. It is important that the plan accommodate these changes so that airport staff can respond to unexpected changes in a timely fashion. These milestones provide flexibility, while potentially extending this plan's useful life if aviation trends slow over time.

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 be slowed or expedited according to actual demand at any given time over the planning period. The resulting plan provides airport officials with a financially responsible and need-based program. **Table 3A** presents the planning horizon milestones for each aircraft activity category. The planning milestones of short, intermediate, and long term generally correlate to the five, ten, and twenty-year periods used in the previous chapter.

TABLE 3A
Planning Horizon Activity Levels
Lake Havasu City Municipal Airport

	2006	Short Term	Intermediate Term	Long Term
Itinerant Operations				
Air Carrier	1,254	1,800	1,900	2,400
Air Taxi	1,600	2,100	2,700	4,400
General Aviation	22,600	28,000	29,900	38,300
Military	360	400	400	400
Total Itinerant	25,814	32,300	34,900	45,500
Local Operations				
General Aviation	23,360	30,300	36,500	46,900
Total Local	23,360	30,300	36,500	46,900
TOTAL OPERATIONS	**49,174**	**62,600**	**71,400**	**92,400**
ENPLANED PASSENGERS	**6,085**	**9,500**	**11,000**	**16,000**
TOTAL BASED AIRCRAFT	**229**	**265**	**295**	**355**

AIRFIELD PLANNING CRITERIA

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. The critical design aircraft is used to define the design parameters for the airport. The critical design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 operations per year at the airport. Planning for future aircraft use is of particular importance since design standards are used to plan many airside and landside components. These future standards must be considered now to ensure that short term development does not preclude the long range potential needs of the airport.

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

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

Category A: Speed less than 91 knots.
Category B: Speed 91 knots or more, but less than 121 knots.
Category C: Speed 121 knots or more, but less than 141 knots.
Category D: Speed 141 knots or more, but less than 166 knots.
Category E: Speed greater than 166 knots.

The airplane design group (ADG) is based upon either the aircraft's wingspan or tail height, whichever is greater. For example, an aircraft may fall in ADG II for wingspan at 70 feet, but ADG III for tail height at 33 feet. This aircraft would be classified under ADG III. The six ADGs used in airport planning are as follows:

ADG	Tail Height (feet)	Wingspan (feet)
I	<20	<49
II	20-<30	49-<79
III	30-<45	79-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

Source: AC 150/5300-13, Change 11

Exhibit 3A summarizes representative aircraft by ARC. As shown on the exhibit, the airport does not currently, nor is it expected to, regularly serve aircraft in ARCs C-III, D-III, C-IV, D-IV, or D-V. These are large transport aircraft commonly used by commercial air carriers and air cargo carriers which do not currently use nor are expected to use Lake Havasu City Municipal Airport through the planning period.

The FAA recommends designing airport functional elements to meet the requirements for the most demanding ARC for that airport. The majority of aircraft currently operating at the airport are small single engine aircraft weighing less than 12,500 pounds. The airport also has a significant volume of corporate aircraft ranging from the smaller Cessna Citation family to the Challenger 600, which can weigh more than 50,000 pounds.

In order to determine airfield design requirements, the critical aircraft and critical ARC should first be determined, and then appropriate airport design criteria can be applied. This process begins with a review of aircraft currently using the airport and those expected to use the airport through the long term planning period.

CRITICAL AIRCRAFT

In some cases, more than one specific make and model of aircraft comprises the airport's critical design aircraft. For example, one category of aircraft may be the most critical in terms of approach speed, while another is most critical in terms of wingspan. Smaller general aviation piston-powered aircraft within approach categories A and B and ADG I conduct the majority of operations at Lake Havasu City Municipal Airport. Turboprops and jets with longer wingspans and higher approach speeds also utilize the airport, but less frequently. While the airport is also utilized by helicopters, they are not included in this determination as they are not assigned an ARC.

In 2006, there were 201 based aircraft at Lake Havasu City Municipal Airport. The majority of these are single and multi-engine piston-powered aircraft which fall within approach categories A and B and ADG I. There were five turboprop aircraft and one jet based at the airport. The most demanding of these turboprops is the King Air 90, with an approach speed and wingspan that categorizes it as an ARC B-II aircraft. The one jet is a Cessna 551, which is in the Cessna Citation family of aircraft. This aircraft also falls in ARC B-II. Before making a final determination of the critical aircraft family, an examination of the transient turboprop and jet aircraft using the airport should also be considered.

Turboprop and Jet Operations

A wide range of transient turboprop and jet aircraft operate at the airport. In order to discern the number and type of turboprop and jet operations at Lake Havasu City Municipal Airport, an analysis of instrument flight plan data was conducted. Flight plan data was acquired for this study from the subscription service, *Airport IQ*. The data available includes documentation of flight plans that are opened and closed on the ground at the airport. Flight plans that are opened or closed from the air are not credited to the airport. Therefore, it is likely that there are more turboprop and jet operations at the airport that are not captured by the methodology. Additionally, some turboprops and jets conduct operations within the traffic pattern at the airport. These local operations are also not captured on instrument flight plans.

Table 3B presents private jet and turboprop operations at Lake Havasu City Municipal Airport from November 1, 2006, to October 31, 2007 (12-month operational count). These operations would be considered itinerant general aviation operations.

05MP08-3A-10/8/07

A-I

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

C-I, D-I

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

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

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

C-II, D-II

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

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

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

C-III, D-III

- ERJ-170, 190
- Boeing Business Jet
- B 727-200
- **B 737-300 Series**
- MD-80, DC-9
- Fokker 70, 100
- A319, A320
- Gulfstream V
- Global Express

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

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

C-IV, D-IV

- **B-757**
- B-767
- C-130
- DC-8-70
- DC-10
- MD-11
- L1011

A-III, B-III

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

D-V

- **B-747** Series
- B-777

Note: Aircraft pictured is identified in bold type.

Exhibit 3A
AIRPORT REFERENCE CODES

TABLE 3B
Private Jet and Turboprop Operations (Minimum)
November 1, 2006 – October 31, 2007
Lake Havasu City Municipal Airport

ARC	Aircraft Type	Annual Operations	%	Number of Jets	%
JETS					
B-I	Cessna 500	8	0.7%	3	1.7%
	Cessna 501	20	1.8%	3	1.7%
	Cessna 510	2	0.2%	1	0.6%
	Premier 390	28	2.5%	4	2.3%
	Mitsubishi MU-300	2	0.2%	1	0.6%
	Falcon 10	14	1.3%	2	1.2%
	Eclipse 500	2	0.2%	1	0.6%
Total B-I		**76**	**6.9%**	**15**	**8.7%**
B-II	Cessna 525	392	35.6%	23	13.3%
	Cessna 550	64	5.8%	19	11.0%
	Cessna 551	28	2.5%	3	1.7%
	Cessna 560	44	4.0%	10	5.8%
	Hawker 700	2	0.2%	1	0.6%
	Hawker 800	2	0.2%	1	0.6%
	Falcon 20	6	0.5%	3	1.7%
	Falcon 50	12	1.1%	2	1.2%
	Falcon 900	2	0.2%	1	0.6%
Total B-II		**552**	**50.2%**	**63**	**36.4%**
C-I	Lear 24	2	0.2%	1	0.6%
	Lear 25	4	0.4%	2	1.2%
	Lear 31	4	0.4%	2	1.2%
	Lear 35	20	1.8%	4	2.3%
	Lear 45	32	2.9%	4	2.3%
	Lear 55	2	0.2%	1	0.6%
	IAI Westwind	4	0.4%	2	1.2%
	Beechjet 400	12	1.1%	6	3.5%
Total C-I		**80**	**7.3%**	**22**	**12.7%**
C-II	Gulfstream G-200	4	0.4%	1	0.6%
	Gulfstream G-1159	14	1.3%	4	2.3%
	Challenger 600	6	0.5%	3	1.7%
	Challenger BD-100	4	0.4%	1	0.6%
	IAI Astra 1125	18	1.6%	3	1.7%
Total C-II		**46**	**4.2%**	**12**	**6.9%**
D-I	Lear 60	4	0.4%	2	1.2%
Total D-I		**4**	**0.4%**	**2**	**1.2%**
D-II	Gulfstream IV	10	0.9%	1	0.6%
Total D-II		**10**	**0.9%**	**1**	**0.6%**
Total Jet Activity		**768**	**69.8%**	**115**	**66.5%**
ARC	**Aircraft Type**	**Annual Operations**	**%**	**Number of Turboprops**	**%**
TURBOPROPS					
B-I	Piaggio P-180	4	0.4%	2	1.2%
	Turbo Commander 690	4	0.4%	2	1.2%
	Beech King Air 100	2	0.2%	1	0.6%
Total B-I		**10**	**0.9%**	**5**	**2.9%**
B-II	Beech King Air 90	40	3.6%	13	7.5%
	Beech King Air 200	198	18.0%	27	15.6%
	Beech King Air B300	48	4.4%	12	6.9%
	Swearingen Metroliner	36	3.3%	1	0.6%
Total B-II		**322**	**29.3%**	**53**	**30.6%**
Total Turboprop Activity		**332**	**30.2%**	**58**	**33.5%**
Total Activity (Jet+Turboprop)		**1,100**	**100.0%**	**173**	**100.0%**

Source: *Airport IQ* utilizing FAA flight plan data

There were a total of 1,100 operations by privately owned jet and turboprop aircraft. The greatest number of operations in any single ARC family was 874 in ARC B-II. This number overwhelmingly accounted for the majority of private jet and turboprop operations, at approximately 80 percent.

The table also presents the number of operations by specific aircraft type. The Cessna 525 model performed the most jet operations (392) at the airport. There were 23 different Cessna 525 aircraft which accounted for this total. The Cessna 525 conducted over 50 percent of the total jet operations according to these records. As for the turboprop aircraft, the King Air 200 conducted 198 operations, accounting for approximately 60 percent of total turboprop operations.

The most demanding privately operated aircraft, in terms of ARC design standard, has been the Gulfstream IV. The Gulfstream IV is classified by the FAA as ARC D-II. Several ARC C-II operations by the Gulfstream G-1159, IAI Astra 1124, and Challenger 600 were also conducted at the airport over the last year.

Another segment of corporate aviation users operate under Federal Aviation Regulation (F.A.R.) Part 135 (air taxi) rules for hire and through fractional-ownership programs. Air taxi operators are governed by the FAA rules which are more stringent than those required for private aircraft owners. For example, aircraft operating under Part 135 rules must increase their calculated landing length requirements by 20 percent for safety factors. Fractional-ownership operators are actual aircraft owners who acquire a portion of an aircraft with the ability to use any aircraft in the program's fleet. These programs have become quite popular over the last several years, especially since 9/11. Some of the most notable fractional ownership programs include NetJets, Bombardier Flexjet, Citation Shares, and Flight Options.

Table 3C provides additional information regarding the ARC of many of the aircraft utilized by the fractional and charter companies which operate at Lake Havasu City Municipal Airport. In addition to F.A.R. Part 135 operators, commercial service aircraft are also shown in the table.

There were a total of 1,476 operations by aircraft operating as commercial or air taxi operators from November 1, 2006, to October 31, 2007. Of this total, 100 were by jet aircraft, and the remaining 1,376 were by turboprop aircraft. The Beechcraft 1900 and Beech Airliner 99 used respectively for passenger and cargo transport accounted for a large majority of the total operations.

Critical Aircraft Design Conclusion

The largest based aircraft in terms of ARC will often account for the design standard to be applied to the airport. The largest aircraft currently based at Lake Havasu City Municipal Airport are the Cessna 551 and King Air 90, which are categorized as ARC B-II aircraft. The analysis then examined the itinerant aircraft operating at the airport. The largest itinerant aircraft operating at the airport include the Gulfstream II and Gulfstream IV, which are included in ARC D-II.

TABLE 3C
Commercial and Air Taxi Operations (Minimum)
November 1, 2006 – October 31, 2007
Lake Havasu City Municipal Airport

ARC	Aircraft Type	Annual Operations	%
JETS			
B-I	Mitsubishi MU-300	4	0.3%
Total B-I		**4**	**0.3%**
B-II	Cessna 550	6	0.4%
	Cessna 560	20	1.4%
	Cessna 680	2	0.1%
	Hawker 700	2	0.1%
Total B-II		**30**	**2.0%**
C-I	Lear 25	4	0.3%
	Lear 31	2	0.1%
	Lear 35	4	0.3%
	Lear 45	12	0.8%
	Beechjet 400	26	1.8%
Total C-I		**48**	**3.3%**
C-II	Cessna 750 (X)	4	0.3%
	Challenger 600	2	0.1%
Total C-II		**6**	**0.4%**
D-I	Lear 60	10	0.7%
Total D-I		**10**	**0.7%**
D-II	Gulfstream II	2	0.1%
Total D-II		**2**	**0.1%**
Total Jet Activity		**100**	**6.8%**
TURBOPROPS			
A-II	Pilatus	4	0.3%
	Piper Cheyenne	2	0.1%
Total A-II		**6**	**0.4%**
B-I	Turbo Commander 690	2	0.1%
Total B-I		**2**	**0.1%**
B-II	Beech King Air 90	16	1.1%
	Beech King Air 200	2	0.1%
	Swearingen Metroliner	138	9.3%
	Beech Airliner 99	600	40.7%
	Beech 1900	612	41.5%
Total B-II		**1,368**	**92.7%**
Total Turboprop Activity		**1,376**	**93.2%**
Total Activity (Jet+Turboprop)		**1,476**	**100.0%**

Source: *Airport IQ* utilizing FAA flight plan data

At non-towered airports, determining a reasonable operational count by aircraft type can be difficult. Fortunately, data provided by *Airport IQ* gives a good representation of the types of aircraft utilizing the airport. As mentioned in Chapter Two, airport staff has traditionally logged aircraft operations during the hours in which they are present. Their records indicate a breakdown of aircraft by single engine, multi-engine, jet, and helicopter. Over the past two years, their records show an average of 670 annual jet operations at the airport. The number of turboprop operations would be included in the single engine and multi-engine categories and is unable to be distinguished. Again, this data shown above represents the absolute minimum number of business, air taxi, and commercial jet and turboprop operations, as it does not take into account visual flight rules (VFR) operations or cancelled flight plans. Data from other airports suggests that actual general aviation turbine operations can range 20 to 50 percent higher than what was reported by *Airport IQ* and airport staff.

The combination of private, air taxi, and commercial jet and turboprop operations accounted for a minimum of 2,576 itinerant operations at Lake Havasu City Municipal Airport over a one-year time period, as presented in **Table 3D**. Of those, aircraft in ARC B-II accounted for 2,272 operations. Aircraft in ARC C-I and C-II conducted another 180 operations. Aircraft in ARC D-I and D-II accounted for 26 operations. Based upon operational estimates, operations by jet and turboprop aircraft within ARC B-II exceed the substantial use threshold of 500 operations per year to be considered the current critical design aircraft. In fact, ARC B-II aircraft totaled approximately 88 percent of all operations used in this analysis. Therefore, the current critical design aircraft for Lake Havasu City Municipal Airport is defined by aircraft in ARC B-II.

TABLE 3D
Total Jet and Turboprop Operations by ARC
Lake Havasu City Municipal Airport

Aircraft Reference Code (ARC)	Total Jet Operations	Total Turboprop Operations	Total Combined Operations
A-II	N/A	6	6
B-I	80	12	92
B-II	582	1,690	2,272
C-I	128	N/A	128
C-II	52	N/A	52
D-I	14	N/A	14
D-II	12	N/A	12
Totals	**868**	**1,708**	**2,576**

Source: *Airport IQ*

Future aircraft mix can expect to include a larger percentage of corporate aircraft. Increased corporate aircraft utilization is typical at general aviation airports surrounded by growing or established population and employment centers. Once utilized only by large conglomerate-type corporations, corporate aircraft (especially jets) have been increasingly utilized by a wider variety of companies. FAA trends indicate that businesses are increasingly utilizing corporate aircraft. This is also evident by the substantial growth of fractional-ownership programs. The fractional-ownership programs have shown significant growth in numbers of aircraft owners joining their programs. These national factors, coupled with a strong socioeconomic condition in the area, will influence corporate aircraft demand. The growing demand will elect to utilize those airports that provide facilities to meet their needs.

Lake Havasu City is expected to support positive population and employment growth in the future. These trends will position the airport well for serving the growing aviation demand. In addition, Lake Havasu City Municipal Airport has already developed a reputation as a clean, attractive airport with several aviation amenities being offered.

As previously discussed, one of the most visible trends in general aviation today is the growth of the fractional-ownership program, and corporate aircraft use in general. Planning for fractional-ownership aircraft is difficult as it is an on-demand service; however, since these aircraft currently operate at the airport, planning should consider meeting the needs of the majority of highly utilized fractional-ownership aircraft. Although these aircraft can range up to ARC D-III, most fractional-ownership aircraft are in ARC B-I to C/D-II. Thus, future facility planning should include the potential for the airport to be utilized by the majority of business jets on the market.

The primary aircraft used for scheduled airline service prior to May 2007 was the 19-seat Beechcraft 1900 turboprop aircraft. This aircraft falls within ARC B-II. The aviation demand forecasts noted the potential to shift to larger turboprop and regional jet aircraft in the future should air service return to the airport and the demand was present to warrant larger aircraft. Larger seating capacity turboprops include the Bombardier Q series of aircraft (ARC B-III) and Embraer and Canadair regional jets (ARC C-II). It is presumed that potential future commercial air service at Lake Havasu City Municipal Airport would fly to/from Phoenix and/or Las Vegas. The short nature of these flights with the long term boarding load factors forecast to be approximately 65 percent would continue to warrant the use of Beechcraft 1900 or aircraft with a similar seating capacity. Larger aircraft may be considered during times of the year when Lake Havasu City experiences its peak vacation travelers. Taking into consideration the potential changes in scheduled airline aircraft in the future, critical commercial aircraft could fall within ARC C-II over the long term.

While a forecast of enplaned air cargo has not been prepared, it can be expected to grow through the planning period as the local economy grows and new industries are developed in the region. It is expected that air cargo service would continue to be regional in nature, with feeder cargo aircraft continuing to serve nearby hub airports. This would limit the size of aircraft to multi-engine piston and turboprop aircraft. A wide variety of piston engine and turboprop aircraft could be used in air cargo service; however, it is not expected that this would include aircraft larger than ARC B-II.

Given all these considerations, the current planning should conform to ARC B-II to accommodate existing based aircraft, cargo, and commercial operations, as well as itinerant business jet and turboprop use. Ultimate planning, however, should conform to ARC C/D-II to meet the needs of business and commercial aircraft.

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

AIRFIELD REQUIREMENTS

Airfield requirements include the need for those facilities related to the arrival and departure of aircraft. The adequacy of existing airfield facilities at Lake Havasu City Municipal Airport has been analyzed from a number of perspectives, including:

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

AIRFIELD CAPACITY

A demand/capacity analysis measures the capacity of the airfield facilities (i.e., runways and taxiways) in order to identify and plan for additional development needs. The capacity of the airport's runway system can provide up to 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 annual service volume (ASV). If the projected long range planning horizon level of operations comes to fruition (92,400), the airfield's ASV will not exceed the 60 percent level. Thus, additional airfield capacity enhancements are not required.

RUNWAYS

Runway conditions such as orientation, length, pavement strength, width, and safety standards at Lake Havasu City Municipal Airport were analyzed. From this information, requirements for runway improvements were determined for the airport.

Runway Orientation

The airport is served by a single runway system. Runway 14-32 is orientated in a northwest/southeast manner. For the operational safety and efficiency of an airport, it is desirable for the runway to be orientated as close as possible to the direction of the prevailing wind. This reduces the impact of wind components perpendicular to the direction of travel of an aircraft that is landing or taking off (defined as a crosswind).

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

Wind data specific to the airport was not available; however, data for Needles Airport (2001-2007) provides information for use in this study. This data is graphically depicted on **Exhibit 3B**. As depicted on the exhibit, Runway 14-32 provides 91.30 percent wind coverage for 10.5 knot crosswinds, 95.70 percent at 13 knots, 99.01 percent at 16 knots, and 99.79 percent at 20 knots. According to this data, aircraft in ARC A-I and B-I could experience crosswinds exceeding 10.5 knots or greater 8.70 percent of the year.

The analysis indicates that a crosswind runway should be planned according to FAA planning standards, if feasible. It should be noted, however, that due to geographical differences, this data could be somewhat different from what is actually experienced at Lake Havasu City Municipal Airport. Without more applicable information, a site-specific determination cannot be made. Topographical features and surrounding terrain and development limit the feasibility of a crosswind runway at Lake Havasu City Municipal Airport. Further, the existing runway is 100 feet wide, which provides a greater safety margin for aircraft operating in crosswind conditions. As a result, no additional runway orientations will be planned as part of this study.

Runway Length

The determination of runway length requirements for the airport is based on five primary factors:

- Mean maximum temperature of the hottest month
- Airport elevation
- Runway gradient
- Critical aircraft type expected to use the airport
- Stage length of the longest nonstop destination (specific to larger aircraft)

The mean maximum daily temperature of the hottest month for Lake Havasu City Municipal Airport is 108 degrees Fahrenheit (F). The airport elevation is 781 feet above mean sea level (MSL). The maximum runway end elevation difference for Runway 14-32 is 33.9 feet, giving the runway a longitudinal gradient of 0.4 percent, which conforms to FAA design standards. For aircraft in approach categories A and B, the runway longitudinal gradient cannot exceed two percent. For aircraft in approach categories C and

D, the maximum allowable longitudinal runway gradient is 1.5 percent.

Table 3E outlines the runway length requirements for various classifications of aircraft that utilize Lake Havasu City Municipal Airport. These were derived utilizing the FAA Airport Design Computer Program for *Runway Lengths Recommended for Airport Design*. These runway lengths are based upon groupings or "families" of aircraft.

TABLE 3E
Runway Length Requirements
Lake Havasu City Municipal Airport

Airport and Runway Data	
Airport elevation	783 feet MSL
Mean daily maximum temperature of the hottest month	108 degrees F
Maximum difference in runway centerline elevation	34 feet
Length of haul for airplanes of more than 60,000 pounds	1,200 miles
Dry runways	
Runway Length Recommended for Airport Design	
Small airplanes with less than 10 passenger seats	
75 percent of these small airplanes	3,000 feet
95 percent of these small airplanes	3,500 feet
100 percent of these small airplanes	4,200 feet
Small airplanes with 10 or more passenger seats	4,700 feet
Large airplanes of 60,000 pounds or less	
75 percent of business jets at 60 percent useful load	5,500 feet
75 percent of business jets at 90 percent useful load	8,700 feet
100 percent of business jets at 60 percent useful load	7,300 feet
100 percent of business jets at 90 percent useful load	11,400 feet
Airplanes of more than 60,000 pounds	6,700 feet

Source: FAA Airport Design Computer Program utilizing Chapter Two of AC 150/5325-4A, *Runway Length Requirements for Airport Design*

Based upon the forecast of aircraft fleet mix through the long range planning period, Lake Havasu City Municipal Airport should be designed to accommodate, at a minimum, 75 percent of business jet aircraft at 60 percent useful load, which typically correlates to ARC C-II aircraft.

According to the FAA design program, to fully accommodate 75 percent of these aircraft at 60 percent useful load, the runway should be at least 5,500 feet. To accommodate 100 percent of business jets at 60 percent useful load (generally corresponding to ARC D-II), the runway should be at least 7,300 feet long. Currently, Runway 14-32 is 8,001 feet, which meets the requirements of ARC C/D-II aircraft. This provides length for longer haul flights than the minimum design consideration. As such, the current length of Runway 14-32 will be adequate through the planning period.

Runway Width

Runway 14-32 is currently 100 feet wide. FAA design standards call for a runway width of at least 75 feet to

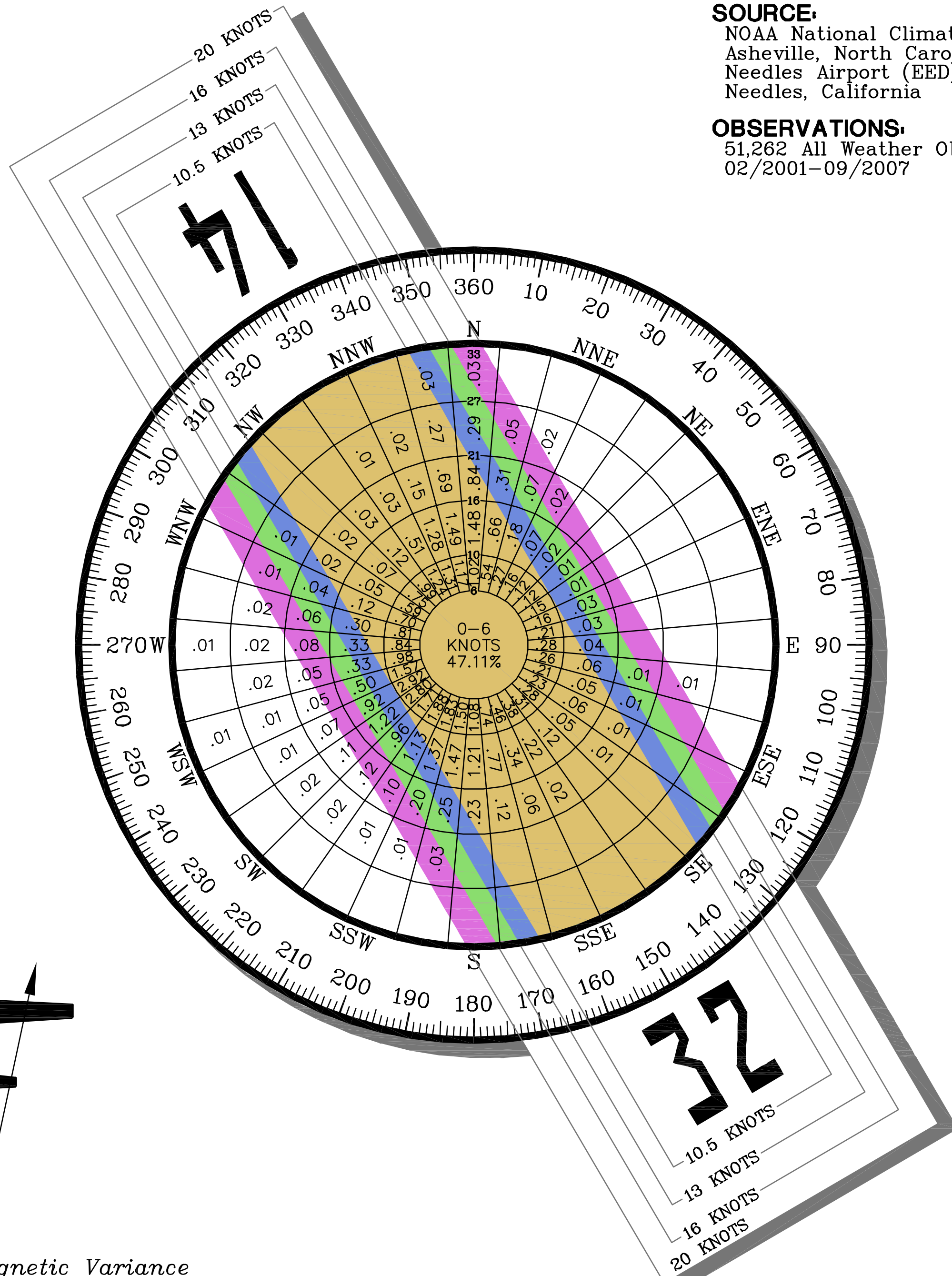
Draft 05MP08-3B-11/13/07

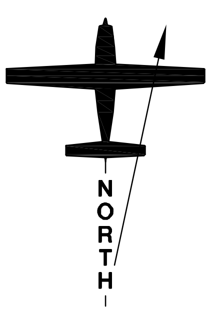
ALL WEATHER WIND COVERAGE

Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 14-32	*91.30%*	*95.70%*	*99.01%*	*99.79%*

SOURCE:
NOAA National Climatic Center
Asheville, North Carolina
Needles Airport (EED)
Needles, California

OBSERVATIONS:
51,262 All Weather Observations
02/2001-09/2007





Magnetic Variance
12° 11' East (November 2007)
Annual Rate of Change
00° 06' West (November 2007)

Exhibit 3B
WINDROSE

serve aircraft up to ARC B-II, as long as the instrument approach minimums are not lower than three-quarters of a mile. For aircraft in approach categories C and D, the runway should be 100 feet wide. Runway 14-32 currently exceeds FAA criteria for ARC B-II aircraft and meets the future design for ARC C/D-II. As such, it should satisfy future needs of the airport with normal maintenance.

The runway shoulder width for Group II aircraft is ten feet on both sides. The shoulder areas provide resistance to blast erosion and must be capable of accommodating emergency and maintenance vehicles as well as the occasional passage of an aircraft veering from the primary runway surfaces. Typically, runway shoulders are paved surfaces, as is the case at Lake Havasu City Municipal Airport. The runway shoulders should be maintained on Runway 14-32.

Runway Strength

The officially published pavement strength rating for Runway 14-32 is 100,000 pounds single wheel loading (SWL). As previously mentioned, SWL refers to the aircraft weight based upon the landing gear configuration with a single wheel on each landing strut.

The future critical aircraft is likely to be in the ARC C/D-II design category. These aircraft typically have a dual wheel landing gear configuration. These types of landing gear allow the weight of the aircraft to be distributed on more wheels, thus allowing a heavier aircraft to safely use the airport pavements. The Gulfstream IV, a D-II aircraft, weighs up to 75,000 pounds with a dual wheel configuration. The Gulfstream V weighs up to 90,000 pounds and is a D-III aircraft. A runway with a strength-rating of 100,000 SWL will adequately support these aircraft which could utilize the airport on a more frequent basis in the future.

Runway/Taxiway Separation

FAA Advisory Circular 150/5300-13, Change 13, *Airport Design*, also discusses separation distances between aircraft and various areas on the airport. The separation distances are a function of the approaches approved for the airport and the runway's designated ARC. Under current conditions, (ARC B-II, approaches not lower than three-quarters of a mile), parallel taxiways need to be at least 240 feet from the Runway 14-32 centerline. Aircraft parking areas are required to be at least 250 feet from the runway centerline.

In order to meet ARC C/D-II standards with approaches not lower than three-quarters of a mile, parallel taxiways need to be at least 300 feet from the runway centerline, and aircraft parking areas are required to be at least 400 feet from the runway centerline.

Currently, parallel Taxiway A located on the west side of Runway 14-32 is located 340 feet from the runway centerline. The aircraft parking apron is located approximately 500 feet from the runway centerline. These distances exceed current and ultimate FAA design standards.

Runway Blast Pad

The blast pad is a surface adjacent to the ends of the runway provided to reduce the erosive effect of jet blast and propeller wash. Runway 14 is equipped with a 200-foot long by 200-foot wide blast pad, and Runway 32 is equipped with a 200-foot long by 140-foot wide blast pad. These dimensions exceed the length and width requirements for an ARC C and D runway.

SAFETY AREA DESIGN STANDARDS

The FAA has established several safety 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 dimensions of these safety areas are dependent upon the critical aircraft and thus, the ARC of the runway. The current critical aircraft family is ARC B-II, as previously determined. Ultimate planning will examine the criteria necessary as ARC C/D-II becomes the critical aircraft family.

Runway Safety Area (RSA)

The RSA is defined in FAA Advisory Circular 150/5300-13, Change 13, *Airport Design*, as a "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." The RSA is centered on the runway, dimensioned in accordance to the approach speed of the critical aircraft using the runway. The FAA requires the RSA to be cleared and graded, drained by grading or storm sewers, capable of accommodating the design aircraft and fire and rescue vehicles, and free of obstacles not fixed by navigational purpose.

The FAA has placed a higher significance on maintaining adequate RSAs at all airports due to recent aircraft accidents. Under Order 5200.8, effective October 1, 1999, the FAA established a *Runway Safety Area Program*. The Order states, "The objective of the Runway Safety Area Program is that all RSAs at federally-obligated airports…shall conform to the standards contained in Advisory Circular 150/5300-13, *Airport Design*, to the extent practicable." Each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at the airport and perform airport inspections.

For ARC B-II runways with not lower than three-quarters of a mile approach minimums, the FAA calls for the RSA to be 150 feet wide and extend 300 feet beyond the runway ends. Analysis in the previous section indicated that Runway 14-32 should be planned to accommodate aircraft up to and including ARC C/D-II. The RSA for ARC C/D-II aircraft is 500 feet wide and extending 1,000 feet beyond each runway end.

Object Free Area (OFA)

The runway OFA is "a two-dimensional ground area, surrounding runways, taxiways, and taxilanes, which is clear of objects except for objects whose location is fixed by function (i.e., airfield lighting)." The OFA is centered on the runway, extending out in accordance to the critical aircraft design category utilizing the runway.

For ARC B-II aircraft and approaches not lower than three-quarters of a mile, the FAA calls for the OFA to be 500 feet wide (centered on the runway), extending 300 feet beyond each runway end. In order to meet design criteria for the future critical aircraft (ARC C/D-II), the OFA would require a cleared area 800 feet wide, extending 1,000 feet beyond each runway end. Runway 14-32 conforms to RSA and OFA standards for current and future critical aircraft design.

Obstacle Free Zone (OFZ)

The OFZ is an imaginary surface which precludes object penetrations, including taxiing and parked aircraft. The only allowance for OFZ obstructions is navigational aids mounted on frangible bases which are fixed in their location by function, such as airfield signs. The OFZ is established to ensure the safety of aircraft operations. If the OFZ is obstructed, the airport's approaches could be removed or approach minimums could be increased.

FAA criterion requires the OFZ to extend 200 feet beyond the runway ends by 400 feet wide (200 feet on either side of the runway centerline) for runways utilized by large aircraft and served by an instrument approach. Currently, there are no OFZ obstructions at Lake Havasu City Municipal Airport. Future planning should maintain the OFZ.

Runway Protection Zone (RPZ)

The RPZ is a trapezoidal area centered on the runway, typically beginning 200 feet beyond the runway end. The RPZ has been established by the FAA to provide an area clear of obstructions and incompatible land uses in order to enhance the protection of approaching aircraft, as well as people and property on the ground. The dimensions of the RPZ vary according to the visibility requirements serving the runway and the type of aircraft operating on the runway.

The lowest existing visibility minimum for approaches to the runway at Lake Havasu City Municipal Airport is one and one-quarter miles. RPZ dimensions for ARC B-II call for a 500-foot inner width, extending outward 1,000 feet, to a 700-foot outer width.

The FAA does not necessarily require the fee simple acquisition (outright property purchase) of the RPZ area, but recommends that airports maintain positive control over development within the RPZ. It is preferred that the airport own the property through fee simple acquisition; however, avigation easements (acquiring control of designated airspace within the RPZ) can be pursued if fee simple purchase is not possible. It should be noted, however, that avigation easements can cost nearly as much as the underlying land value and may not fully prohibit incompatible land uses from the RPZ. Also, the area encompassed by the RPZ envelops a portion of the required RSA, OFA, and areas needed for installation of approach lighting systems, all of which would be required for purchase.

Currently, the airport owns and maintains positive control over all existing RPZs through fee simple acquisition or easement. It should be noted that the RPZ for ARC C/D-II aircraft would be larger than the current RPZ and would extend into areas outside the existing airport property line. The dimensions for RPZs considering ARC C/D-II aircraft are detailed in **Table 3F**.

TABLE 3F
Airfield Design Standards
Lake Havasu City Municipal Airport

	Runway 14-32	
	Existing	Ultimate
Airport Reference Code (ARC)	B-II	C/D-II
Approach Visibility Minimums	1.25 miles	3/4 mile
Runway Length (feet)	8,001	8,001
Runway Width (feet)	100	100
Runway Pavement Strength (pounds)	100,000 SWL	100,000 SWL
Runway Safety Area		
Width (feet)	150	500
Length Beyond Runway End (feet)	300	1,000
Object Free Area		
Width (feet)	500	800
Length Beyond Runway End (feet)	300	1,000
Obstacle Free Zone		
Width (feet)	400	400
Length Beyond Runway End (feet)	200	200
Runway Protection Zone		
Inner Width (feet)	500	1,000
Outer Width (feet)	700	1,510
Length Beyond Runway End (feet)	1,000	1,700
Runway Centerline to:		
Parallel Taxiway Centerline (feet)	340	300
Aircraft Parking Area (feet)	500	400
Taxiway Width (feet)	35-70	35
Taxiway Object Free Area Width (feet)	131	131
Taxiway Centerline to:		
Fixed or Moveable Object (feet)	66	66

TAXIWAYS

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

As detailed in Chapter One, the taxiway system at Lake Havasu City Municipal Airport consists of a parallel taxiway and six entrance/exit taxiways serving Runway 14-32. **Table 3F** outlines the runway to taxiway separation standards. Parallel Taxiway A is 340 feet from Runway 14-32. This is adequate for the existing ARC B-II and future ARC C/D-II standards for not lower than three-quarter of a mile approach minimums.

Exit taxiways provide a means to enter and exit the runway at various points on the airfield. The type and number of exit taxiways can have a direct impact on the capacity and efficiency of the airport as a whole. Runway 14-32 has a total of six exit taxiways on the west side of the runway. Exit taxiways are most effective when planned at least 750 feet apart. The current taxiway layout appears efficient.

Dimensional standards for the taxiways are depicted in **Table 3F**. The airfield taxiways are at least 35 feet wide, with most equal to or exceeding 50 feet in width. All taxiways meet or exceed Design Group II standards and should be maintained through the planning period.

NAVIGATIONAL AIDS AND INSTRUMENT APPROACHES

Airport and runway navigational aids are based on FAA recommendations, as defined in DOT/FAA Handbook 7031.2B, *Airway Planning Standard Number One*, and FAA AC 150/5300-2D, *Airport Design Standards, Site Requirements for Terminal Navigation Facilities*.

Navigational Aids

Navigational aids are electronic devices that transmit radio frequencies which properly equipped aircraft and pilots translate into point-to-point guidance and position information. The very high frequency omnidirectional range (VOR), global positioning system (GPS), and LORAN-C are available for pilots to navigate to and from Lake Havasu City Municipal Airport. These systems are sufficient for navigation to and from the airport; therefore, no other navigational aids are needed at the airport.

Instrument Approach Procedures

Instrument approach procedures (IAPs) 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. At Lake Havasu City Municipal Airport, there is a circling VOR/DME or GPS-A approach to the airport. This approach allows aircraft to land at the airport when visibility is as low as one and one-quarter miles and cloud ceilings are as low as 1,017 feet above ground level (AGL) for aircraft with approach speeds less than 91 knots. For higher approach speeds, the visibility minimums increase to as much as three miles.

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

Weather conditions at Lake Havasu City Municipal Airport are very rarely below approach minimums to prevent an aircraft from landing. The GPS-WAAS would allow for lower approach minimums at the airport and could be an option in the future for improved approach procedures. Ultimate planning will consider the implementation of approach minimums down to not lower than three-quarters of a mile, utilizing GPS technologies, for Runway 14-32. It should be noted, however, that any approach providing less than one mile visibility minimums will require the installation of an approach lighting system. The possibility of implementing this type of approach will be studied in the next chapter.

Weather Reporting Aids

Lake Havasu City Municipal Airport has a wind cone and segmented circle as well as two supplemental wind cones. The wind cones provide information to pilots regarding wind conditions, such as direction and speed. The segmented circle consists of a system of visual indicators designed to provide traffic pattern information to pilots. Two of the three windcones are lighted for nighttime and/or poor weather conditions. The lighted windcones are located inside the segmented circle and near the Runway 32 threshold. It is recommended that the other windcone also be lighted during the planning period.

The airport is equipped with an Automated Weather Observation System III (AWOS-III) which provides automated weather observations 24 hours per day. The system updates weather observations every minute, continuously reporting significant weather changes as they occur. The AWOS-III reports cloud ceiling, visibility, temperature, dew point, wind direction, wind speed, altimeter setting, and density altitude. This system should be maintained through the planning period.

AIRFIELD LIGHTING, MARKING, AND SIGNAGE

There are a number of lighting and pavement marking aids serving pilots using the airport. These aids assist pilots in locating the airport and runway at night or in poor visibility conditions. They also assist in the ground movement of aircraft.

Airport Identification Lighting

The location of the airport at night is universally indicated by a rotating beacon. For civil airports, a rotating beacon projects two beams of light, one white and one green, 180 degrees apart. At Lake Havasu City Municipal Airport, the beacon is located directly south of the terminal building area adjacent to the fire station. The beacon is sufficient and should be maintained through the planning period.

Runway and Taxiway Lighting

Runway identification lighting provides the pilot with a rapid and positive identification of the runway and its alignment. Runway 14-32 is equipped with medium intensity runway lights (MIRL). Medium intensity taxiway lighting (MITL) is provided on Taxiway A and the entrance/exit taxiways leading to Runway 14-32. During the course of the planning period, MITL should be applied to all active taxiways. This includes Taxiway B, Taxiway C, and any future taxiways constructed at the airport.

Visual Approach Lighting

To provide pilots with visual glideslope and descent information, visual approach slope indicators (VASIs) or precision approach path indicators (PAPIs) are commonly found to the side of the runway. These systems can consist of either a two or four-box unit. Four-box systems are recommended for use by business jet aircraft. Currently, both ends of Runway 14-32 are served by four-box PAPIs. These are the recommended visual descent aids and should be maintained through the planning period.

In conjunction with the potential lowering of approach minimums at the airport to not lower than three-quarters of a mile, consideration should be given to a more sophisticated approach lighting system. Due to physical land constraints north of the airport, it is most likely that a straight-in instrument approach would not be served on Runway 14. The possibility exists that a straight-in approach could be implemented on Runway 32. Examples of approach lighting systems that could be implemented on Runway 32 include an omni-directional approach lighting system (ODALS), lead-in lighting system (LDIN), or medium intensity approach lighting system (MALS).

Runway End Identification Lighting

Runway end identification lights (REILs) are flashing lights located at each runway end that facilitate identification of the runway end at night or during poor visibility conditions. REILs provide pilots with the ability to identify the runway ends and distinguish the runway end lighting from other lighting on the airport and in the approach areas. The FAA indicates that REILs should be considered for all lighted runway ends not planned for a more sophisticated approach lighting system.

Currently, REILS are located on both ends of Runway 14-32. In the event that a more sophisticated approach lighting system will be installed on one of the runway ends (most likely Runway 32), the REILs to that particular runway end can be removed.

Pilot-Controlled Lighting

Lake Havasu City Municipal Airport is equipped with pilot-controlled lighting (PCL). PCL allows pilots to control the intensity of the runway and taxiway lighting using the radio transmitter in the aircraft. PCL also provides for more efficient use of energy. This system should be maintained through the planning period.

Airfield Signs

Airfield identification signs assist pilots in identifying their location on the airfield and directing them to their desired location. Lighted signs are installed on all runway and taxiway intersections serving Runway 14-32. All of these signs should be maintained throughout the planning period. It should be noted that the airport is planning to have its runway and taxiway signage upgraded in 2008 to better conform to FAA standards.

Pavement Markings

Runway markings are designed according to the type of instrument approach available on the runway. FAA Advisory Circular 150/5340-1F, *Marking of Paved Areas on Airports*, provides guidance necessary to design an airport's markings. Runway 14-32 is equipped with non-precision markings. The non-precision markings are adequate even if additional approaches are approved. These markings should be properly maintained.

Helipads

The airport currently has marked parking dedicated for the use of helicopters immediately adjacent to the east side of Taxiway B. Helicopter and fixed-wing aircraft should be segregated to the extent possible. Facility planning should include establishing a designated transient helipad at the airport, including at least two parking positions. Lighting should be provided to allow the safe operation to the helipad at night.

AIR TRAFFIC CONTROL

Lake Havasu City Municipal Airport does not have an operational airport traffic control tower (ATCT); therefore, no formal terminal air traffic control services are available at the airport.

Federal funding for the construction and operation of an ATCT is governed by Title 14 of the Code of Federal Regulations (CFR) Part 170, *Establishment and Discontinuance Criteria For Air Traffic Control Services and Navigational Facilities*.

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

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

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

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

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

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

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

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

Since the cost data fluctuates each year based on new control tower operational cost estimates, development cost estimates, and aircraft operational costs, the benefit/costs analysis ratios change frequently and cannot be readily determined for the airport in the future. The FAA has sole authority over the benefit/cost analysis.

Facility planning should include identifying and reserving a location for the future development of an ATCT, should one be required in the future or the community wish to participate in the FAA Contract Tower Program.

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 capacity of the various components of each area was examined in relation to projected demand to identify future landside facility needs. This includes components for commercial service and general aviation needs such as:

- Passenger Airline Terminal
- Aircraft Hangars
- Aircraft Parking Aprons
- Auto Parking and Access
- Airport Support Facilities

AIRLINE TERMINAL AREA

Lake Havasu City Municipal Airport has a passenger terminal building. This building totals approximately 5,700 square feet. The terminal building houses airport administration, two rental car agencies, and amenities for commercial airline service to include passenger waiting areas, a baggage claim area, a vending area, and a ticket counter.

Generalized facility needs have been developed based upon scheduled passenger enplanement levels of 9,500, 11,000, and 16,000. These represent reasonable planning levels derived from the forecasting effort. Terminal area requirements have been considered for the following functional areas:

- Ticketing
- Departure Area/Public Lobby
- Baggage Claim
- Concessions and Terminal Services
- Auto Rental Car Area
- Automobile Parking
- Terminal Curb
- Aircraft Gate Positions and Apron Space

This section identifies the terminal area facilities required to meet the airport's needs through the planning period. These requirements are based upon specific passenger enplanement thresholds, rather than a given year. In this manner, the airport's management can reference the guidelines, even if growth varies from the forecasts.

The existing airline terminal area facilities were evaluated based on planning guidelines relating to the major functional elements of the terminal area as presented in FAA Advisory Circular 150/5360-13, *Planning and Design of Airport Terminal Facilities*, the consultant's database of terminal planning criteria, and information collected during the inventory element to prepare estimates of various terminal building requirements. It should be noted that FAA Advisory Circular 150/5360-13 only provides formulas for recommended square footage for terminal facilities starting at about 30 peak hour enplanements. Lake Havasu City Municipal Airport is not forecast to reach that threshold until the long term planning period. As a result, the current facilities are primarily evaluated based on consultant experience at similar commercial service airports.

The methodology utilized in analysis of the passenger terminal building involved the potential design hour passenger demands. The evaluation process includes the major terminal building areas that are normally affected by peaking characteristics. **Table 3G** depicts square footage space required to satisfy potential passenger enplanements for each planning period.

TABLE 3G
Commercial Terminal Building Requirements
Lake Havasu City Municipal Airport

	Existing	Short Term	Intermediate Term	Long Term
Ticketing/Check-in				
No. of Airlines	1	1	1	1
Number of Pax/Half Hr. Peak	7	11	15	23
No. of Agent Positions	1	1	1	2
Counter Frontage (l.f.)	7	8	10	15
Ticket Lobby Queue (s.f.)	100	90	246	380
Airline Operations (s.f.)				
Counter Area	50	76	98	152
Airline Ops	220	759	983	1,519
Subtotal Airline Operations	270	835	1,081	1,671
Gate Facilities				
Peak Occupants	10	17	22	34
Holdroom Area (s.f.)	900	374	484	748
Baggage Claim				
Pax Claiming Bags	6	10	13	20
Claim Display (l.f.)	15	17	22	34
Claim Display Floor Area (s.f.)	50	102	132	204
Claim Lobby Area (s.f.)	450	483	618	942
Total Bag Claim Area (s.f.)	500	585	750	1,146
Rental Car Counters				
Counter Frontage (l.f.)	24	33	33	35
Counter Office Area (s.f.)	150	660	660	700
Counter Queue Area (s.f.)	140	198	198	210
Total Rental Car Area (s.f.)	290	858	858	910
Concessions (s.f.)				
Food and Beverage	400	676	854	1,306
Gift Shops	0	85	107	163
Total Concessions	400	761	961	1,469
Public Waiting Lobby (s.f.)				
Public Lobby/Seating	1,040	367	462	715
Greeting Lobby	300	101	124	188
Total Public Waiting Lobby	1,340	468	586	903
TSA Security Area (s.f.)				
Security Queuing Area	200	161	206	314
Restrooms (s.f)				
Men's/Women's	400	124	156	241
Administration Offices/Conf. (s.f.)				
Office, Conference	1,300	1,095	1,110	1,160
Gross Terminal Building Space (s.f.)	**5,700**	**6,200**	**7,400**	**10,000**

As depicted in the table, 6,200 square feet will be needed to meet all the typical passenger terminal design standards in the short term. By the long term planning period, up to 10,000 square feet would be needed for the passenger terminal. It should be noted that these square footages are the ideal planning scenario and do not consider financial constraints to constructing to this standard.

Ticketing

The first destination for enplaning passengers in the terminal building is the airline ticket counter. The ticketing area consists of the ticket counters, queuing area for passengers to approach the counters, and the ticket lobby which provides circulation. The ticket lobby should be arranged so that the enplaning passenger has immediate access and clear visibility to the individual airline ticket counter upon entering the building.

Circulation patterns should allow the option of bypassing the counters with minimum interference. Airline ticket counter frontage, counter area, ticketing lobby, airline office, and baggage makeup area requirements for each potential enplanement level have been calculated.

Departure Area/Public Lobby

The lobby/departure lounge is the designated waiting area used by passengers immediately prior to boarding an aircraft. Direct access from the curb, with space for waiting and seating, should be provided adjacent to the ticketing area. The lobby must be large enough to accommodate passengers who arrive early, passengers with delayed flights, and people who accompany passengers to the airport. This area is the hub of the circulatory route through the terminal and should not conflict with passengers queuing at the ticket counters or with passenger traffic flow.

Baggage Claim Facilities

The baggage claim area should be sufficiently segregated from ticketing passengers and seating areas so that public circulation in minimally affected. The current location of the baggage claim area should be adequate through the long term planning horizon.

Concessions

The concession functional area should consider areas for snacks and gifts. This could be accommodated with vending machines through the planning period, as is currently the case in the terminal building. A display case with an assortment of gifts such as embroidered shirts and hats is always a good practice for a public-use airport.

Auto Rental Car Area

Locating a rental car agency in the terminal building is a common practice for commercial service airports. There are currently two rental car agencies located in the terminal building. The planning forecast calls for making at least one parking space available for a rental car in the short term and increasing to five spaces available in the long term. Currently, there are 20 spaces available for rental car parking in the airport terminal building parking lot.

Terminal Curb Frontage

The curb element is the interface between the terminal building and the ground transportation system. The length of the curb required for loading and unloading of passengers and baggage is determined by the type and volume of ground transportation vehicles anticipated in the peak period on the design day. Only in the long term would even approximately 70 feet of terminal curb be forecast, thus the current curb length of 200 feet is sufficient.

Airline Gate Positions and Apron Area

Ground level boarding is appropriate for Lake Havasu City Municipal Airport. The airport is not forecast to have a second air carrier through the planning period. Thus, there will not be a need for additional gates.

The terminal apron consists of the area and facilities used for gate parking and aircraft support and servicing operations. In addition to the actual gate position, sufficient room must be provided for aircraft servicing, taxilanes, and service/fire lanes designated for vehicles used for aircraft ground servicing.

Currently, there are approximately 11,000 square yards of apron space designated for commercial service. This is adequate space considering the planning standard of 1,300 square yards for each ground level gate.

Airline Terminal and Automobile Parking

Vehicle parking for the terminal complex includes the two marked parking lots directly to the west of the terminal building. **Table 3H** shows the passenger terminal parking requirements. The number of necessary spaces takes into account arriving and departing passengers as well as those people there to greet them or drop them off.

TABLE 3H
Airline Terminal Building Requirements
Lake Havasu City Municipal Airport

	Existing	Short Term	Intermediate Term	Long Term
Terminal Curb				
Enplane Curb (ft.)	120	15.3	19.8	30.6
Deplane Curb (ft.)	80	17.9	23.1	35.7
Total Curb (ft.)	200	33.2	42.9	66.3
Auto Parking				
Total Public Parking	151	62	72	106
Employee Parking	N/A	5	6	8
Rental Car Parking	20	1	2	5
Total All Parking	171	68	80	119

Security and Screening

Terminal security requirements are related to the *Aviation and Transportation Security Act* of 2001, which was passed in response to the terrorist acts of September 11. Major provisions of the law are applicable to terminal planning, including the creation of the Transportation Security Administration (TSA) for the purpose of managing screening operations at commercial service airports.

Currently, the TSA is located in a facility directly north of the terminal building. The next chapter will examine ways to provide office space for TSA employees in the airport terminal building.

GENERAL AVIATION FACILITIES

Hangars

The demand for aircraft storage hangars typically depends upon the number and type of aircraft expected to be based at the airport. For planning purposes, it is necessary to estimate hangar requirements based upon forecast operational activity. However, hangar development should be based on actual demand trends and financial investment opportunities.

Hangar facilities at Lake Havasu City Municipal Airport consist of shade hangars, Port-A-Port hangars, and box (conventional/executive) hangars. These different types of hangars offer varying levels of privacy, security, and protection from the elements. Demand for hangars also varies with the number of aircraft based at the airport. Another important factor is the type of based aircraft. Smaller single engine aircraft usually prefer shade, Port-A-Port hangars, or T-hangars, while larger multi-engine aircraft and business jets will prefer conventional or executive hangars. Rental costs will also be a factor in the choice.

While a majority of aircraft owners prefer enclosed aircraft storage, a number of based aircraft will still tiedown outside (due to lack of hangar availability, hangar rental rates/ and/or operational needs). Therefore, enclosed hangar facilities do not necessarily need to be planned for each based aircraft. At Lake Havasu City Municipal Airport, the majority of based aircraft are currently stored in hangars (70 percent). According to airport records, there are approximately 62 aircraft which utilize the tiedown spaces available on the airport.

Airport staff maintains a waiting list of aircraft owners desiring to store their aircraft in a City-owned box hangar or shade hangar storage space. It is assumed that several aircraft that are currently located in tiedown positions on the airport would move into a hangar facility as they become available. Conversion of the waiting list to signed hangar leases was taken into consideration when developing hangar storage requirements.

Presently, all of the shade hangar and Port-A-Port hangars on the airfield are occupied and there is a waiting list for units. The airport has 45 shade hangar and Port-A-Port hangar storage units. Shade hangar and Port-A-Port hangar space available at the airport totals approximately 57,200 square feet for aircraft storage. Analysis of future shade hangar, Port-A-Port hangar, and T-hangar requirements, as depicted on **Table 3J**, indicates additional hangar positions which will be needed through the long range planning horizon.

Box hangar space makes up a much larger portion of hangar space at the airport. These hangars are typically utilized by owners of larger aircraft or multiple aircraft. Often a corporate flight department will operate out of an executive hangar as well. Box hangar space at Lake Havasu City Municipal Airport currently totals approximately 103,400 square feet. Future requirements show a demand for additional hangar space in the form of box (conventional and/or executive) hangar space.

TABLE 3J
Aircraft Storage Hangar Requirements
Lake Havasu City Municipal Airport

		Future Requirements		
	Currently Available	Short Term	Intermediate Term	Long Term
Total Based	201	265	295	355
Aircraft to be Hangared	139	185	209	260
T-Hangars/Shade Hangars/Port-A-Ports	45	95	110	137
Box (Conventional/Executive) Hangars (aircraft positions)	94	90	99	123
Hangar Area Requirements				
T-Hangars/Shade Hangars/Port-A-Ports	57,200	99,600	112,200	140,400
Box (Conventional/Executive) Hangars	103,400	166,000	188,000	234,000
Maintenance	10,000	24,900	28,200	35,100
Total Hangar Area (s.f.)	**170,600**	**290,500**	**328,400**	**409,500**

Table 3J compares existing hangar space to the future hangar requirements. It is evident from the table that there is a need for additional hangar space throughout the planning period. As previously mentioned, Lake Havasu City Municipal Airport has approximately 100,000 square feet of hangar space, mainly in the form of executive and conventional hangars, proposed to be developed over the next several years. The analysis also indicates a potential need for additional maintenance and office space through the planning period. It is expected that the aircraft storage hangar requirements will continue to be met through a combination of hangar types.

Aircraft Parking Apron

FAA Advisory Circular 150/5300-13, Change 13, *Airport Design*, suggests a methodology by which transient apron requirements can be determined from knowledge of busy-day operations. At Lake Havasu City Municipal Airport, the number of itinerant spaces required was determined to be approximately 15 percent of the busy-day itinerant operations. A planning criterion of 800 square yards per aircraft was applied to determine future transient apron requirements for single and multi-engine aircraft. For business jets (which can be much larger), a planning criterion of 1,600 square yards per aircraft position was used. Locally based tiedowns typically will be utilized by smaller single engine aircraft; thus, a planning standard of 650 square yards per position is utilized.

A parking apron should provide space for the number of locally based aircraft that are not stored in hangars, transient aircraft, and for maintenance activity. For local tie-down needs, an additional 20 spaces are identified for maintenance activity. Maintenance activity would include the movement of aircraft into and out of hangar facilities and temporary storage of aircraft on the ramp.

Total apron parking requirements are presented in **Table 3K**. Currently, there are 148 transient positions available for single and multi-engine aircraft on the airport. This includes City tiedowns and tiedowns associated with FBO leases. Approximately eight business jet positions are available. Finally, there are 62 positions utilized for locally based aircraft.

As shown in the table, there may be a need for additional locally based aircraft parking for single and multi-engine aircraft in the future. It appears that there is adequate transient and jet aircraft parking through the planning period. In order to satisfy the increased need for locally based positions, considerations should be given to conversion of some of the transient tiedown spaces to locally based aircraft parking.

TABLE 3K
General Aviation Aircraft Parking Apron Requirements
Lake Havasu City Municipal Airport

	Available	Short Term	Intermediate Term	Long Term
Single, Multi-engine Transient Aircraft Positions	148	24	26	34
Apron Area (s.y.)	125,100	19,100	21,000	27,200
Transient Business Jet Positions	8	4	5	7
Apron Area (s.y.)	20,000	6,400	8,000	11,200
Locally-Based Aircraft Positions	62	80	86	95
Apron Area (s.y.)	52,400	64,000	68,800	76,000
Total Positions	**218**	**108**	**117**	**136**
Total Apron Area (s.y.)	**197,500**	**89,500**	**97,800**	**114,400**

General Aviation Terminal Facilities

General aviation terminal facilities have several functions. Space is required for a pilots' lounge, flight planning, concessions, management, storage, and various other needs. This space is not necessarily limited to a single, separate terminal building, but can include space offered by FBOs for these functions and services.

The methodology used in estimating general aviation terminal building space needs is based on the number of itinerant users expected to utilize general aviation facilities during the design hour. General aviation space requirements were then 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 aircraft (multiplier). An increasing passenger count per aircraft (from 1.9 to 2.2) is used to account for the likely increase in the number of passengers utilizing general aviation services. **Table 3L** outlines the general aviation terminal facility space requirements for Lake Havasu City Municipal Airport.

As presented in the table, the existing public space will need to be addressed in the short term of the plan. By the long term, approximately 5,148 square feet of space could be needed. As mentioned earlier, the desired space can be made up of a combination of facilities at the airport. The 4,000 square feet of current available building space listed in **Table 3L** accounts for the approximate amount of space dedicated to general aviation use within D2 Aero General Aviation Services and Desert Skies Executive Air Terminal. The airport terminal building was not taken into consideration since in the past it has been dedicated for commercial service use.

An additional consideration for terminal space is the emergence of a new class of aircraft. As mentioned in Chapter Two, a number of aircraft manufacturers are beginning to produce low cost microjets, commonly referred to as very light jets (VLJs). The VLJs typically have a capacity of up to six passengers. A number of new companies are positioning themselves to utilize the VLJs for on-demand air taxi services. The air taxi businesses are banking on a desire by business travelers to avoid delays at major commercial service airports by taking advantage of the nationwide network of general aviation airports such as Lake Havasu City Municipal Airport. General aviation airports with appropriate terminal building services are better positioned to meet the needs of this new class of business traveler.

TABLE 3L
General Aviation Terminal Area Facilities
Lake Havasu City Municipal Airport

	Available	Short Term	Intermediate Term	Long Term
Design Hour Operations	29	36	42	54
Design Hour Itinerant Operations	15	18	20	26
Multiplier	1.8	1.9	2	2.2
Total Design Hour Itinerant Passengers	27	34	40	57
General Aviation Building Spaces (s.f.)	4,000	3,078	3,600	5,148

Automobile Parking

General aviation vehicular parking demands have been determined for Lake Havasu City Municipal Airport. Space determinations were based on an evaluation of the existing airport use, as well as industry standards. Automobile parking spaces required to meet general aviation itinerant demands were calculated by taking the design hour itinerant passengers and using a multiplier of 1.9, 2.0, and 2.2 for each planning period. This multiplier represents the anticipated gradual increase in the number of passengers per aircraft utilizing general aviation services. Currently, D2 Aero General Aviation Services has approximately ten marked parking spaces and Desert Skies Executive Air Terminal has approximately 16 marked spaces. When taking these facilities into account, approximately 26 vehicle parking spaces with 10,000 square feet of parking area are available. North of the fixed base operators (FBOs) is an area that encompasses approximately 41,000 square feet that is dedicated for leased automobile parking. In total, approximately 51,000 square feet of parking area providing 154 vehicle spaces is provided. Parking spaces related to the airport terminal building were not taken into consideration since they have traditionally served the needs of commercial passengers.

The parking requirements of based aircraft owners should also be considered. Although some owners prefer to park their vehicles in their hangars, safety can be compromised when automobile and aircraft movements are intermixed. For this reason, separate parking requirements, which consider one-half of based aircraft at the airport, were applied to general aviation automobile parking space requirements. Parking requirements for the airport are summarized in **Table 3M**.

TABLE 3M
GA Vehicle Parking Requirements
Lake Havasu City Municipal Airport

		Future Requirements		
	Available	Short Term	Intermediate Term	Long Term
Design Hour Itinerant Passengers	27	34	40	57
FBO Vehicle Spaces	26	62	73	103
Parking Area (s.f.)	10,000	24,600	29,000	41,100
General Aviation Spaces	128	40	50	63
Parking Area (s.f.)	41,000	16,000	20,000	25,200
Total Parking Spaces	154	102	123	166
Total Parking Area (s.f.)	51,000	40,600	49,000	66,300

By the short term planning period, there appears to be a need for additional vehicle parking spaces and parking area for the FBOs. There is adequate general aviation parking spaces and parking area through the long term planning period. In order to satisfy the need for additional FBO vehicle parking spaces and parking area, consideration should be given to the conversion of some the leased automobile spaces to FBO vehicle spaces.

SUPPORT REQUIREMENTS

Various facilities that do not logically fall within the classifications of airside or landside facilities have also been identified. These other areas provide certain functions related to the overall operation of the airport.

FUEL STORAGE

There are two fuel farms located on the airport that currently store fuel for aviation use. D2 Aero General Aviation Services and Desert Skies Executive Air Terminal, the two major FBOs at the airport, each operate a fuel storage facility. D2 Aero owns their facility and Desert Skies leases their facility from the Lake Havasu City Municipal Airport.

D2 Aero General Aviation Services has one 10,000-gallon capacity Avgas storage tank and one 10,000-gallon capacity Jet A storage tank. Both tanks are aboveground. They use two fuel trucks to deliver fuel to aircraft that include a 1,500-gallon capacity Avgas truck and a 2,200-gallon capacity Jet A truck. D2 Aero also provides self-service Avgas fuel capability. By using a credit card, one can access Avgas fuel at their convenience.

Desert Skies Executive Air Terminal operates three underground fuel storage tanks consisting of two 12,000-gallon capacity Avgas tanks and one 12,000-gallon capacity Jet A tank. They use four fuel trucks for delivery of fuel that include two Avgas fuel trucks that store 1,100 and 1,200 gallons of fuel, and two Jet A fuel trucks that store 1,700 and 2,200 gallons of fuel.

It should be noted that Havasu Air Center, a third FBO that opened for business in July 2008, has constructed a fuel farm also. A 12,000-gallon capacity Avgas storage tank and a 15,000-gallon capacity Jet A storage tank have been included with the development of the FBO. Fuel trucks are also available to transport the fuel to aircraft.

Fuel storage requirements are typically based upon maintaining a two-week supply of fuel during an average month. However, more frequent deliveries can reduce the fuel storage capacity requirement. Generally, fuel tanks should be of adequate capacity to accept a full refueling tanker, which is approximately 8,000 gallons, while maintaining a reasonable level of fuel in the storage tank. Maintaining storage to meet a two-week supply for each is currently available.

Future Avgas and Jet A fuel storage requirements for the airport, based upon a two-week supply during the peak month, will likely exceed the existing total storage capacities. One option to address this potential storage issue is to increase the frequency of fuel deliveries. For the long term planning period, additional fuel storage facilities should be planned.

SECURITY FENCING / GATES

Lake Havasu City Municipal Airport operations areas are completely enclosed by an eight-foot chain link fence topped by three-strand barbed wire. The fence does not always follow the airport property line due to the layout of physical features and actual boundary lines. There are currently five controlled access gates located at the airport to provide enhanced security of the airfield.

F.A.R. PART 139 CERTIFICATION REQUIREMENTS

Federal Aviation Regulation (F.A.R.) Part 139, *Certification and Operations: Land Airports Serving Certain Air Carriers*, was amended to include those airports with scheduled passenger air service utilizing aircraft with a seating capacity of less than 31 passengers. In the past, Lake Havasu City Municipal Airport has been served by a 19-seat air carrier aircraft.

Under the amended Part 139 requirements, there are four classes of airports: Classes I, II, III, and IV. Airports serving all types of scheduled operations of large air carrier aircraft and any other type of air carrier operations are known as Class I airports. Class II airports are those airports that serve scheduled operations of small air carrier aircraft (10-30 seats) and unscheduled operations of larger air carrier aircraft (more than 30 seats). Class III airports are those airports that serve only scheduled operations of air carrier aircraft with 10-30 seats. Class IV airports are those airports serving only unscheduled air carrier operations in aircraft with more than 30 seats. Lake Havasu City Municipal Airport is designated as a Class III. Should the airport regain commercial air service in the future and be served by an air carrier aircraft with more than 30 passenger seats, it would be required to comply with Class I of the regulation.

AIRPORT RESCUE AND FIREFIGHTING (ARFF)

Lake Havasu City Municipal Airport is currently served by an aircraft rescue and firefighting facility (ARFF). Lake Havasu City's Fire Station #6, located south of the airport terminal building, is designed to provide emergency and rescue services to the airport and the surrounding area. There are 12 ARFF-certified personnel working for the Lake Havasu City Fire Department, and a certain number of them are present at Fire Station #6 24 hours per day, seven days per week. A primary ARFF vehicle and a fire engine are kept at the facility. The ARFF vehicle is a 1999 Emergency One Titan and has 1,640 gallons of storage capacity and is capable of carrying 223 gallons of ARFF foam and 500 pounds of Purple K dry chemical. A 750-gallon capacity fire engine is also stationed at the facility.

Part 139 airports, such as Lake Havasu City Municipal Airport, are required to provide ARFF services during air carrier operations that require a Part 139 certificate. Each certified airport maintains equipment and personnel based on the ARFF index established according to the length of aircraft and scheduled daily flight frequency. There are five indices, designated as A through E, with A applicable to the smallest aircraft and E to the largest aircraft (based on wingspan). Lake Havasu City Municipal Airport is categorized within ARFF Index A. ARFF equipment at the airport currently exceeds Index A requirements and meets Index B level ARFF capability.

AIRPORT MAINTENANCE BUILDING

Presently, there is not a dedicated airport maintenance facility at the airport. Airport maintenance personnel utilize an existing hangar and other outside locations for equipment storage. Consideration should be given to developing a maintenance facility for the storage of maintenance equipment and to provide work areas for airport maintenance employees.

SURFACE TRANSPORTATION ACCESS

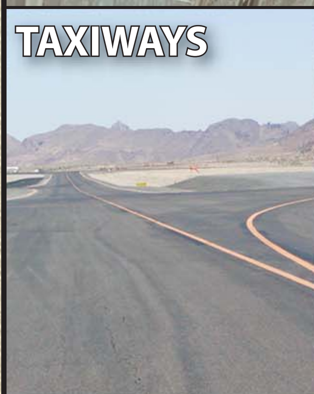
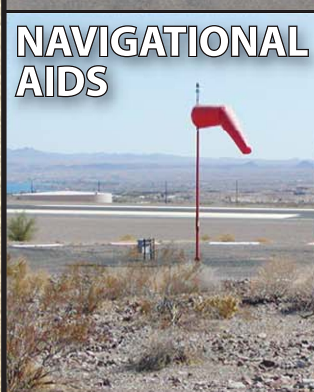
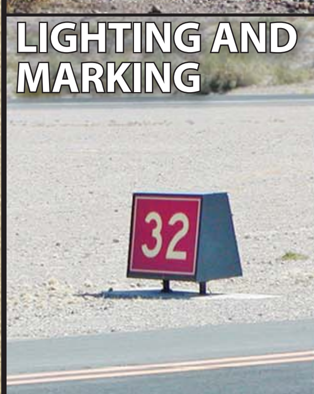
Primary access to the airport is provided by Airport Centre Boulevard, which is accessed directly from State Highway 95. Patton Drive is located east of State Highway 95 and provides access to various businesses and hangars on the airport. The airport terminal building is accessed by Airport Centre Boulevard. Besides routine maintenance and pavement improvements, the existing roadway access to the airport should be capable of supporting aviation-related growth at the airport. Expansion of roadways and new roadway development at the airport will be a function of future development at the airport.

SUMMARY

The intent of this chapter has been to outline the facilities required to meet potential aviation demands projected for Lake Havasu City Municipal Airport for the planning horizon. A summary of the airside and landside requirements is presented on **Exhibits 3C** and **3D**.

Following the facility requirements determination, the next step is to determine a direction of development which best meets these projected needs through a series of Airport Development Alternatives. The remainder of the Master Plan will be devoted to outlining this direction, its schedule, and its cost.

05MP08-3C-10/8/07

	AVAILABLE	SHORT TERM	LONG TERM
RUNWAYS 	**Runway 14-32** 8,001′ x 100′ 100,000 SWL 1.25-Mile Visibility ARC B-II Design	**Runway 14-32** 8,001′ x 100′ 100,000 SWL 1.25-Mile Visibility ARC B-II Design	**Runway 14-32** 8,001′ x 100′ 100,000 SWL **.75-Mile Visibility (32)** **ARC C/D-II Design**
TAXIWAYS 	**Runway 14-32** Full parallel Taxiway A 340′ Seperation 6 exits West All taxiways 35′-70′ wide Hold apron on each runway end	**Runway 14-32** Full parallel Taxiway A 340′ Seperation 6 exits West All taxiways 35′-70′ wide Hold apron on each runway end **Extend Taxiway B North**	**Runway 14-32** Full parallel Taxiway A 340′ Seperation 6 exits West All taxiways 35′-70′ wide Hold apron on each runway end **Extend Taxiway B North** **Extend Taxiway C South**
NAVIGATIONAL AIDS 	VOR and GPS AWOS-III Segmented Circle 3 windcones (two lighted) **Runway 14-32** VOR/DME or GPS-A approach (circling)	VOR and GPS AWOS-III Segmented Circle **All 3 windcones lighted** **Runway 14-32** VOR/DME or GPS-A approach (circling)	VOR and GPS AWOS-III Segmented Circle **All 3 windcones lighted** **Potential ATCT** **Runway 14-32** VOR/DME or GPS-A approach (circling) **Runway 32** **GPS straight-in approach**
LIGHTING AND MARKING 	Airport Beacon MITL on taxiway A and entrance / exit taxiways **Runway 14-32** MIRL PAPI-4 REIL's PCL Non-Precision Marking	Airport Beacon **MITL on all active taxiways** **Helipads (2)** **Runway 14-32** MIRL PAPI-4 REIL's PCL Non-Precision Marking	Airport Beacon **MITL on all active taxiways** **Helipads (2)** **Runway 14-32** MIRL PAPI-4 REIL's PCL Non-Precision Marking **Runway 32** **Approach lighting system (MALS, LDIN, ODALS)**

KEY

ATCT- Airport Traffic Control Tower
AWOS- Automated Weather Observation System
MIRL- Medium Intensity Runway Lighting
MITL- Medium Intensity Taxiway Lighting
PAPI - Precision Approach Path Indicator
PCL- Pilot Controlled Lighting
REIL- Runway End Identification Lights
SWL- Single Wheel Loading

Bold red print indicates recommended / required changes

LAKE HAVASU CITY, ARIZONA • MUNICIPAL AIRPORT •

Exhibit 3C
AIRFIELD FACILITY REQUIREMENTS

05MP08-3D-10/8/07

AIRCRAFT STORAGE HANGARS

	AVAILABLE	SHORT TERM	INTERMEDIATE TERM	LONG TERM
T-HANGARS / SHADE HANGARS / PORT-A-PORTS	45	95	110	137
BOX (CONVENTIONAL / EXECUTIVE) HANGARS	94	90	99	123
HANGAR AREA REQUIREMENTS (s.f.)				
T-HANGARS / SHADE HANGARS / PORT-A-PORTS	57,200	99,600	112,200	140,400
BOX (CONVENTIONAL / EXECUTIVE) HANGARS	103,400	166,000	188,000	234,000
Maintenance	10,000	24,900	28,200	35,100
TOTAL HANGAR AREA (s.f.)	**170,600**	**290,500**	**328,400**	**409,500**

AIRCRAFT PARKING APRON REQUIREMENTS

	AVAILABLE	SHORT TERM	INTERMEDIATE TERM	LONG TERM
Single, Multi-engine Transient Aircraft Positions	148	24	26	34
Transient Business Jet Positions	8	4	5	7
Locally-Based Aircraft Positions	62	80	86	95
TOTAL POSITIONS	**218**	**108**	**117**	**136**
TOTAL APRON AREA (s.y.)	**197,500**	**89,500**	**97,800**	**114,400**

TERMINAL SERVICES AND VEHICLE PARKING

	AVAILABLE	SHORT TERM	INTERMEDIATE TERM	LONG TERM
Terminal Building Space (s.f.)	5,700	6,200	7,400	10,000
General Aviation Building Spaces (s.f.)	4,000	3,078	3,600	5,148
TOTAL TERMINAL PARKING	**171**	**68**	**80**	**119**
FBO Vehicle Spaces	26	62	73	103
General Aviation Vehicle Spaces	128	40	50	63
TOTAL GENERAL AVIATION PARKING SPACES	**154**	**102**	**123**	**166**
TOTAL PARKING AREA (s.f.)	**51,000**	**40,600**	**49,000**	**66,300**

Exhibit 3D
LANDSIDE FACILITY REQUIREMENTS

Chapter Four

AIRPORT DEVELOPMENT ALTERNATIVES

Chapter Four

AIRPORT DEVELOPMENT ALTERNATIVES

The previous chapters have focused on the airport's available facilities, existing and potential future demand, and future levels and types of facilities that are needed to meet demand. Prior to defining the recommended development program for Lake Havasu City Municipal Airport, it is important to first consider development potential as well as constraints to future development at the airport. The purpose of this chapter is to formulate and examine reasonable airport development alternatives that address the planning horizon demand levels. Because there are a multitude of possibilities and combinations thereof, intuitive judgment is necessary to focus in on those opportunities which have the greatest potential for success.

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 inconsistent with the future goals and objectives of Lake Havasu City and its citizens, who have a vested interest in the development and operation of the airport.

In this chapter, airport development alternatives are considered for the

airport, where applicable. The ultimate goal is to develop the underlying rationale which supports the final recommended Master Plan 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 federal airport design standards.

The development alternatives for Lake Havasu City Municipal Airport can be categorized into two functional areas: airside (runways, taxiways, navigational aids, etc.) and landside (general aviation hangars, aprons, terminal area, etc.). This Master Plan primarily focuses on the aviation-use development of existing and proposed property that will encompass the airport. Within each of these areas, specific facilities are required or desired. In addition, the utilization of the remaining airport property to provide revenue support for the airport and to benefit the economic development and well-being of the regional area must be considered.

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 Lake Havasu City Municipal Airport will meet the needs of the community, 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), Lake Havasu City, and the general public, 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 Lake Havasu City Municipal Airport.

NO-BUILD ALTERNATIVE

In analyzing and comparing the advantages and disadvantages of various development alternatives, it is important to consider the consequences of no future development at Lake Havasu City Municipal Airport. The "no-build" or "do nothing" alternative essentially considers keeping the airport in its present condition, not providing any type of expansion or improvement to the existing facilities (other than general airfield and City-owned hangar and terminal building maintenance projects). The primary result of this alternative would be the inability of the airport to satisfy the projected aviation demands of the airport service area.

Lake Havasu City Municipal Airport is an important contributor to the economic development of the regional area. The airport is a transportation link to other regional and national economic centers. Not improving Lake

Havasu City Municipal Airport to meet commercial and general aviation needs could limit economic growth for the region.

The growth of activity at Lake Havasu City Municipal Airport can largely be attributed to the growing economy and population of Lake Havasu City and growth within the general aviation industry as a whole. The general aviation industry has experienced extended periods of decline and growth over the last 20 years. However, general aviation is now seen as a growth industry once more. While overall, general aviation growth will be steady but slow nationally, the demand for higher performance aircraft is experiencing the strongest growth rate. With heightened interest in commercial aviation security, corporate general aviation could expect demand for private aircraft to grow even more. This could be spurred by the new very light jet (VLJ) and expectations for true air taxi service at general aviation airports. As mentioned in previous chapters, Lake Havasu City Municipal Airport is well positioned to attract operations by VLJs with adequate runway length and forecasted growth in business opportunities in the airport service area.

The airport has also served commercial airline operations in the past and is actively partnered with local agencies to regain commercial airline service in the future. This is being done to ensure the community is provided an important transportation link to the region. It is often required for commercial service airports to make improvements to the airfield in order to provide the highest level of safety and efficiency for the traveling public.

Aviation demand forecasts and analysis of facility requirements indicated a potential need for improved facilities at Lake Havasu City Municipal Airport. Improvements recommended in the previous chapter include extending taxiways, improving instrument approach procedures, providing additional airfield lighting, constructing additional hangar facilities, improving navigational aids, improving lighting and marking aids, and expanding, replacing, or relocating the passenger terminal building. Without these improvements, regular users of the airport will be constrained from taking maximum advantage of the airport's air transportation capabilities.

The unavoidable consequence of the "no-build" alternative would involve the airport's inability to attract potential airport users and expand economic development in Lake Havasu City and the surrounding region. Corporate aviation and commercial air service play a major role in the transportation of business leaders and key employees. Also, recreational activities surrounding Lake Havasu City require general aviation and commercial air service support. If the airport does not have the capability to meet the terminal, hangar, apron, or airfield needs of potential users, the City's capability to attract the major sector businesses or recreational travelers that rely on air transportation could be diminished.

Following the "no-build" alternative would also not support the private businesses that have made investments at Lake Havasu City Municipal

Airport. As these businesses grow, the airport will need to be able to accommodate the infrastructure needs associated with their growth. Each of the businesses on the airport provides jobs for local residents, creates positive economic benefits for the community, and pays taxes for local government operations.

By owning and operating Lake Havasu City Municipal Airport, Lake Havasu City is charged with the responsibility of developing aviation facilities necessary to accommodate aviation demand and minimize operational constraints. Flexibility must be programmed into airport development to assure adequate capacity should market conditions change unexpectedly.

To propose no further development at Lake Havasu City Municipal Airport could adversely affect the long term viability of the airport, resulting in negative economic effects on Lake Havasu City and the region as a whole. The "no-build" alternative is also inconsistent with the long term goals of the Federal Aviation Administration (FAA) and Arizona Department of Transportation (ADOT) – Aeronautics Division, which are to enhance local and interstate commerce. Therefore, this alternative is not considered to be prudent or feasible and will no longer be considered in this study.

AIRPORT DEVELOPMENT OBJECTIVES

It is the overall objective of this effort to produce a balanced airside and landside complex to serve forecast aviation demands. However, before defining and evaluating specific alternatives, airport development objectives should be considered. The primary goal for 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 community and its users. With this in mind, the following development objectives have been defined for this planning effort:

- Maintain an attractive, efficient, and safe aviation facility in accordance with federal, state, and local regulations.

- Develop facilities necessary to efficiently and securely accommodate commercial airline service.

- Develop facilities to efficiently serve general aviation users and encourage increased use of the airport, including increased business and corporate use of the airport.

- Provide sufficient airside and landside capacity through additional facility improvements which will meet the long term planning horizon level of demand of the area.

- Identify any future land acquisition needs.

- Ensure that any recommended future development is environmentally compatible.

- Target local economic development through the development of available property.

- Identify opportunities for approved non-aeronautical use of certain areas on the airport to further diversify the airport's revenue-generat-ing potential.

The remainder of this chapter will describe various development alternatives for the airside and landside facilities. Within each of these areas, specific facilities are required or de-sired. Although each area is treated separately, planning must integrate the individual requirements so that they complement one another. **Exhibit 4A** presents both airside and landside planning issues that will be specifically addressed.

AIRSIDE PLANNING CONSIDERATIONS

Airfield elements such as the runway and taxiway system are, by nature, the focal point of the 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 alternatives. In particular, the runway system requires the greatest commitment of land area and often imparts the greatest influence on the identification and development of other airport facilities. Furthermore, aircraft operations dictate the FAA design criteria that must be considered when examining potential airfield improvements. These design standards can have a significant impact on the various alternatives intended to meet airfield needs.

Several airfield topics will be discussed in detail and then applied to the various airport development alternatives. In the next chapter, a recommended alternative will be presented which may be one of these alternatives as presented or may be a combination of elements from these alternatives.

AIRFIELD DESIGN STANDARDS

The design of airfield facilities is based, in part, on the physical and operational characteristics of aircraft using the airport. The FAA utilizes the Airport Reference Code (ARC) system to relate airport design requirements to the physical (wingspan and tail height) and operational (approach speed) characteristics of the largest and fastest aircraft conducting 500 or more operations annually at the airport. While this can at times be represented by one specific make and model of aircraft, most often the airport's ARC is represented by several different aircraft which collectively conduct more than 500 annual operations at the airport.

Analysis in the previous chapter indicated that the critical aircraft at Lake Havasu City Municipal Airport is currently ARC B-II. It is forecast, however, that during the course of the planning period, the critical aircraft will transition to ARC C/D-II. With this transition come changes in FAA design standards. Of primary concern are the runway safety area (RSA), object free area (OFA), and runway protection zone (RPZ). The existing and future safety areas are presented on **Exhibit 4B**.

Runway Safety Area

The FAA defines the RSA as "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." The RSA is an integral part of the runway environment. RSA dimensions are established in FAA Advisory Circular (AC) 150/5300-13, Change 13, *Airport Design*, and are based on the ARC of the critical design aircraft for the airport. The RSA is intended to provide a measure of safety in the event of an aircraft's excursion from the runway, by significantly reducing the extent of personal injury and aircraft damage during overruns, undershoots, and veer-offs. According to the AC, the RSA must be:

1) cleared and graded and have no potentially hazardous ruts, bumps, depressions, or other surface variations;

2) drained by grading or storm sewers to prevent water accumulation;

3) capable, under dry conditions, of supporting aircraft rescue and firefighting equipment, and the occasional passage of aircraft without causing structural damage to the aircraft; and

4) free of objects, except for objects that need to be located in the safety area because of their function.

Furthermore, the FAA has placed a higher significance on maintaining adequate RSAs at all airports due to recent aircraft accidents. Under Order 5200.8, the FAA established the *Runway Safety Area Program*. The Order states, "The goal of the Runway Safety Area Program is that all RSAs at federally-obligated airports and all RSAs at airports certificated under Title 14 of the Code of Federal Regulations (CFR) Part 139 shall conform to the standards contained in AC 150/5300-13, *Airport Design*, to the extent practicable." Under the Order, each Regional Airports Division of the FAA is obligated to collect and maintain data on the RSA for each runway at federally-obligated airports.

In late 2004, a notable change to AC 150/5300-13, *Airport Design*, pertained to RSAs. Previously, the FAA required the same RSA on both ends of the runway, based on ARC of the critical aircraft. The new change recognizes different RSA measurements for take-offs and landings. For ARC C/D-II aircraft, 600 feet of RSA is now required prior to the approach end of the runway, whereas 1,000 feet is still required beyond the far end of the runway. The intent of this change is to allow airports with significant physical constraints, such as a creek or highway off the runway end, to avoid shortening the runway. Even with the new standard, all airports should strive for the full RSA on both runway ends.

05MP08-4A-3/03/08

AIRSIDE CONSIDERATIONS

- *Evaluate Runway 14-32 for Airport Reference Code (ARC) C/D-II design standards*
- *Analysis of improved instrument approach procedures to the airport*
- *The installation of an approach lighting system on Runway 32*
- *Identify property off each runway end that may be needed for approach protection*
- *Evaluate impacts of safety area considerations*
- *Provide medium intensity taxiway lighting (MITL) on all active taxiways*
- *Extend Taxiway C to the south to provide access for potential aviation development on the airport*
- *The construction of a partial-length parallel taxiway on the east side of Runway 14-32 to allow for future aviation development*

LANDSIDE CONSIDERATIONS

- *Identify locations for additional hangar development to meet projected demand*
- *Analyze current and future terminal building needs and locations*
- *Identify locations dedicated to air cargo operations, transient business jet parking, and helicopter parking*
- *Identify potential locations for a future airport traffic control tower (ATCT)*
- *Identify locations suitable for a permanent airport maintenance building*
- *Analyze property on east side of airfield for future aviation use*
- *Consider alternatives for development in southwest area of the airport*
- *Identify property southwest of existing airport boundary for potential land acquisition to be utilized as aviation revenue support*
- *Identify locations for non-aviation development and revenue support methods*

LAKE HAVASU CITY, ARIZONA • MUNICIPAL AIRPORT •

Exhibit 4A
PLANNING CONSIDERATIONS

Exhibit 4B
EXISTING/ULTIMATE CONDITIONS

As previously mentioned, the airport's current critical aircraft falls in ARC B-II. With approach visibility minimums currently not lower than three-quarters of a mile, the required RSA for Runway 14-32 is 150 feet wide, extending 300 feet beyond each runway end. An upgrade to ARC C/D-II design standards increases both dimensions of this requirement. The ARC C/D-II standard for RSA increases to 500 feet in width extending 1,000 feet beyond each runway end.

The existing RSA for Runway 14-32 is adequate, considering ARC B-II aircraft design standards, as depicted at the top of **Exhibit 4B**. The bottom of **Exhibit 4B** depicts the safety areas when the airport progresses to ARC C/D-II design standards without other improvements being made. As depicted, the enlarged ARC C/D-II RSA would remain on airport property. The area in the enlarged RSA would need to be improved to meet standards as described above.

Object Free Area

The runway OFA is defined in FAA AC 150/5300-13, Change 13, *Airport Design*, as an area centered on the runway extending laterally and beyond each runway end, in accordance to the critical aircraft design category utilizing the runway. The OFA must provide clearance of all ground-based objects protruding above the RSA edge elevation, unless the object is fixed by function serving air or ground navigation. For ARC B-II design and approaches not lower than three-quarters of a mile, the OFA is 500 feet wide, extending 300 feet beyond each runway end.

As with RSA standards, the OFA increases significantly for ARC C/D-II aircraft. For ARC C/D-II aircraft design, the OFA should be 800 feet wide and extend 1,000 feet beyond the runway ends. It should be noted that, in some cases, the terrain encompassing the OFA may fall significantly below the RSA elevation. In those cases, objects can be in the OFA as long as they do not rise above the elevation of the RSA at any given lateral position.

Existing and future OFA for the south end of the runway fall within current airport bounds and are adequate to meet ARC design standards that apply. The existing OFA at the north end of Runway 14-32 currently meets ARC B-II standards; however, the northwest portion of the OFA that corresponds to future ARC C/D-II standards extends off airport property adjacent to Arizona State Highway 95. The alternatives section to follow will address the OFA at the north end of the airport.

Runway Protection Zone

The RPZ is a trapezoidal surface which begins 200 feet from the runway threshold. The RPZ is a designated area beyond the runway end that the FAA encourages airports to own or, in some fashion, maintain positive control over the types of land uses within the RPZ. The goal of the RPZ standard is to increase safety for both pilots and people on the ground. Unlike the RSA, the RPZ can have objects located within its boundaries, provided the objects are not obstructions under CFR Part 77, *Objects Affecting Navigable Airspace* or FAA Order 8260.3B, *Terminal Instrument Procedures* (TERPS). It should be noted, however, that the FAA places high priority on maintaining the RPZ free of items that attract groupings of people or permanent residences.

The FAA does not necessarily require the fee simple acquisition of the RPZ area, but highly recommends that the airport have positive control over development within the RPZ. It is preferred that the airport owns the property; however, avigation easements (ownership of airspace within the RPZ) can be pursued if fee simple purchase is not possible. It should be noted, however, that avigation easements can often cost as much as 80 percent of the full property value and may not adequately prohibit incompatible land uses from locating in the RPZ. An avigation easement would include the space below the approach surface and within the RPZ. For planning purposes, where feasible, alternatives will assume fee simple acquisition of the RPZ and land on either end of the runway not currently encompassed by the existing property line.

The northwest portion of the existing RPZ for Runway 14 extends beyond airport property, nearing State Highway 95, as shown on **Exhibit 4B**. When the airport transitions to ARC C/D-II design standards, the RPZ off each runway end will grow significantly. The RPZ for Runway 14 would extend farther north across State Highway 95 and encompass approximately 6.5 acres of land off current airport property. In conjunction with improved approach visibility minimums lower than three-quarters of a mile associated with a potential straight-in precision instrument approach on Runway 32, the proposed RPZ would expand off the south portion of airport property to include approximately 31.4 acres.

INSTRUMENT APPROACHES

This section will present information regarding the potential for improved instrument approach procedures. Where possible, approach minimums should be as low as possible considering safety and financial constraints. The best approach minimums possible will prevent aircraft from having to divert to another airport, which can cause financial hardship for the operator, on-airport businesses, and the City.

A key priority which needs to be considered is protecting the airport from the potential for 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 ARC and/or the weight of the critical aircraft, as well as the type of approaches established or planned for the airport. For visual approaches and/or approaches not lower than one mile visibility for ARC B-II aircraft, minimum obstruction clearance is required. For ARC C/D-II aircraft with approach minimums lower than three-quarters of a mile visibility, however, the obstruction criterion is more protective.

The two primary resources for determining airspace obstructions are the FAA's Federal Aviation Regulation (F.A.R.) 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. In fact, TERPS analysis is used to evaluate and develop instrument approach procedures including visibility minimums and cloud heights associated with approved approaches.

Analysis in the previous chapter indicated that the plan should consider improved instrument approach capabilities for Runway 14-32. The first step in identifying potential airspace obstructions is the evaluation of the appropriate threshold siting surfaces (TSS). TSS is an imaginary surface which represents the most critical approach area nearest the runway end. The TSS is defined by the visibility minimums of the approach and aircraft type utilizing the approach. At Lake Havasu City Municipal Airport, the lowest visibility minimum for aircraft in approach category A is one and one-quarter mile for a circling approach. Circling approaches for approach category B aircraft have a minimum of one and one-half mile. Circling approach minimums for approach categories C and D is three miles.

Lake Havasu City Municipal Airport should consider approval and implementation of approaches providing lower than three-quarters of a mile visibility minimums for Runway 14-32. Approaches providing lower than three-quarters of a mile minimums will allow operations at the airport, when in the past, aircraft may have had to divert to another airport for landing, or delay departure from their origination point awaiting weather improvements at Lake Havasu City. Further, the forecast increase in the operation of business jets at the airport and the pursuit of commercial service operations at the airport provide a need for improved instrument approach procedures.

Many commercial service and general aviation airports have approved instrument approach procedures with visibility minimums as low as one-half mile with a 200-foot cloud height ceiling. This is referred to as a Category (CAT) I approach. CAT I approaches require an approach lighting system, a glide-slope antenna, and a localizer. In addition, certain criteria must be met, such as reaching a minimum threshold of annual instrument approaches or regular weather conditions that warrant an instrument landing system (ILS) approach.

As previously discussed in Chapter Three – Airport Facility Requirements, significant advancements continue to be made in global positioning system (GPS) navigation that can provide a more cost-effective and attractive means of obtaining CAT I instrument approaches. This includes the continued development of the Wide

Area Augmentation System (WAAS). WAAS provides for approaches with both course and vertical navigation. This capability was historically only provided by an ILS, which requires extensive on-airport facilities. The GPS-WAAS could allow for approach minimums to be lower than three-quarters of a mile visibility. For purposes of this study, the airside alternatives will consider approaches providing for lower than and not lower than three-quarters of a mile visibility minimums.

To achieve an approach providing less than one mile visibility minimums, the corresponding runway end will require the installation of an approach lighting system. Examples of approach lighting systems for approaches with not lower than three-quarters of a mile visibility minimums would include a medium intensity approach lighting system (MALS), omnidirectional approach lighting system (ODALS), or a lead-in light system (LDIN). For approaches with lower than three-quarters of a mile visibility minimums, a medium intensity approach lighting system with runway alignment indicator lights (MALSR) is required.

Preliminary Obstruction Analysis

Exhibits 4C and **4D** present an analysis of the TSS associated with ultimate instrument approach procedures for Runways 14 and 32, respectively. The top portions of the exhibits display the plan, or "overhead" view of each TSS. The bottom half of each exhibit depicts the profile view of the TSS conditions.

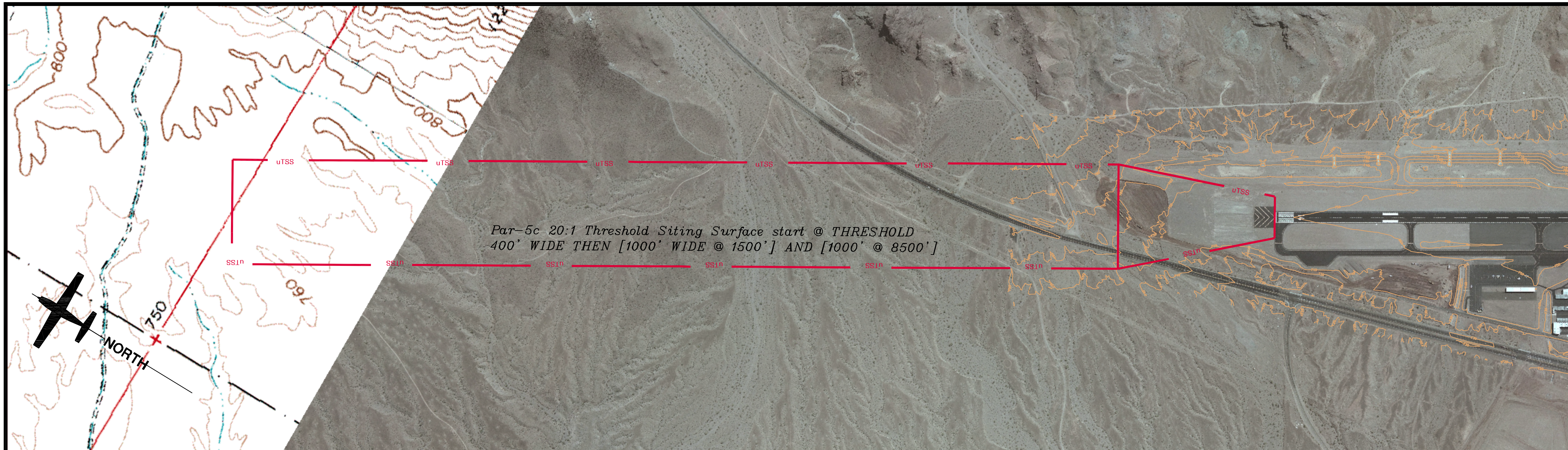
Exhibit 4C presents the airspace obstruction evaluation for Runway 14 considering a straight-in instrument approach with not lower than one mile visibility minimums. There are no identified obstructions to the 20:1 TSS slope for the planned approach to Runway 14.

Exhibit 4D presents airspace obstruction analysis for a CAT I approach on the Runway 32 end. There are no identified obstructions to the 34:1 TSS slope associated with a planned precision approach with lower than three-quarters of a mile visibility minimums on this runway end.

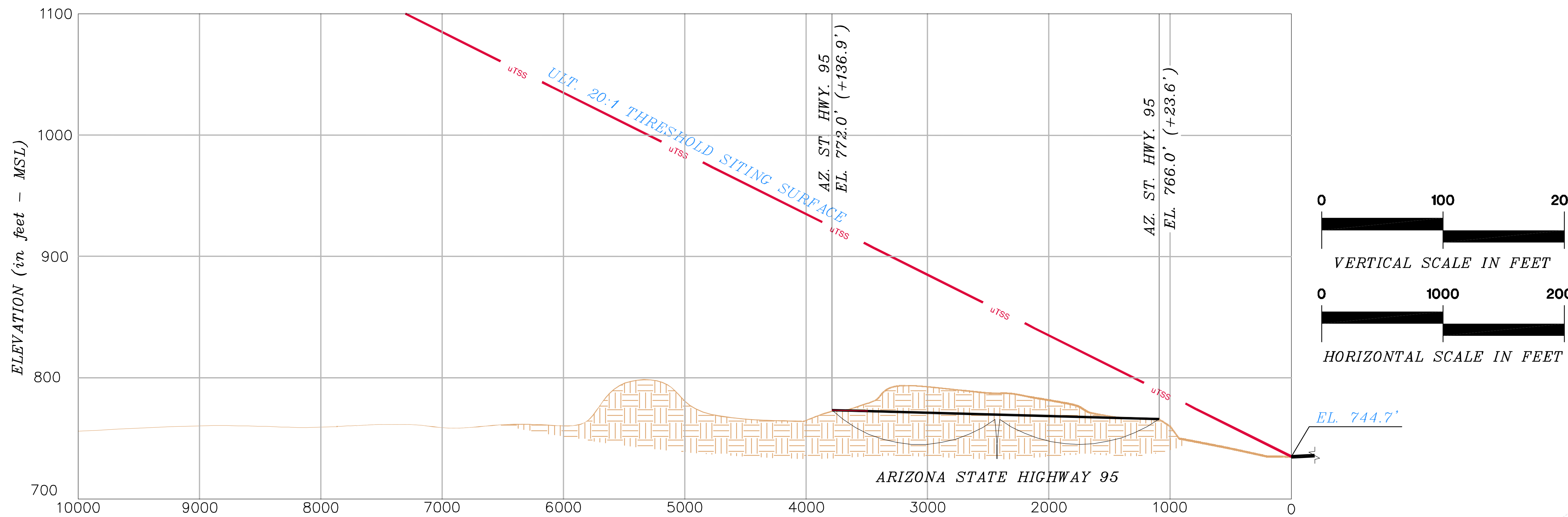
RUNWAY

Analysis in the previous chapter indicated that Runway 14-32 provides adequate length and width to satisfy the planning category of aircraft through the planning period. Currently, Runway 14-32 is 8,001 feet long by 100 feet wide, which meets the requirements of ARC C/D-II aircraft and provides length for longer haul flights than the minimum design consideration. This runway length is consistent with the FAA runway length requirements contained in FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design*.

Also discussed in Chapter Three – Airport Facility Requirements was separation distances between aircraft on the runway and various areas on

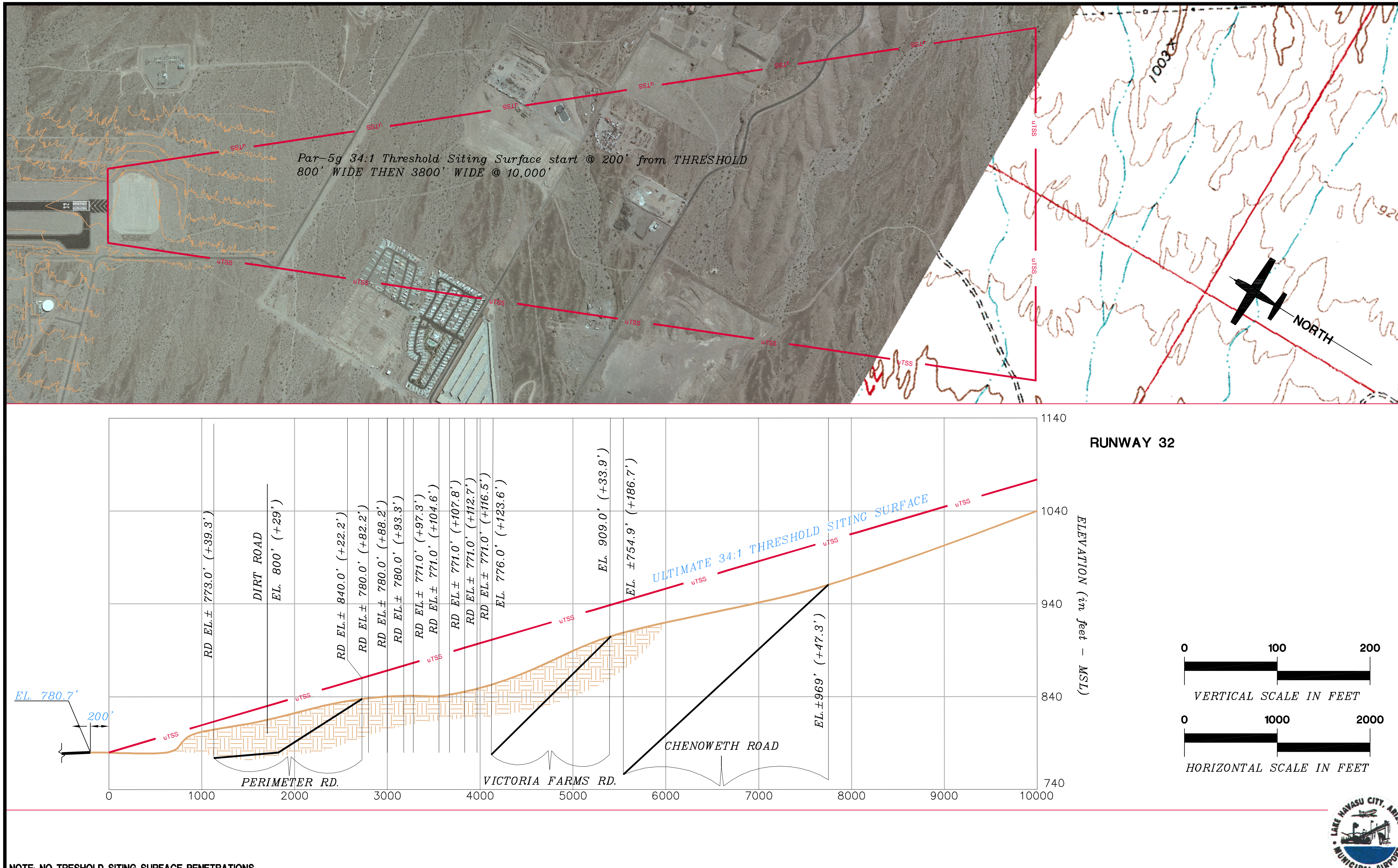


RUNWAY 14



NOTE: NO TRESHOLD SITING SURFACE PENETRATIONS

RUNWAY 14 THRESHOLD SITING SURFACE PLAN AND PROFILE
EXHIBIT 4C



RUNWAY 32 THRESHOLD SITING SURFACE PLAN AND PROFILE

EXHIBIT 4D

the airport. The separation distances are a function of the approaches approved for the airport and the runway's designated ARC. Under current conditions (ARC B-II, approaches not lower than three-quarters of a mile) parallel taxiways need to be at least 240 feet from the Runway 14-32 centerline. Aircraft parking areas are required to be at least 250 feet from the runway centerline.

In order to meet ARC C/D-II standards with approaches not lower than three-quarters of a mile, parallel taxiways need to be at least 300 feet from the runway centerline, and aircraft parking areas are required to be at least 400 feet from the runway centerline. For ARC C/D-II runways with an approach lower than three-quarters of a mile, parallel taxiways need to be at least 400 feet from the runway centerline, and aircraft parking areas are required to be at least 500 feet from the runway centerline.

Currently, parallel Taxiway A located on the west side of Runway 14-32 is located 340 feet from the runway centerline. The aircraft parking apron is located approximately 500 feet from the runway centerline. The alternatives section to follow will address the existing Runway 14-32 and parallel Taxiway A separation associated with different approach visibility minimum criteria.

The capacity analysis presented in the previous chapter indicated that projected long term annual aircraft operations will account for approximately 40 percent of the airport's annual service volume (ASV). The FAA suggests that airports should plan for capacity improvements once annual aircraft operations reach 60 percent of the ASV. Thus, additional airfield capacity enhancements are not required.

TAXIWAYS

Taxiways are the primary transport surfaces linked with the runway and its operation. Such surfaces include a parallel taxiway, entrance/exit taxiways, and connecting taxiways.

Taxilanes are those surfaces that would typically realize a lower level of aircraft activity because the taxilanes provide direct ingress/egress to a specific location or airport facility. An example of a taxilane would be the surface which links to a box hangar complex, as not all aircraft will use the surface but only those traversing to and from the box hangar.

FAA AC 150/5300-13, Change 13, *Airport Design*, provides standards for taxiway object free areas (OFAs) surrounding the taxiway system. As discussed in the previous chapter, the taxiway OFA is based on the critical aircraft design group which will frequent that particular taxiway. Design standards for airplane design group (ADG) II, aircraft with wingspans ranging from 49 feet to 79 feet, require the taxiway OFA to be 131 feet wide. The taxilane OFA required for ADG II aircraft is 115 feet wide. Analysis of existing and future taxiway OFA will be provided in the airside alternatives to follow.

The current layout of the taxiway system at Lake Havasu City Municipal

Airport is adequate from a functional standpoint. Runway 14-32 is supported by a full length parallel taxiway and six entrance/exit taxiways. Two of these taxiways provide high-speed exits from the runway system which improves the overall capacity of the airport. Parallel Taxiway A is 50 feet wide and the six entrance/exit taxiways range from 50 feet to 65 feet in width. Further removed from the runway, Taxiways B and C range from 35 feet to 70 feet in width. FAA design criteria call for taxiways serving critical aircraft in ADG II to be at least 35 feet wide.

Additional taxiways should be constructed as development and demand warrant. The alternatives to follow show additional taxiways. These taxiways are based on continued development of the airport. During the course of the planning period, medium intensity taxiway lighting (MITL) should be applied to all taxiways.

SEGMENTED CIRCLE/ LIGHTED WIND CONE

The airport is currently equipped with a segmented circle and lighted wind cone on the east side of the airfield to aid pilots in determining appropriate traffic patterns, wind direction, and speed. Once the ARC design standards are upgraded to C/D-II, the safety areas of the airport will widen, causing the segmented circle and wind cone to be located within the runway OFA. It is defined in FAA AC 150/5300-13, *Airport Design*, that the OFA should be cleared of objects protruding above the runway safety area edge elevation. Therefore, the segmented circle and wind cone should be relocated farther to the east so that it lies completely outside the OFA.

AIRSIDE DEVELOPMENT ALTERNATIVES

The following section describes three airside development alternatives. Within these alternatives are two scenarios regarding the entrance/exit taxiways extending from Runway 14-32. Also considered are other taxiway improvements to include a partial-length parallel taxiway on the east side of Runway 14-32, extension of existing taxiways, options for improved instrument approach procedures and approach lighting aids, and land acquisition on the south side of the airport.

AIRSIDE ALTERNATIVE A

Airside Alternative A, depicted on **Exhibit 4E**, considers the implementation of a straight-in instrument approach with not lower than three-quarters of a mile visibility on Runway 32. As previously discussed, airport management monitors the airport's UNICOM frequency and has traditionally logged airport operations at the airport. According to their records, approximately 65 percent of aircraft utilize Runway 32 during the hours in which they are present. Also, during times when poor weather conditions exist that may warrant the use of a straight-in instrument approach, it is most likely that wind conditions would favor the use of Runway 32. As

05MP08-1F-1/31/08

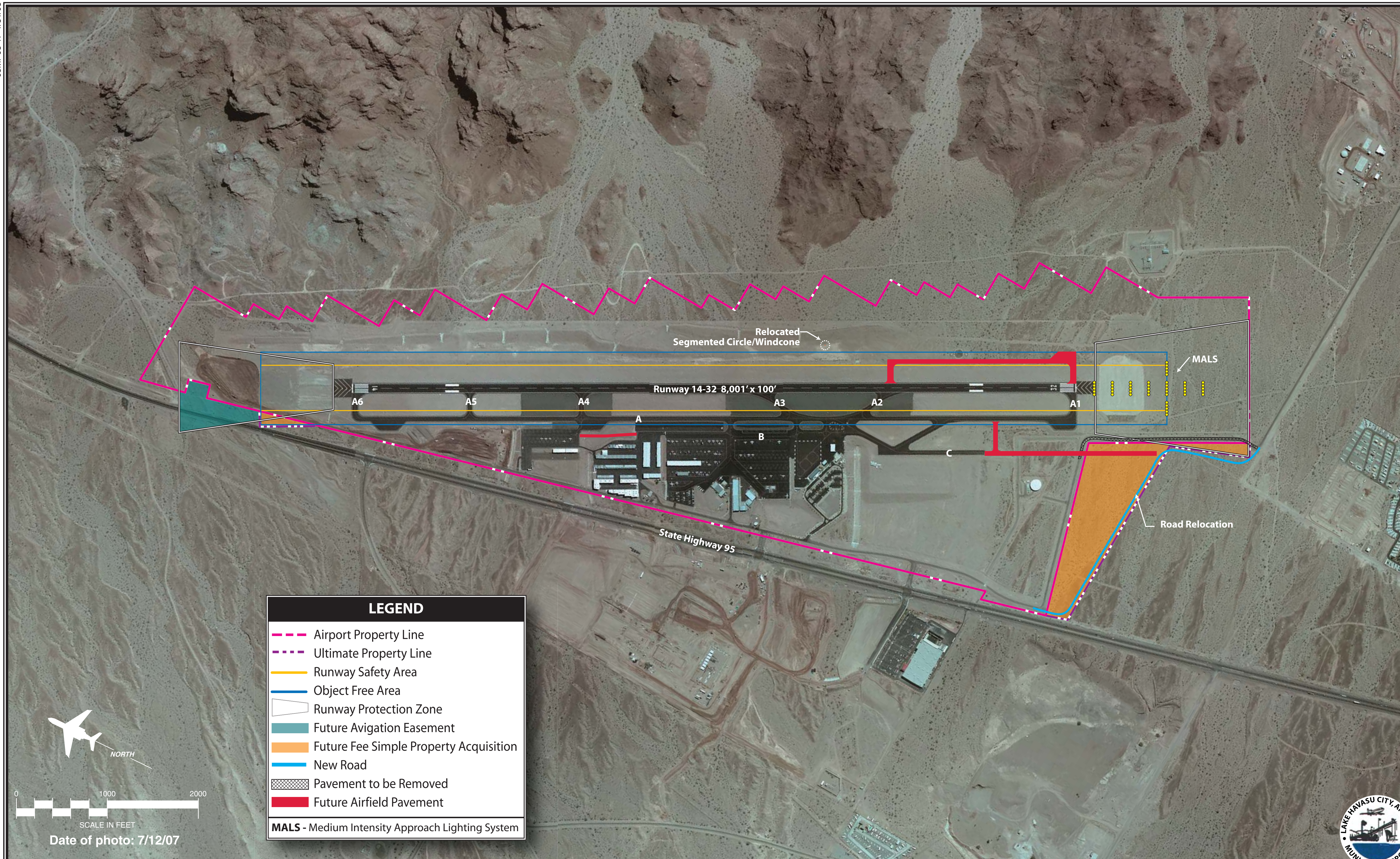


Exhibit 4E
AIRSIDE ALTERNATIVE A

depicted on **Exhibit 4E**, a medium intensity approach lighting system (MALS) is proposed since the runway would provide for less than one mile visibility minimums. The MALS lights begin approximately 200 feet from the runway threshold and are spaced to a maximum distance of 1,400 feet. It should be noted that an approach lighting system is depicted on all airside alternative exhibits to provide a general layout of what the system may look like. Further engineering analysis, separate from this Master Plan, would determine the exact location of the approach lighting system.

With the onset of improved instrument approach procedures to Runway 32, the proposed RPZ will further expand to include areas outside existing airport property. The FAA places a high priority on maintaining an RPZ with little or no development and/or congestion. The expanded RPZ would include portions of the perimeter road on the southwest side of the airport. Although the road could pass through the RPZ, as long as it didn't then constitute an obstruction to the TSS, it is recommended that the road be relocated completely outside the RPZ. Although the FAA does not require the fee simple acquisition of areas within the RPZ, it is recommended that the airport have positive control over the use of this property. Approximately 1.5 acres of land fall outside the southwest portion of the expanded RPZ. Due to the current nature of the property and proposed development further to the south of the airport in the future, it is recommended that this portion of property be acquired through fee simple acquisition.

Also depicted on Airside Alternative A are extensions of Taxiway B to the north and Taxiway C to the south. Extending Taxiway B to the north would allow direct access to the main aircraft apron for smaller aircraft on the north apron. In doing so, this would create a bypass helping to alleviate aircraft taxiing on parallel Taxiway A. Farther to the south, a 1,900-foot extension to Taxiway C is depicted that would open up additional areas for potential aviation development. Approximately 23 acres of land is shown in this area as being purchased by the airport to be used for aviation development. The existing entrance/exit taxiways extending west of Runway 14-32 would be maintained in their current location on this alternative.

On the north side of Runway 14-32, an expanded RPZ to accommodate ARC C/D-II aircraft with the potential for a straight-in instrument approach with not lower than one mile visibility is depicted. The proposed OFA and RPZ would extend beyond the current property boundary, necessitating land acquisition to the north. The total area of land outside the property line but within the OFA and RPZ is approximately 7.3 acres. At a minimum, the airport would need to acquire the OFA areas outside the property line. Due to the nature and location of the property adjacent to State Highway 95, it may not be prudent or feasible to purchase this property. In the event that this property cannot be acquired, an easement over this area should be pursued giving the airport control over what can be done in this area. Farther to the north, the proposed RPZ extends outside existing airport property and crosses Highway 95. Due to the nature of the land use, it may not be financially feasible or reasonable to purchase the land via fee simple acquisition. At the very least, the airport should have positive control over what can be developed within this area. Methods of gaining control could include an avigation easement, letter of agreement, or memorandum of understanding.

Finally, Airside Alternative A depicts a partial parallel taxiway on the east side of Runway 14-32. This taxiway measures approximately 2,000 feet in length and is located 300 feet from the runway centerline, satisfying runway-to-parallel taxiway separation for an instrument approach providing not lower than three-quarters of a mile visibility. This taxiway would provide access to future aviation development on the southeast side of the airport. In order to satisfy ultimate safety design standards and accommodate potential development in this area, the segmented circle and wind cone would be relocated farther north and east, outside the OFA. It should be mentioned that preliminary plans are in place for the realignment of State Highway 95 on the east side of the airport, thus, opening up this area to automobile access. Due to the physical layout of land on the east side of the airport, future analysis will determine the feasibility and justification of future development in this area. Further, forecast aviation demand through the long term planning horizon of this Master Plan can be accommodated on property to the west of Runway 14-32 that is already provided with taxiway access and better suited for automobile access.

AIRSIDE ALTERNATIVE B

A second option for accommodating airside needs is depicted on **Exhibit 4F**. In this alternative, the high-speed exit taxiways extending west off Runway 14-32 would be relocated to provide a more efficient taxiing network from the runway system and improve operational capacity in doing so. The high-speed exits were originally constructed to accommodate a 5,500-foot runway. Since the runway has been extended to 8,000 feet, analysis shows that the high-speed exit taxiways would better accommodate larger jet aircraft if they were located further north of their current location. In addition, two right-angled taxiways are depicted farther south to allow for additional runway exits.

As in the previous alternative, the OFA and RPZ would both extend beyond the current property line to the north of the airport. The total area of land outside the property line that encompasses the OFA and RPZ is 7.3 acres, similar to what is shown on the previous exhibit. It is recommended that the airport gain control of areas within the OFA and RPZ to the extent practicable.

The improved instrument approach for Runway 32 is also considered on Alternative B. A MALS is implemented that would enable the runway to ob-

05MP08-4F-3/01/08

Exhibit 4F
AIRSIDE ALTERNATIVE B

tain a straight-in approach with not lower than three-quarters of a mile visibility minimums. As proposed, Runway 14 could support a non-precision approach with visibility minimums not lower than one mile.

As shown in Alternative A, Taxiway B and Taxiway C would be extended to support future aviation development on the west side of the airport. The extension of Taxiway C would lead to an area on the southwest side of the airport that is considered for fee simple property acquisition to meet the needs of future aviation demand. On the east side of Runway 14-32, a 2,400-foot partial parallel taxiway is depicted 300 feet from the runway centerline that would provide for future aviation development most likely beyond the planning horizon of this Master Plan. In doing so, the segmented circle and wind cone would be relocated farther north and east of their current location so as not to interfere with safety areas and future development.

AIRSIDE ALTERNATIVE C

Airside Alternative C depicts a precision instrument approach on Runway 32. As shown on **Exhibit 4G**, the proposed RPZ will expand further south as a result of CAT I visibility minimums. A medium intensity approach lighting system with runway alignment indicator lights (MALSR) will be required to obtain approach visibility minimums lower than three-quarters of a mile. The MALSR lights begin approximately 200 feet from the runway threshold and are spaced to a maximum distance of 2,400 feet, as indicated on the exhibit. The FAA requires that the airport own property within 100 feet on either side of the MALSR extending 200 feet from the end. With this being said, the proposed MALSR would extend approximately 500 feet beyond airport property, necessitating the need for property acquisition.

The proposed RPZ associated with a precision CAT I approach encompasses approximately 31.4 acres outside airport property. As previously mentioned, the FAA strongly encourages having positive control of the RPZ through the use of fee simple property acquisition with little or no development and/or congestion within it. Discussions with airport and City staff point to the fact that areas adjacent to the south side of the airport are currently dedicated for future business and industrial park development. Analysis of preliminary plans depicts a significant area extending farther south of the runway that is kept undeveloped to accommodate potential airport safety areas. As a result, the expanded RPZ should encompass an area that is not originally shown for business and industrial park development. This alternative shows the relocation of the perimeter road to keep it out of the RPZ in order to better accommodate the proposed CAT I approach.

In order to meet safety design standards for a precision instrument approach with visibility minimums lower than three-quarters of a mile, the runway-to-parallel taxiway separation is required to be 400 feet for ARC C/D-

II runways. As previously discussed, the separation from Runway 14-32 to parallel Taxiway A is 340 feet. Future planning should consider one of two options in addressing future design standards so that a precision instrument approach can be implemented on Runway 32. First, Lake Havasu City Municipal Airport could submit a request for modification to airport design standards as per FAA AC 150/5300, *Airport Design*. The FAA would then determine if the current separation warrants a precision approach. The second option would be to consider the relocation of Taxiway A approximately 60 feet to the west to meet the 400-foot separation criteria.

The other airside improvements proposed on Alternative C are similar to those depicted on Alternative A. The partial parallel taxiway on the east side of Runway 14-32 is located 400 feet from the runway centerline in order to satisfy the proper separation requirements for a precision instrument approach, as discussed in the previous paragraph.

LANDSIDE PLANNING CONSIDERATIONS

The purpose of this section is to identify and evaluate viable landside alternatives at Lake Havasu City Municipal Airport to meet program requirements set forth in Chapter Three. While the airfield is comprised of facilities where aircraft movement occurs (runway, taxiways, etc.), other "landside" functions occur outside this area. The primary aviation functions to be accomplished landside at Lake Havasu City Municipal Airport include aircraft storage hangars, aircraft parking aprons, a passenger terminal building, and automobile parking and access. The interrelationship of these functions is important to defining a long-range landside layout for commercial and general aviation uses at the airport. Due to the amount of land available at the airport, careful consideration will also be given to parcels of land that could be considered for non-aviation related uses that can provide additional revenue support to the airport and support economic development for the region.

The orderly development of the airport terminal area, those areas along the flight line parallel to the runway, can be the most critical, and often times the most difficult to control on the airport. A development approach of taking the path of least resistance can have a significant effect on the long-term viability of an airport. Allowing development without regard to a functional plan could result in a haphazard array of buildings and small apron areas, which will eventually preclude the most efficient use of valuable space along the flight line.

Activity in the terminal area should be divided into high, medium, and low intensity levels at the airport. The high-activity area should be planned and developed to provide aviation services on the airport. An example of the high-activity area is the airport terminal building and adjoining aircraft parking apron, which provides tiedown locations and circulation for aircraft. In addition, large conventional hangars used for fixed base op-

05MP08-4G-3/11/08

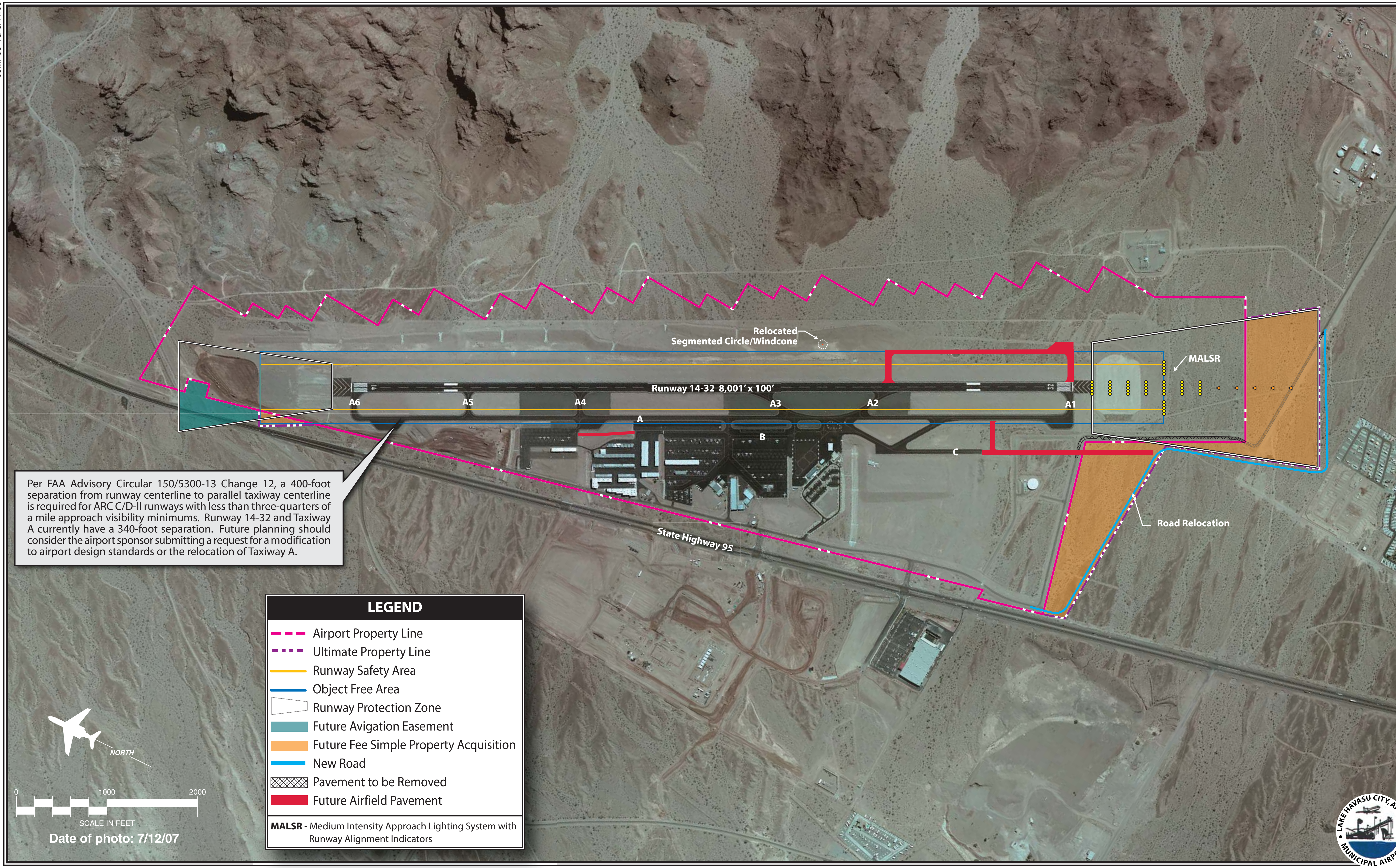


Exhibit 4G
AIRSIDE ALTERNATIVE C

erators (FBOs), corporate aviation departments, or storing a large number of aircraft would be considered a high-activity use area. The best location for high-activity areas is along the flight line near midfield, for ease of access to all areas of the airfield.

The medium-activity use category defines the next level of airport use and primarily includes smaller corporate aircraft that may desire their own executive hangar storage on the airport. The best location for medium-activity use is off the immediate flight line, but still readily accessible to aircraft including corporate jets. Due to an airport's layout and other existing conditions, if this area is to be located along the flight line, it is best to keep it out of the midfield area of the airport, so as to not cause congestion with transient aircraft utilizing the airport. Parking and utilities such as water and sewer should also be provided in this area.

The low-activity use category defines the area for storage of smaller single and multi-engine aircraft. Low-activity users are personal or small business aircraft owners who prefer individual space in T-hangars or shade hangars. Low-activity areas should be located in less conspicuous areas. This use category will require electricity, but generally does not require water or sewer utilities.

Ideally, terminal area facilities at airports should follow a linear configuration parallel to the primary runway. The linear configuration allows for maximizing available space, while providing ease of access to terminal facilities from the airfield. Landside alternatives will address development in specific areas on the airport. Separation of activity levels and efficiency of layout will be discussed as well.

In addition to the functional compatibility of the terminal area, the proposed development concept should provide a first-class appearance for Lake Havasu City Municipal Airport. As previously mentioned, Lake Havasu City serves as a very important link to the entire region whether it is for business or pleasure. Consideration to aesthetics should be given high priority in all public areas, as the airport can serve as the first impression a visitor may have of the community.

Lake Havasu City Municipal Airport is located on approximately 646 acres. In order to allow for maximum development of the airport while keeping with FAA mandated safety design standards, it is very important to devise a plan that allows for the orderly development of airport facilities. Typically, airports will reserve the first 1,000 feet parallel to the runway for aviation-related activity exclusively. This distance will allow for the location of taxiways, apron, and hangars.

In those circumstances where ultimate demand levels fall short of the ultimate build-out need, some airports will encourage non-aviation commercial or industrial development. The potential of non-aviation development on airport property can provide an additional revenue source in the form of long-term land leases for the airport. Aviation-related growth is forecasted to be very strong at Lake Havasu City Municipal Airport throughout the planning period, thus, the majority of property on the airport will be dedicated for aviation use.

The alternatives to be presented 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 City. Many times, airport operators change their plan to meet the needs of specific users. The goal in analyzing landside development alternatives is to focus future development so that airport property can be maximized.

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

AIRCRAFT HANGAR DEVELOPMENT

The facility requirements indicated a need for the development of more aircraft storage hangars at Lake Havasu City Municipal Airport. Hangar development takes on a variety of sizes corresponding with several different uses.

Commercial general aviation activities are essential to providing the necessary services needed on an airport. This includes businesses involved with, but not limited to, aircraft rental and flight training, aircraft charters, aircraft maintenance, line service, and aircraft fueling. These types of operations are commonly referred to as FBOs. The facilities associated with businesses such as these include large conventional type hangars that hold several 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 for transient aircraft. Utility services are needed for these types of facilities, as well as automobile parking areas.

The mix of aircraft using Lake Havasu City Municipal Airport is expected to change to include more business class aircraft which have larger wingspans. These larger aircraft require greater separation distances between facilities, larger apron areas for parking and circulation, and larger hangar facilities.

Another need indicated was additional space for the storage of smaller aircraft. This primarily involves T-hangars and shade 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. Typically, this involves electricity, but may also include water and sanitary sewer.

Other types of hangar development can include clearspan hangars for accommodating several aircraft simultaneously. Typically, these types of hangars are used by corporations with company-owned aircraft or by an individual or group of individuals with several aircraft. These hangar areas require all utilities and segregated roadway access.

PASSENGER TERMINAL BUILDING

Analysis in the previous chapter indicated that additional commercial terminal building space is needed through the planning period. The current terminal building totals approximately 5,700 square feet and houses airport administration, two rental car agencies, and commercial airline service amenities that include passenger waiting areas, a baggage claim area, a vending area, and a ticket counter. In the event that Lake Havasu City Municipal Airport regains commercial airline service, which it is actively pursuing, projected passenger enplanement levels justify a need for additional terminal area space.

An airport passenger terminal is similar in many respects to other transportation terminals, but has some distinctly different characteristics. For example, the ground time of an aircraft is minimized; therefore, airport passenger terminals must be able to accommodate condensed peak passengers and baggage situations. In addition, airports place a greater reliance on the use of private automobiles for access to and from the airport, creating a need for adequate roadway and parking facilities.

The passenger terminal building is the first impression air travelers have of the community. A functional and attractive terminal facility is needed to secure and build air travelers' favorable opinion of a community, particularly business leaders who may be investing in the community.

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 and times 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.

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

A review of each of these factors is listed below.

Runway configuration: The existing terminal is situated west of Runway 14-32 near midfield. Taxiway A serves the apron adjacent to the terminal building. Due to the single runway orientation at the airport, there are no additional runways that are crossed.

Access to transportation network: The existing terminal building is located adjacent to Airport Centre Boulevard, which provides circular, one-way access to Patton Drive. Patton Drive connects directly with State Highway 95 west of the terminal building. State Highway 95 extends directly to Lake Havasu City's central business district and points beyond.

Expansion potential: Space is available to the north and south of the terminal for building expansion. Approximately 150 feet to the northwest of the terminal building is a temporary facility that houses Transportation Security Administration (TSA) functions. Approximately 80 feet to the south is a covered parking area for airport operations vehicles. Additional automobile parking could be obtained farther west of the existing parking lots associated with the terminal building.

FAA Geometric Design Standards: The existing terminal is located approximately 1,000 feet west of the Runway 14-32 centerline. This is well outside any area obstruction clearance area and does not impact any design standards.

As shown, the existing terminal building site meets the general recommendations of the FAA utilizing this criterion. Therefore, retention of the terminal in its existing location will be considered in one of the landside alternatives to follow. However, for planning purposes, a new terminal location will also be explored.

REVENUE SUPPORT LAND USES

Due to the physical terrain and layout of certain portions of airport property, the landside alternatives to follow consider options for Lake Havasu City to utilize portions of the airport for non-aeronautical purposes such as commercial, industrial, or office park development. It should be noted that the City does not have the approval to use airport property for non-aeronautical purposes at this time. This requires specific approval from the FAA. The Master Plan does not gain approval for non-aeronautical uses, even if these uses are ultimately shown in the Master Plan. A separate request justifying the use of airport property for non-aeronautical uses will be required once the Master Plan is complete. The Master Plan can be a source for developing that justification.

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

These obligations will require that the City formally request from the FAA a release from the terms, conditions, reservations, and restrictions contained in any conveyance deeds and assurances in previous grant agreements. A release is required even if the airport desires to continue to own the land and only lease the land for development. The obligations relate to the use of the land just as much as they do to the ownership of the land.

U.S. Code 47153 authorizes the FAA to release airport land when it is convincingly clear that:

a. Airport property no longer serves the purpose for which it was conveyed. In other words, the airport does not need the land now or in the future because it has no airport-related or aeronautical use, nor does it serve as approach protection, a compatible land use, or a noise buffer zone.

b. The release will not prevent the airport from carrying out the purpose for which the land was conveyed. In other words, the airport will not experience any negative impacts from relinquishing the land.

c. The release is actually necessary to advance civil aviation interests of the counters. In other words, there is a measurable and tangible benefit for the airport or the airport system.

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

A formal request to the FAA for a release from federal obligations will have several distinct elements. The major elements of the request will include:

1. A description of the obligating conveyance instrument or grant.

2. A complete property description including a legal description of the land to be released.

3. A description of the property condition.

4. A description of federal obligations.

5. The kind of release requested. (lease or sale)

6. Purpose of the release.

7. Justification for the release.

8. Disposition and market value of the released land.

9. Reinvestment agreement. A commitment by the City to reinvest any lease revenues exclusive-

ly for the improvement, operation, and maintenance of the airport.

10. Draft instrument of release.

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

AIRPORT TRAFFIC CONTROL TOWER

There is currently no airport traffic control tower (ATCT) at the airport. Facility planning in Chapter Three indicated that a location should be reserved for the development of an ATCT, should future justification support one.

The ATCT is the focal point for controlling flight operations within the airport's designated airspace and all aircraft and vehicle movement on the airport's runways and taxiways. Site selection involves certain mandatory requirements concerning the ultimate planned development of the airport.

The following operational and spatial requirements are identified in FAA Order 6480.4, *Airport Traffic Control Tower Siting Criteria*.

Mandatory Siting Requirements

- There must be maximum visibility of airport traffic patterns.
- There must be a clear, unobstructed, and direct view of the approaches to all runways or landing areas and to all runway and taxiway surfaces.
- The proposed site must be large enough to accommodate current and future building needs including employee parking spaces.
- The proposed tower must not violate F.A.R. Part 77 surfaces unless it is absolutely necessary.
- The proposed tower must not derogate the signal generated by any existing or planned electronic navigational aid.

Nonmandatory Siting Requirements

- To assure adequate depth perception, the line-of-sight to aircraft movement areas should be perpendicular to the direction of aircraft travel.

- The tower cab should be oriented to face north or alternatively to the east, south, or west. Every effort should be made to prevent an aircraft approach from being aligned with the rising or setting sun.

- The controller's visibility should not be impaired by direct or indirect external lighting sources.

- All aircraft movement areas including parking aprons, tie-down spaces, run-up pads, etc., should be visible from the ATCT.

- Consideration must be given to local weather phenomena to preclude restriction to visibility due to fog or ground haze.

- Exterior noise should be at a minimum and sites should be evaluated for expected noise levels.

- Access to the site should not require controllers to cross a runway or taxiway.

- Consideration should be given to planned airport expansion, especially for the construction of buildings, hangars, runway/taxiway extensions, etc. to preclude the relocation of the ATCT at a later date.

The landside alternatives will consider potential areas for siting an ATCT. Final site locations and the height of the ATCT cab will be completed by the FAA in a separate study outside the Master Plan. It should be noted that current and projected aircraft operational counts will not fully fund the construction and operation of an ATCT; thus, future justification of such a facility may not be warranted during the planning period of this Master Plan. The purpose of this analysis is only to reserve an area for the future development of an ATCT in the future should justification support one.

LANDSIDE DEVELOPMENT ALTERNATIVES

A series of landside alternatives have been examined for the west side of the airport. These alternatives consider commercial and general aviation facility development providing for separation of activity levels. The goal of this analysis is to indicate development potentials which would provide Lake Havasu City Municipal Airport with a specific goal for future development. The resultant plan will aid the City in strategic marketing of available airport properties.

LANDSIDE ALTERNATIVE A

Landside Alternative A, depicted on **Exhibit 4H**, considers the acquisition of approximately 23 acres of land on the southwest side of the airport for future aviation development. The principal philosophy followed is to group facilities supporting similar activity levels together.

This alternative proposes keeping the existing terminal building in the current location and expanding it in size. As mentioned earlier, Lake Havasu City Municipal Airport can expect an increase in passenger enplanements through the planning period in the event that it regains commercial service. Analysis in the previous chapter indicated that the terminal building will need to provide approximately 10,000 square feet in order to accommodate the functions associated with commercial airline service by the long term planning period. There is sufficient room on either side of the facility to accommodate an expansion. The existing automobile access roads and parking areas are capable of handling an increase in passenger service demand.

Immediately to the northwest of the terminal building is an area designated for a future ATCT. This area is currently being occupied by a TSA trailer. It is assumed that a future terminal expansion would allow TSA offices and personnel to relocate inside the facility; thus, allowing the area immediately north of the terminal to be used for another function. In this case, the ATCT would be provided a desirable midfield location with clear line-of-sight to the runway and taxiway systems on the airfield.

This alternative also proposes changes to be made on the main aircraft parking apron. It is important to keep different aircraft activity levels separated in order to provide a safe and efficient environment for landside activity. Currently, a designated air cargo area is located immediately east of the leased automobile parking lot. Larger turboprop aircraft are typically utilized for transferring air cargo to and from Lake Havasu City Municipal Airport and would be better served in a location that provides more convenient access to the taxiway system. A temporary air cargo area is depicted farther to the east adjacent to Taxiway B. In the future, as development occurs further south adjacent to Taxiway C, a permanent air cargo area is depicted that would provide a more secure location for the screening of cargo and vehicles as they enter the airfield environment.

Marked helicopter hardstands are depicted immediately north of the temporary air cargo area. Providing these markings would better segregate helicopters from fixed-wing aircraft and would eliminate the need for the designated helicopter parking area to the east of Taxiway B. A portion of the main aircraft parking apron also shows dedicated large aircraft parking to accommodate transient business jet operations. An area of vacant land immediately south of the leased automobile parking lot also provides for future aviation development.

To the north of the main aircraft parking apron is an area designated for additional aircraft storage in the form of five T-hangars. Immediately north of this area is land that is currently being developed for aviation use to support an FBO.

In keeping with the philosophy of grouping similar activity levels together, this alternative proposes hangar development in the form of conventional, executive, and T-hangars on the southwest side of the airport in areas between Taxiway C and Patton Drive. Large conventional hangar facilities are depicted that could support FBO-type operations, with smaller executive hangars to the south that will accommodate corporate flight departments. Farther south are several T-

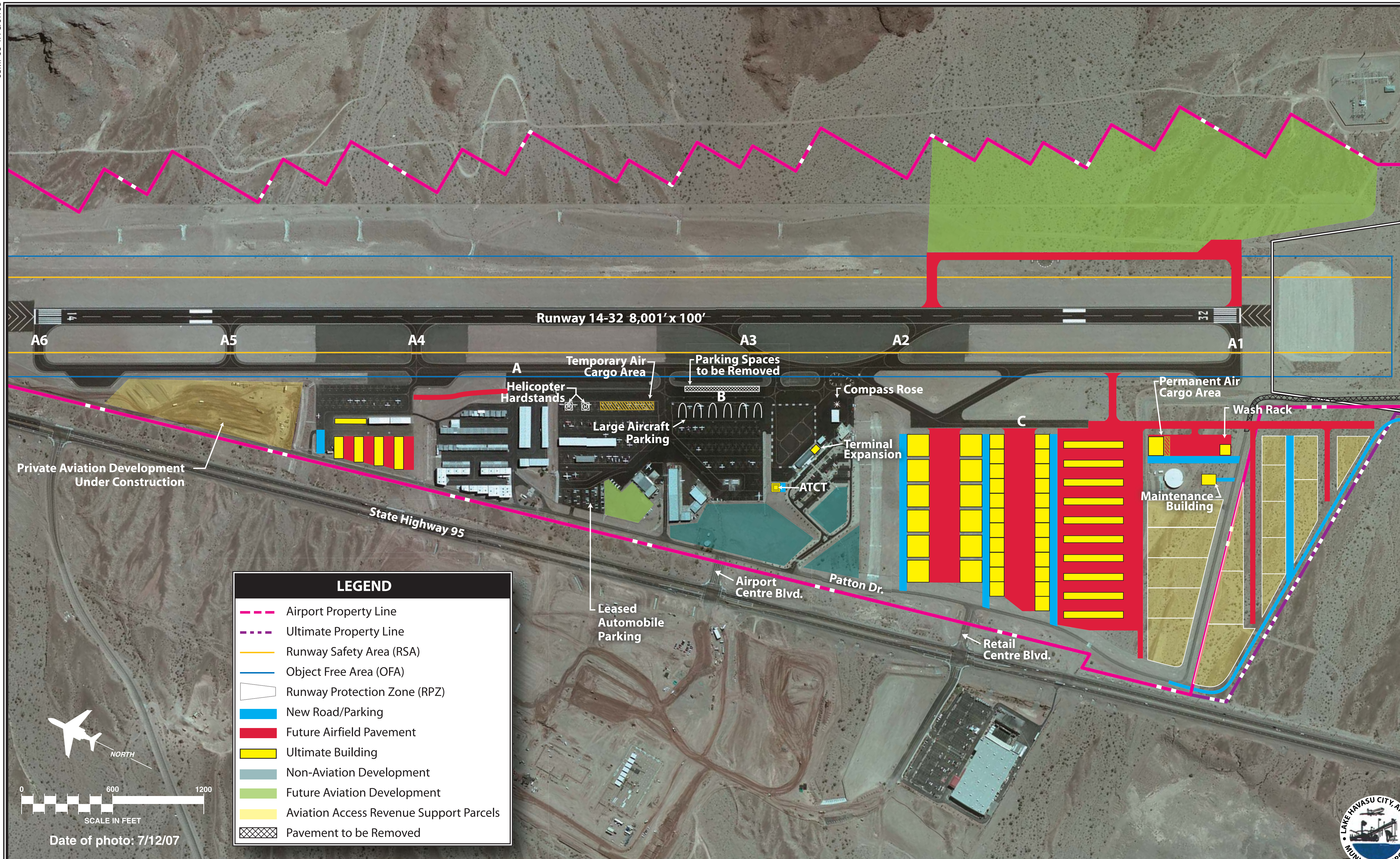


Exhibit 4H
LANDSIDE ALTERNATIVE A

hangar complexes to accommodate smaller aircraft storage. These facilities can be accessed by roadways extending east from Patton Drive.

An airport maintenance building is depicted on the south side of the water storage tank that would allow for the storage of airport equipment, while also enhancing the productivity of airport maintenance staff. Currently, airport maintenance personnel utilize an existing hangar and other outside locations for equipment storage. A dedicated maintenance building in this location would provide for public vehicle access without the need to cross aircraft operational areas and allow for aircraft storage in the hangar currently being used for equipment storage.

A 1,900-foot southerly extension to Taxiway C would allow for additional aviation development on existing and future airport property. To the east of the existing water storage tank is an area dedicated to future air cargo operations as well as a wash rack. Several aviation access revenue support parcels ranging in size from one-half to two acres are depicted that would be provided aircraft access by taxiways extending west of Taxiway C.

Landside Alternative A also dedicates three separate parcels of land on the east side of Patton Drive for non-aviation development. These parcels could accommodate commercial and/or industrial activity that does not require airfield access, as the function and physical terrain in adjacent areas do not readily accommodate aircraft. As previously discussed, specific approval would need to be granted by the FAA for non-aviation use in these areas.

The above describes maximum development potential on the west side of the airport to include approximately 23 acres of land acquisition. In order to fully utilize all areas on the airport, analysis was also conducted on the east side of the airport as well. Preliminary plans implementing proposed automobile access on the east side of the airport could open up areas for future aviation development. It is likely that any development on the east side of Runway 14-32 would extend beyond the planning horizon of this Master Plan. As depicted on **Exhibit 4H**, an area of land on the southeast side of existing airport property is designated for future aviation development that is provided aircraft access by a partial parallel taxiway on the east side of the runway.

The proposed development areas discussed in this alternative will need to be analyzed and studied in more detail before ever coming to fruition. As with any development, these areas will have to take into account specific site preparation methods regarding grading and drainage.

LANDSIDE ALTERNATIVE B

Landside Alternative B considers relocating the terminal building farther south of its current location. As depicted on **Exhibit 4J**, a new terminal area would be implemented adjacent to Taxiway C facing east. Four conventional hangars are proposed directly north and south of the terminal building, with apron space out front to support commercial and general aviation aircraft. Access to the terminal area would be provided by a new roadway extending east from Retail Centre Boulevard. Directly west of the terminal building is adequate automobile parking for passengers utilizing the facility as well as an area designated for non-aviation development.

Additional aviation support facilities located between the proposed terminal area and Patton Drive include an aircraft wash rack and five T-hangar complexes. Positioning these low-activity levels away from the flight line is desired. The current leased automobile parking lot would be relocated to this area. To the south are several executive hangars that would be provided with airfield access via two taxiways extending west of Taxiway C. The existing perimeter road that traverses the south side of airport property would be relocated farther south to accommodate aviation access to revenue support parcels ranging in size from one-half to three acres.

Farther to the north, air cargo operations would be relocated adjacent to the existing terminal building. This facility could house air cargo screening as well as other commercial business operations. It should be noted that in order to accommodate larger vehicles associated with the ground movement of cargo, the roadway leading to this area would most likely need to be realigned to eliminate the near 90 degree turns that may disable large transport trucks from utilizing the facility. A proposed ATCT location is shown directly south of this location. This is a desirable midfield location providing good visibility to the runway and taxiways on the airport. The airport maintenance building is proposed to be built on the northwest corner of the existing terminal apron. Marked helicopter parking areas are located on the apron to the east, providing even greater separation from fixed-wing aircraft than on the previous alternative.

Large aircraft parking is proposed on the main aircraft parking apron. The leased automobile parking lot is dedicated for aviation development as is the area immediately south of it. Additional aircraft storage hangars in the form of T-hangars or shade hangars are also depicted on the main apron area.

A slightly different approach was taken in analyzing the north aircraft parking apron area. This alternative shows seven aircraft storage hangars aligned parallel to Runway 14-32, possibly providing more storage space than what is shown on Landside Alternative A.

As previously depicted, the southeast corner of airport property is proposed for aviation development that will likely exceed the long term planning period. As stated earlier, future automobile access and other physical constraints will dictate the potential for aviation development in this area.

LANDSIDE ALTERNATIVE C

Exhibit 4K depicts Landside Alternative C. This alternative relocates the terminal building approximately 500

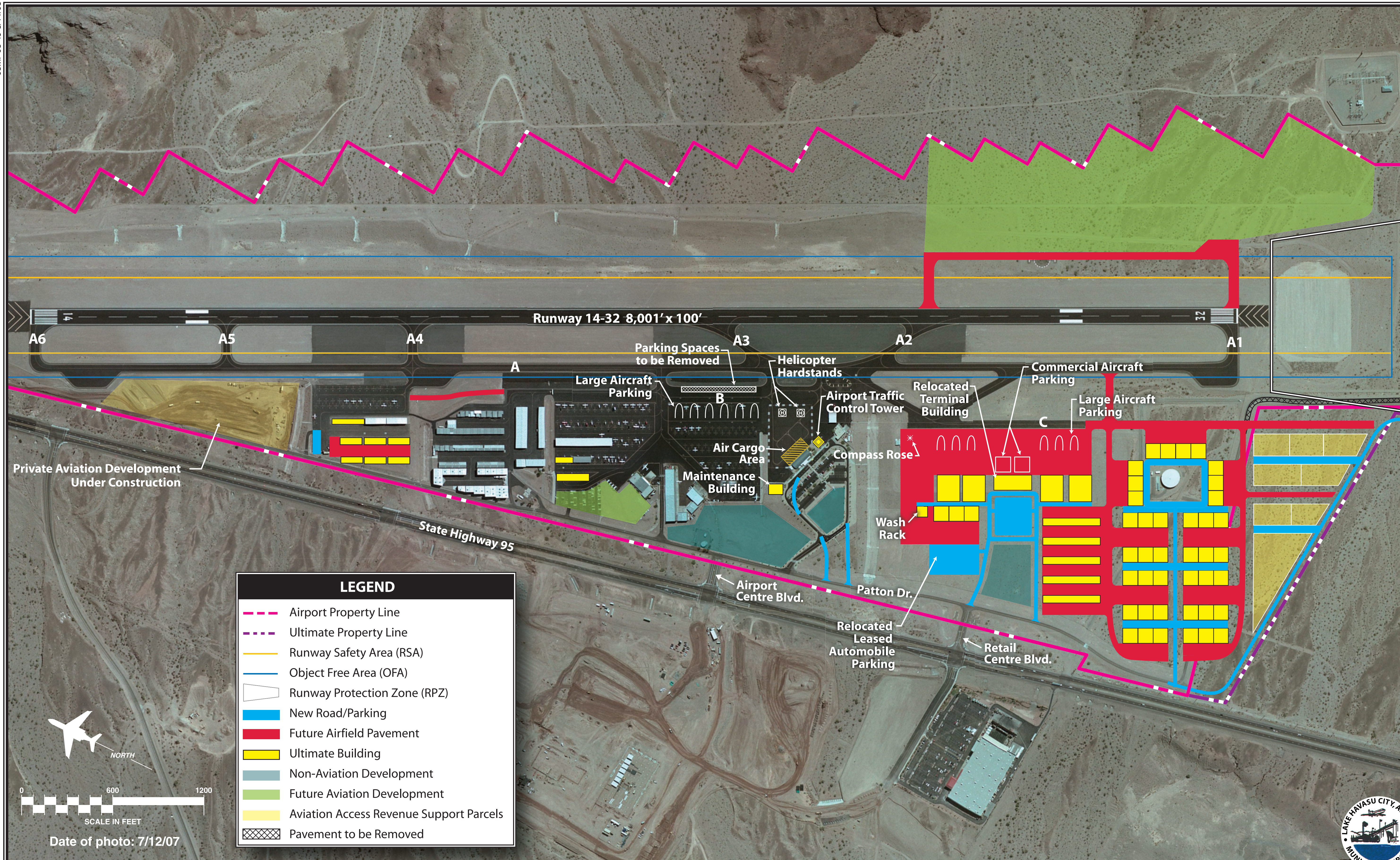


Exhibit 4J
LANDSIDE ALTERNATIVE B

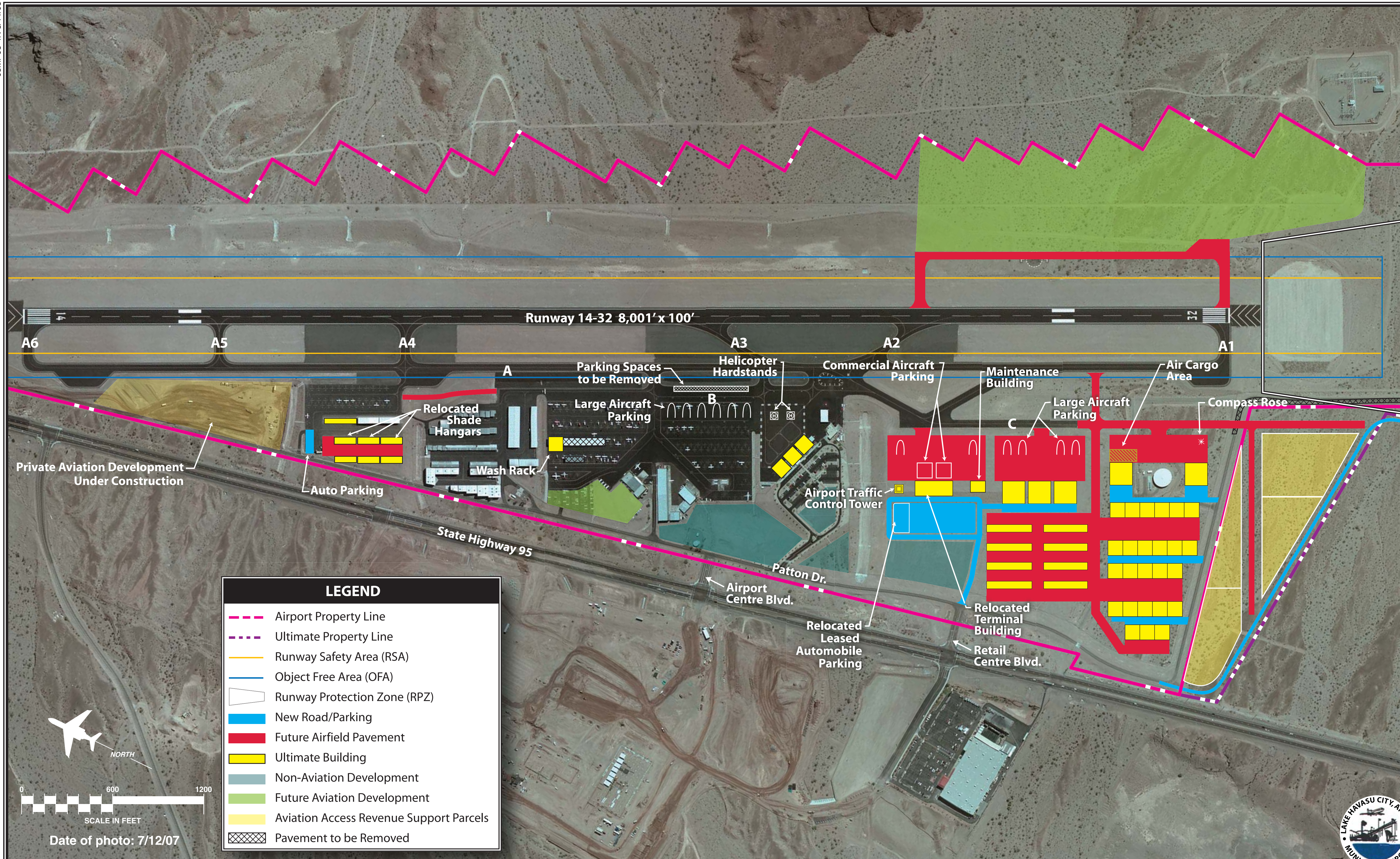


Exhibit 4K
LANDSIDE ALTERNATIVE C

feet north of the proposed location on Landside Alternative B. In this alternative, a separate terminal apron is dedicated to commercial aviation operations. A maintenance building is depicted on the south side of this apron and an ATCT is proposed north of the terminal building. This location is farther south and west, and would not provide the desired center field location as in the previous alternatives. A separate siting study would determine the line-of-sight and height requirements for an ATCT in this location. Directly behind the proposed terminal building is a large automobile parking area. The northern quadrant of this parking area is dedicated for leased automobile parking. Between the parking area and Patton Drive is an area depicted as non-aviation development.

South of the proposed terminal area is a second aircraft apron that would accommodate general aviation operations. Three large conventional hangars are proposed adjacent to the apron which would lend themselves well to FBO operations and large corporate flight departments. To the west of these hangars are several T-hangar complexes that would allow for ample aircraft storage for smaller single and multi-engine aircraft.

A third aircraft parking apron is depicted east of the water storage tank that would be provided airfield access with a southerly extension on Taxiway C. Similar to Landside Alternative A, air cargo operations are depicted in this area. Several executive hangars are proposed in areas to the west and are provided automobile access by the perimeter road that extends along the current airport property line. Four aviation access revenue support parcels are depicted on the proposed 23 acres of future airport property acquisition.

This alternative proposes three conventional hangars atop the existing terminal building. Helicopter hardstands and large aircraft parking are shown, similar to previous exhibits. The existing shade hangars located on the north side of the main aircraft parking apron are shown to be replaced by an aircraft wash rack. The shade hangars would be relocated to the north aircraft parking apron; thus, making available more aircraft parking space near the existing FBOs on the airport.

Additional areas designated for aviation and non-aviation development are shown on this alternative that would generate additional revenue for the airport in the form of land leases. As in the previous landside alternatives, an area on the east side of Runway 14-32 is shown as aviation development that considers the maximum use of airport property for future development.

SUMMARY

The process utilized in assessing the airside and landside development alternatives involved a detailed analysis of short and long term requirements, as well as future growth potential. Current and future airport design standards were considered at every stage in the analysis. Safety, both in the air and on the ground, was given a high priority in the analysis of alternatives.

After review and input from the Planning Advisory Committee (PAC), City officials, and the public, a recommended concept will be developed by the consultant. The resultant plan will represent an airside facility that fulfills the safety design standards and a landside complex that can be developed as demand dictates. The development plan for Lake Havasu City Municipal Airport must represent a means by which the airport can evolve in a balanced manner, both on the airside and landside, to accommodate the forecast demand. In addition, the plan must provide flexibility to meet activity growth beyond the long range planning horizon.

The following chapters will be dedicated to refining the basic concept into final plan, with recommendations to ensure proper implementation and timing for a demand-based program.

Chapter Five

RECOMMENDED MASTER PLAN CONCEPT

Chapter Five

RECOMMENDED MASTER PLAN CONCEPT

The planning process for the Lake Havasu City Municipal Airport Master Plan has included several technical efforts in the previous chapters intended to establish the role of the airport, 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, thus far, has included the presentation of two draft phase reports to the Planning Advisory Committee (PAC) and public information workshops. Lake Havasu City and airport administration have participated in each of these meetings and have been actively involved in the master planning process.

The PAC is comprised of several constituents with a stake in the Lake Havasu City Municipal Airport. Groups represented on the PAC include the Federal Aviation Administration (FAA), the Arizona Department of Transportation (ADOT) — Aeronautics Division, Lake Havasu City Council, airport administration, airport advisory board, various city departments, airport tenants, Arizona Military Airspace Working Group, Aircraft Owners and Pilots Association, Arizona Pilots Association, Lake Havasu Area Chamber of Commerce, Lake Havasu Economic Development, and a citizen representative. This diverse group has provided valuable input into the Master Plan Concept.

In the previous chapter, several development alternatives were analyzed to explore different options for the future growth and development of Lake Ha-

vasu City Municipal Airport. The development alternatives have been refined into a single recommended concept for the Master Plan. The purpose of this chapter is to describe, in narrative and graphic form, the plan for the future use and development of Lake Havasu City Municipal Airport. Environmental conditions that need to be considered during development are also examined within this chapter.

MASTER PLAN CONCEPT

The Master Plan Concept represents the development direction for the Lake Havasu City Municipal Airport through the planning period of this Master Plan. The Master Plan Concept is the consolidation and refinement of the airside and landside alternatives, presented in Chapter Four, into a single development concept collectively representing input received from the PAC, Lake Havasu City, and the general public. It presents an ultimate configuration for the airport that meets FAA design standards and provides a variety of landside development options to meet the increasing demands on the airport by different aviation activities. It is important to note that the finalized concept provides for anticipated facility needs over the next 20 years, as well as establishing a vision and direction for meeting facility needs beyond the planning period of this Master Plan.

AIRSIDE DEVELOPMENT PLAN

Airside components include the runways, parallel and connecting taxiways, lighting aids, navigational aids, and imaginary surfaces which help to provide a safe operating environment for aircraft. The major airside issues addressed in the Master Plan Concept include the following:

- The upgrade of Runway 14-32 to Airport Reference Code (ARC) C/D-II design standards.
- A straight-in instrument approach procedure to Runway 32.
- The installation of an approach lighting system on Runway 32.
- Land acquisition for approach protection.
- The construction of an additional exit taxiway on the west side of Runway 14-32 to provide a more efficient taxiing network from the runway system.
- The extension of Taxiway C south to provide access for future aviation development on the airport.
- The installation of taxiway lighting on all active taxiways.
- The relocation of the segmented circle and wind cone to conform to future airport safety design standards.
- The construction of a partial-parallel taxiway on the east side of Runway 14-32 to allow for future aviation development.

Airfield Design Standards

As a federally obligated airport (the result of accepting federal grant funding), Lake Havasu City Municipal Airport must comply with FAA design and safety standards. The FAA has established these design criteria to define the physical dimensions of runways and taxiways and the imaginary surfaces surrounding them that ensure the safe operation of aircraft at the airport. FAA design standards also define the separation criteria for the placement of landside facilities. As discussed previously in Chapter Three, FAA design criterion is a function of the critical design aircraft's approach speed, wingspan, and/or tail height, and in some cases, the runway approach visibility minimums. The critical design aircraft is defined as the most demanding aircraft or "family" of aircraft which will conduct 500 or more operations (take-offs and landings) per year at the airport.

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

Category A: Speed less than 91 knots.

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

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

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

Category E: Speed greater than 166 knots.

The airplane design group (ADG) is based upon either the aircraft's wingspan or tail height, whichever is greater. The six ADGs used in airport planning are as follows:

Airplane Design Group	Tail Height (feet)	Wingspan (feet)
I	Less than 20	Less than 49
II	Greater than 20, but less than30	Greater than 49 but less than 79
III	Greater than 30 but less than 45	Greater than 79 but less than 118
IV	Greater than 45 but less than 60	Greater than 118 but less than 171
V	Greater than 60 but less than 66	Greater than 171 but less than 214
VI	Greater than 66 but less than 80	Greater than 214 but less than 262

Source: AC 150/5300-13, Change 13

Lake Havasu City Municipal Airport is used by a wide range of general aviation aircraft. General aviation aircraft include single and multi-engine piston aircraft within ARCs A-I and B-I, turboprop aircraft within ARCs B-I and B-II, and business jet aircraft within ARCs B-I, B-II, C-I, C-II, and occasionally ARCs D-I and D-II. Future aircraft mix can expect to include a larger percentage of corporate aircraft and, as a result, future facility planning should include the potential for the airport to be utilized by the majority of business jets on the market.

In the past, Lake Havasu City Municipal Airport has also supported scheduled airline service. The Beech 1900 turboprop aircraft was the primary aircraft used prior to commercial service being suspended in May 2007. This aircraft falls within ARC B-II. Analysis in Chapter Two indicated the potential to shift to larger turboprop and regional jet aircraft in the future should air service return to the airport. Taking into consideration the potential changes in scheduled airline service in the future, the critical commercial aircraft could fall within ARC C-II over the long term.

The Master Plan anticipates that jet aircraft activity will continue to be strong and define the critical aircraft parameters for Lake Havasu City Municipal Airport through the planning period. In addition, Runway 14-32 provides adequate length to support a large majority of jet aircraft in operation today. For this reason, Runway 14-32 is planned for the most demanding ARC C/D-II design standards.

The design of taxiways considers the wingspan requirements of the most demanding aircraft to operate within the specific area. All taxiways on the west side of Runway 14-32 are planned to accommodate aircraft within ADG II. Taxilanes serving existing and proposed T-hangar areas are planned to accommodate aircraft in ADG I. **Table 5A** summarizes the planned airfield safety and facility requirements for Lake Havasu City Municipal Airport. The following sections summarize the airside development recommendations as depicted on **Exhibit 5A**.

- **The upgrade of Runway 14-32 to ARC C/D-II design standards**

Forecast operations at Lake Havasu City Municipal Airport include an increase in business turboprop and jet aircraft utilizing the airport. This follows the national trend of increased business and corporate use of turboprop and jet aircraft, strong sales and deliveries of turboprop and jet aircraft, and expanded fractional ownership programs for these aircraft.

Some of the larger jet aircraft that are forecast to utilize the airport on a more frequent basis in the future have higher approach speeds than the current critical aircraft operating at the airport. The higher approach speeds of these aircraft are expected to have the potential of changing the critical aircraft designation for the airport. Currently, the critical design aircraft using the airport fall within ARC B-II. Ultimately, it is expected to accommodate aircraft within ARC C/D-II.

05MP08-4K-3/11/08

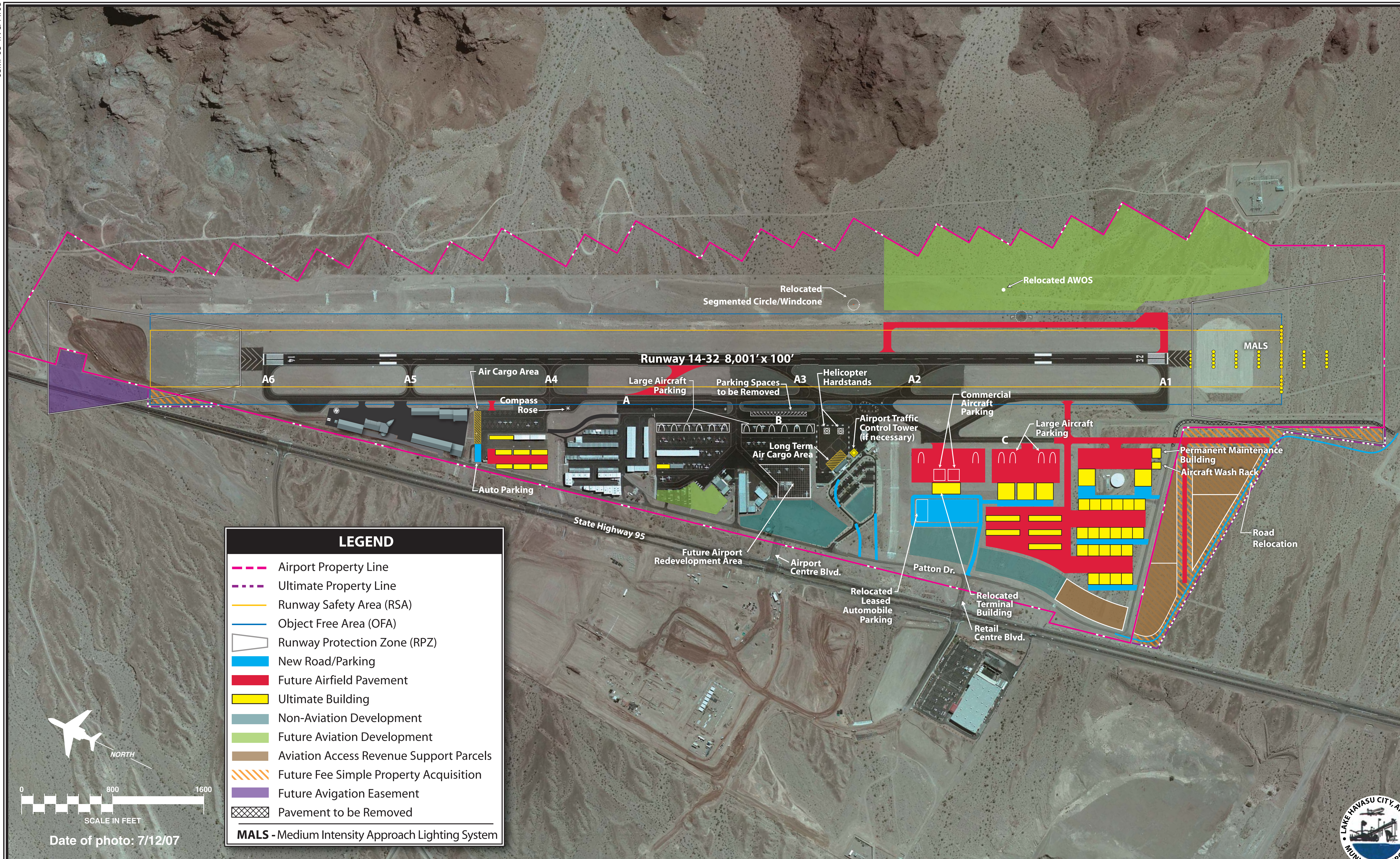


Exhibit 5A
MASTER PLAN CONCEPT

TABLE 5A
Airfield Safety and Facility Dimensions (in feet)
Lake Havasu City Municipal Airport

	Existing Runway 14-32	Ultimate Runway 14-32	
Airport Reference Code (ARC)	B-II	C/D-II	
Approach Visibility Minimums	1.25 miles – circling only	3/4 mile - Runway 32	
Runways			
Length	8,001	8,001	
Width	100	100	
Runway Safety Area (RSA)			
Width	150	500	
Length Beyond Runway End	300	1,000	
Object Free Area (OFA)			
Width	500	800	
Length Beyond Runway End	300	1,000	
Obstacle Free Zone (OFZ)			
Width	400	400	
Length Beyond Runway End	200	200	
Runway Centerline to:			
Parallel Taxiway Centerline	340	300*	
Edge of Aircraft Parking Apron	500	400*	
Runway Protection Zone (RPZ)	Both Ends	14	32
Inner Width	500	500	1,000
Outer Width	700	1,010	1,510
Length	1,000	1,700	1,700
Taxiways			
Width	35	35	
Safety Area Width	79	79	
Object Free Area Width	131	131	
Taxiway Centerline to:			
Parallel Taxiway/Taxilane Centerline	105	105	
Fixed or Moveable Object	65.5	65.5	
Taxilanes			
Object Free Area Width	115	115	
Taxilane Centerline to:			
Parallel Taxilane Centerline	97	97	
Fixed or Moveable Object	57.5	57.5	

*Denotes ultimate C/D-II design standards.
Source: FAA Advisory Circular (AC) 150/5300-13, Change 13, *Airport Design*; 14 CFR Part 77, *Objects Affecting Navigable Airspace*

Should aircraft in ARC C/D-II conduct more than 500 operations annually at the airport, Runway 14-32 will be required to conform to ARC C/D-II design standards. As shown in **Table 5A**, this will require the expansion of the runway safety area (RSA) and object free area (OFA). The airport is in good position for this transition as the ARC C/D-II RSA and OFA are currently unobstructed. It should be mentioned, however, that a portion of the proposed OFA would extend beyond the current airport property boundary on the northwest side of the airport. The total area of land outside the property line but within the OFA is approximately 1.2 acres. At a minimum, the airport would need to acquire the OFA areas outside the property line. Due to the nature and location of the property adjacent to State Highway 95, it may not be prudent or feasible to purchase this property. In the event that this property cannot be acquired, an easement should be pursued giving the airport control over what can be done in this area. Methods of gaining control could include an avigation easement, letter of agreement, or memorandum of understanding.

- **A straight-in instrument approach procedure to Runway 32**

Lake Havasu City Municipal Airport currently has a circling instrument approach to Runway 14-32 that allows for visibility minimums as low as one and one-quarter miles. Where possible, approach minimums should be as low as practical considering safety and financial constraints. Lower approach minimums and/or a straight-in instrument approach procedure could prevent aircraft from having to divert to another airport, which can cause financial hardships for the operator, on-airport businesses, and the City.

A large majority of new instrument approach procedures in the United States are being developed with global positioning system (GPS). With the development of the Wide Area Augmentation System (WAAS) as previously detailed in Chapter Three, a GPS WAAS approach provides for both course and vertical navigation, just like an instrument landing system (ILS) precision approach. As WAAS is upgraded in the future, precision approaches similar in capability to an ILS should become available for Lake Havasu City Municipal Airport.

The Master Plan Concept depicts the installation of a straight-in instrument approach to Runway 32. This approach is planned for visibility minimums as low as three-quarters of a mile and cloud ceilings as low as 200 feet above ground level (AGL). The installation of a medium intensity approach lighting system (MALS) to Runway 32 is required to achieve these visibility minimums and cloud ceiling requirements.

The prevailing winds are most commonly out of the northwest at Lake Havasu City Municipal Airport, favoring the use of Runway 32. Also, during times when poor weather conditions exist that may warrant the use of a straight-in instrument approach, wind conditions would favor the use of Runway 32. A preliminary obstruction analysis completed in the previous chapter concluded that there are no identified obstructions to Runway 32 that would prohibit or restrict a straight-in instrument approach procedure. As proposed on the Master Plan Concept, Runway 14 could support a non-precision instrument approach with visibility minimums not lower than one mile.

It should be mentioned that Lake Havasu City Municipal Airport recently obtained notification from the FAA that it plans to develop a GPS localizer performance with vertical guidance

(LPV) instrument approach procedure to Runway 32. The FAA is currently reviewing potential environmental and safety impacts related to a proposed instrument approach to the runway.

- **The installation of an approach lighting system on Runway 32**

The Master Plan Concept depicts the installation of a MALS on Runway 32 in order for the runway to provide for visibility minimums as low as three-quarters of a mile. The MALS lights begin approximately 200 feet beyond the runway threshold and extend to a maximum distance of 1,400 feet. Further engineering analysis, separate from this Master Plan, would determine the exact location of the approach lighting system.

It should be noted that a runway served by an instrument approach procedure with visibility minimums as low as three-quarters of a mile will have an expanded primary surface per Title 14 of the Code of Federal Regulation (CFR) Part 77, *Objects Affecting Navigable Airspace*. The hangar infrastructure currently being developed on the northwest side of the airport would penetrate the proposed primary surface associated with this type of approach. Future analysis completed by the FAA separate from this study will determine future instrument approach procedure minimums. Building infrastructure and other objects on the airport and within the runway approach paths will be evaluated by the FAA in determining the approach minimums. In the event that it is determined by the FAA that approach minimums as low as three-quarters of a mile cannot be obtained due to objects on the airport or within the runway approach paths, the proposed MALS would not be needed.

- **Land acquisition for approach protection**

With the onset of improved instrument approach procedures to Runway 14-32 in addition to the airport transitioning to ARC C/D-II design standards, the proposed runway protection zones (RPZs) will further expand to include areas outside existing airport property. The Master Plan Concept depicts two types of land acquisition. The first type of land acquisition is related to securing the proposed RPZ associated with Runway 32. Approximately 1.5 acres of land to include a portion of the perimeter road on the southwest side of the airport are included in the proposed RPZ. Due to the nature of the property and proposed development farther south of the airport in the future, the plan proposes realigning the perimeter road outside the RPZ and acquiring the 1.5 acres through fee-simple property acquisition in order to maintain total control over the area.

A second type of land acquisition is shown to provide protection to the proposed RPZ associated with Runway 14. Approximately six acres of land just to the northwest of airport property would fall within the RPZ. This area would need to be controlled by at least an avigation easement in order to provide approach protection from any future development. Although the FAA typically recommends fee simple property acquisition for areas within the RPZ, avigation easements can be obtained. An avigation easement is typically structured to provide the airport with control of the airspace above the property. Given that State Highway 95 traverses this area, it is not possible to purchase this property through fee simple acquisition; thus, making an avigation easement more reasonable.

- **The construction of an additional exit taxiway on the west side of Runway 14-32 to provide a more efficient taxiing network from the runway system**

The Master Plan Concept includes the construction of an additional high-speed exit taxiway extending west of Runway 14-32 farther to the north. The existing high-speed exit taxiways were constructed to accommodate Runway 14-32 when it was initially built at 5,500 feet. Since the runway has been extended to 8,001 feet, analysis shows that an additional high-speed exit taxiway located farther north would better serve larger jet aircraft. As a result, the high-speed exit taxiway is proposed approximately 4,200 feet from the Runway 32 threshold.

As demand warrants, providing for an additional high-speed exit taxiway will increase the capacity of Runway 14-32 and will enhance and improve aircraft operational flow on the airport.

- **The extension of Taxiway C south to provide access for future aviation development on the airport**

The extension of Taxiway C approximately 1,900 feet to the south is proposed to satisfy potential landside development in the southwest area of the airport. This taxiway could provide access to aviation-related development in the form of aircraft storage hangars and commercial aviation businesses and would be designed to meet ADG II aircraft design standards.

It should be noted that the proposed extension of Taxiway C does traverse areas of land currently outside the existing airport property line. Prior to constructing the entire length of the proposed taxiway, property adjacent to the southwest side of the airport would need to be acquired by Lake Havasu City Municipal Airport. This is further discussed in the landside development plan to follow.

- **The installation of taxiway lighting on all active taxiways**

Currently, only parallel Taxiway A and the entrance/exit taxiways are equipped with medium intensity taxiway lighting (MITL). In an effort to increase safety and provide enhanced guidance for aircraft taxiing during nighttime and/or poor weather conditions, MITL should be applied to all active taxiways on the airport. This includes Taxiway B, Taxiway C, and any future taxiways constructed at the airport.

- **The relocation of the segmented circle and wind cone to conform to future airport design standards**

It has been determined that once the ARC design standards are upgraded to C/D-II, the existing location of the segmented circle and wind cone will penetrate the proposed OFA. FAA AC 150/5300-13, *Airport Design*, indicates that the OFA should be cleared of objects protruding above the runway safety area edge elevation.

The Master Plan Concept depicts the relocation of the segmented circle and wind cone approximately 1,500 feet northeast of their current location. In doing so, the facility will be located outside the ultimate OFA and also provide a more desired midfield location.

- **The construction of a partial-parallel taxiway on the east side of Runway 14-32 to allow for future aviation development**

A partial-parallel taxiway on the east side of Runway 14-32 is depicted on the Master Plan Concept. This taxiway would allow for certain areas in the southeast area of the airport to be afforded aircraft access which could lead to aviation-related development. This taxiway measures approximately 2,500 feet in length and is located 300 feet from the runway centerline. This distance complies with runway-to-parallel taxiway separation requirements for an ARC C/D-II runway providing an instrument approach procedure with not lower than three-quarters of a mile visibility minimum.

A study is currently being conducted that calls for the potential realignment of State Highway 95 on the east side of the airport. If this were to occur, automobile access and utility infrastructure would better accommodate future aviation development on the east side of the airport. It should be mentioned, however, that forecast aviation demand through the long term planning horizon of this Master Plan can be accommodated on the west side of Runway 14-32. It is likely that any development in the southeast area of the airport including a partial-parallel taxiway will occur outside the planning period of this study.

LANDSIDE DEVELOPMENT PLAN

Examples of landside facilities include aircraft storage hangars, terminal buildings, aircraft parking aprons, hangar and apron access taxilanes, fuel storage facilities, and vehicle parking lots. The landside plan for Lake Havasu City Municipal Airport has been devised to efficiently accommodate potential aviation demand and provide revenue enhancement possibilities by designating the use of certain portions of airport property for aviation-related and non-aviation-related commercial and industrial uses. Future construction of landside facilities is anticipated to be accomplished through a combination of private and public investments. This is more clearly illustrated in Chapter Six.

All existing landside facilities at Lake Havasu City Municipal Airport are located on the west side of the runway. Parallel Taxiway A connects the terminal apron and main aircraft parking aprons to either end of the runway. The current terminal building is located at approximately midfield, with hangar development located to the north. Conventional, executive, shade, and Port-A-Port hangar storage space is provided, and the airport maintains a waiting list for additional hangar space.

The primary goal of landside facility planning is to provide adequate aircraft storage space while also maximizing operational efficiencies and land uses. Achieving this goal yields a development scheme which segregates aircraft users (large vs. small aircraft) while maximizing the airport's revenue potential.

The development of landside facilities will be demand-based. In this manner, the facilities will only be constructed if required by verifiable demand. For example, additional aircraft storage hangars will be constructed only if new based aircraft owners desire enclosed aircraft storage. The landside plan is based on projected needs that can change over time. The landside plan is developed with flexibility in mind to ensure the orderly development of the airport should this demand materialize. **Exhibit 5A** depicts the recommended landside development plan for the airport.

West Side Development Area

As previously mentioned, all aviation-related facilities are located on the west side of the airport. This includes the passenger terminal building, fixed base operators (FBOs), aircraft storage hangars, aircraft parking aprons, and other support facilities.

The current terminal building was constructed in 1991 and provides for approximately 5,700 square feet of space that is occupied by airport administrative offices, two rental car agencies, and amenities for commercial airline service to include passenger waiting areas, a baggage claim area, a vending area, and a ticket counter. Analysis in Chapter Three indicated the need for additional terminal building space to accommodate the future demands of airport users. Lake Havasu City Municipal Airport can expect an increase in passenger enplanements through the planning period in the event that it regains commercial service. It was indicated that the terminal building will need to provide approximately 10,000 square feet in order to accommodate the functions associated with commercial airline service by the long term planning period.

In an effort to better accommodate future airport users and maximize the amount of available space in the terminal area, the recommended plan proposes construction of a new passenger terminal building site approximately 900 feet south of the current location. Proposed automobile parking associated with the new terminal building location will be provided directly west of the facility with access being provided by a new roadway extending east from Retail Centre Boulevard.

An added benefit of the new terminal building location will be the amount of space made available for additional aviation-related development. The Master Plan Concept proposes air cargo activity to be relocated to the existing terminal area once a new terminal building is constructed farther south. Currently, a designated air cargo area is located in the northwest portion of the main aircraft parking apron adjacent to the leased automobile parking lot. This requires larger turboprop aircraft associated with the transfer of air cargo to taxi through areas designated for aircraft parking and FBO activities. The air cargo area would be better served in a location that provides more convenient access to the taxiway system. As a result, a short term air cargo area is proposed on the north aircraft parking apron that will provide improved segregation of air cargo operations. As previously discussed, once a new passenger terminal building is constructed, air cargo activity could be transferred to the existing terminal area. This would be desirable as the facility would provide a more secure location for the screening of cargo and vehicles as they enter the airfield environment.

In order to accommodate larger vehicles associated with the ground movement of cargo, the roadway leading to this area is depicted as being realigned to eliminate the near 90 degree turns that may disable large transport trucks from accessing the facility. A one-way entrance and exit road connecting to Patton Drive will provide automobile access to the ultimate air cargo area. It should be noted that the existing terminal facility could also support other commercial business operations.

Other areas adjacent to the existing terminal building were closely studied for future development. Marked helicopter parking areas are located on the terminal apron to the east, providing improved separation from fixed-wing aircraft activities on the main aircraft parking apron.

Facility planning in Chapter Three suggested that a location should be reserved for the development of an airport traffic control tower (ATCT), should future justification support one. As a result, the Master Plan Concept reserves an area of land immediately south of the existing terminal building for the potential construction of an ATCT. This is a desirable midfield location providing good visibility to the runway and taxiways on the airport. It should be noted that current and future aircraft operations projections will not fully fund the construction and operation of an ATCT; thus, future justification of the facility may not be warranted during the planning period of this Master Plan. The recommended plan only reserves an area for the future development of an ATCT should justification ever support one.

Farther to the north, two rows of large aircraft parking are proposed on the main aircraft parking apron. In addition, an area designated for future redevelopment is depicted that could accommodate aircraft hangars used for commercial aviation activities and/or aircraft storage. An aircraft storage hangar in the form of a T-hangar or shade hangar is proposed on the north side of the main aircraft parking apron. Future aviation development is called for in areas on the northwest side of the main parking apron. Currently, a portion of this area is dedicated for a leased automobile parking lot. Upon completion of the relocated terminal building and automobile parking lot on the south side of the airport, the existing leased automobile parking lot can be relocated to the dedicated automobile parking area. This is desired as it will better segregate aircraft and automobiles while also providing additional space for aviation development.

Adjacent to the aircraft parking area on the north side of the airport are seven proposed aircraft storage hangars. Single engine and smaller multi-engine aircraft could utilize these hangar facilities. An additional taxiway connecting the north aircraft parking apron and parallel Taxiway A is planned to improve the flow of aircraft in this area.

As previously discussed, the Master Plan Concept also proposes future development of the southwest side of the airport. As a large majority of this area is currently vacant, significant improvements will be needed, including roadway access and utility extensions, before infrastructure development can begin. Careful consideration should be given regarding the implementation of staging projects in this area. While the recommended plan shows total build-out in this area, actual demand will dictate the timeline for future development.

The orderly development of the southwest side of the airport will be important and should provide for the proper separation of high, medium, and low activity levels at the airport. The high activity area should be planned and developed to provide aviation services on the airport. Examples would include the relocated terminal building and adjoining aircraft parking areas, which provide tiedown locations and circulation for aircraft. Large conventional style hangars used for FBOs, corporate aviation departments, and the storage of large numbers of aircraft should also be considered in this area. The best locations for these types of activities are near the flight line. In the case at Lake Havasu City Municipal Airport, these proposed high activity functions are located adjacent to Taxiway C.

An aircraft wash rack and airport maintenance building are also proposed toward the south end of the high activity development area. Currently, airport maintenance personnel utilize an existing hangar and other outside locations for equipment storage. A dedicated airport maintenance staging area would provide for vehicle access without the need to traverse aircraft operational areas and allow for aircraft storage in the hangar currently being utilized for equipment storage. This location will be provided access via the perimeter road that currently lies next to the property line on the southwest side of the airport.

To the west of the proposed conventional hangar development includes smaller executive and T-hangars that would fit the medium and low activity levels. The best location for these types of facilities are off the immediate flight line, but still readily accessible to aircraft, including corporate jets. A taxiway extending west from Taxiway C separates the executive and T-hangar development, which is preferred.

The Master Plan Concept also proposes the acquisition of approximately 23 acres of land south of the existing perimeter road to be utilized for future aviation-related development. Four aviation access revenue support parcels are depicted ranging in size from approximately two to five acres and are provided access via a taxiway extending west of the proposed extension to Taxiway C. These parcels could support aviation businesses and/or aircraft storage.

Portions of the west side of the airport are not provided airfield access. Automobile access routes and physical land constraints limit the areas from airfield access. As such, the utility of these areas is limited to non-aviation development in the form of commercial and industrial parcels. These uses are allowable by the FAA as long as they are not minimizing the availability of aviation-related property. Commercial and industrial uses provide the airport with an opportunity to improve revenue streams, increasing the airport's financial resources. These uses should be promoted as a means to bolster the airport's financial position and ability to become and remain financially self-sufficient.

East Side Development Area

In order to fully utilize all areas on the airport, the recommended plan highlights portions of the southeast area of the airport for future aviation development. As previously discussed, preliminary plans calling for the relocation of State Highway 95 on the east side of the airport could make this area much more attractive for future development. As is the case with the southwest side of the airport, before infrastructure development can begin, utility extensions and roadways will be needed. The timeline for development in this area will likely extend beyond the long term planning period associated with this Master Plan.

Landside Summary

The following list includes the major considerations for landside improvements at Lake Havasu City Municipal Airport throughout the planning period.

- Improve utilities, aircraft access, and automobile access to the southwest area of the airport for future aviation-related development.

- Construct a new terminal building south of the current location on the airport.

- Consider proper implementation of infrastructure development on the southwest side of the airport to include a terminal facility area, hangars, and aircraft apron space.

- Construct additional aircraft storage hangars adjacent to the north aircraft parking apron.

- Construct aviation support facilities to include an aircraft wash rack and airport maintenance building.

- Designate additional marked parking spaces for large aircraft on the main aircraft parking apron.

- Identify approximately 23 acres of land adjacent to the southwest side of the airport for future fee simple property acquisition to be utilized for aviation-related development.

- Identify areas of land on airport property that are not provided airfield access for non-aviation development to further enhance airport revenue support.

- Identify land on the southeast side of the airport for future aviation-related development to fully maximize all areas of airport property.

ENVIRONMENTAL EVALUATION

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 proposed improvement program at Lake Havasu City Municipal Airport to determine whether the proposed 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 the improvements depicted on the Airport Layout Plan (ALP) will require compliance with the *National Environmental Policy Act* (NEPA) *of 1969*, as amended to receive federal financial assistance. For projects not "categorically excluded" under FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*, compliance with NEPA is generally satisfied through the preparation of an Environmental Assessment (EA). Instances in which significant environmental impacts are expected, an Environmental Impact Statement (EIS) may be required.

While this portion of the Master Plan is not designed to satisfy the NEPA requirements for a categorical exclusion, EA, or EIS, it is intended to supply a preliminary review of environmental issues that would need to be analyzed in more detail within the NEPA process. This evaluation considers all environmental categories required for the NEPA process as outlined in FAA Order 1050.1E and Order 5050.4B, *National Environmental Policy Act Implementation Instructions for Airport Actions.*

FAA Orders 1050.1E and 5050.4B contain a list of the environmental categories to be evaluated for airport projects. Of the 23 environmental categories described in the FAA's *Envi-*

ronmental Desk Reference (2007), the following resources are not found within the airport environs:

- Coastal Resources (Coastal Barriers and Coastal Zones)
- Farmland
- Wild and Scenic Rivers

Since these are not found within the airport environs, they are not addressed in this analysis. The following sections describe potential impacts to resources present within the airport environs. These resources were described in detail within Chapter One of this study.

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 Dioxide (NO_2), Particulate Matter (PM_{10} and $PM_{2.5}$), and Lead (Pb). 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. Various levels of review apply within both NEPA and permit requirements. According to the most recent update contained on the EPA's Greenbook website, Mohave County is currently in attainment for all criteria pollutants.

A number of projects planned at the airport could have temporary air quality impacts during construction, especially those which require a large amount of land disturbance such as the construction of apron areas or taxiways. Emissions from the operation of construction vehicles and fugitive dust from pavement removal are common air pollutants during construction. However, with the use of best management practices (BMPs) during construction, these air quality impacts can be significantly lessened.

BIOTIC (FISH, WILDLIFE AND PLANTS) RESOURCES

The United States Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) determines that a significant impact to biotic resources will result when the proposed action would likely jeopardize the continued existence of a species in question or would result in the destruction or adverse modification of federally designated critical habitat in the area. Lesser impacts, as outlined by agencies and organizations having jurisdiction, may also result in a significant impact.

Table 5B lists the federally threatened, endangered, and candidate species with the potential to occur in Mohave County. Arizona does not have an endangered species law, although through their Comprehensive Wildlife

Conservation Strategy, Arizona does identify "Wildlife of Special Concern" (WSC). These species are also shown in **Table 5B**.

TABLE 5B
Federal and State Listed Species
Mohave County, Arizona

Common Name	Scientific Name	Federal Status	State Status
Amphibians			
Relict leopard frog	*Lithobates [Rana] onca*	C	WSC
Birds			
American peregrine falcon	*Falco perinigrus anatum*		WSC
Bald eagle	*Haliaeetus leucocephalus*	T (Desert Nesting)	WSC
Clark's Grebe	*Aechmophorus clarkia*		WSC
California Brown pelican	*Pelecanus occidentalis californicus*	E	
California condor	*Gymnogyps californianus*	E	
Least bittern	*Ixobrychus exilis*		WSC
Mexican spotted owl	*Strix occidentalis lucida*	T	
Northern goshawk	*Accipter gentilis*		WSC
Southwestern willow flycatcher	*Empidonax traillii extimus*	E	WSC
Yuma clapper rail	*Rallus longirostris yumanensis*	E	WSC
Yellow-billed cuckoo	*Coccyzus americanus*	C	
Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*		WSC
Flowering Plants			
Arizona cliffrose	*Purshia subintegra*	E	
Fickeisen plains cactus	*Pediocactus peeblesianus var. fickeideniae*	C	
Holmgren (Paradox) milk vetch	*Astragulus homgreniorum*	E	
Jones cycladenia	*Cycladenia humilis var. jonesii*	T	
Siler pincushion cactus	*Pediocactus sileri*	T	
Fish			
Bonytail chub	*Gila elegans*	E	WSC
Desert pupfish	*Cyprinodon macularius*	E	WSC
Gila chub	*Gila intermedia*	E	
Humpback chub	*Gila cypha*	E	WSC
Razorback sucker	*Xyrauchen texanus*	E	WSC
Virgin River chub	*Gila seminude*	E	WSC
Woundfin	*Plagopterus argentissimus*	E	WSC

TABLE 5B (Continued) Federal and State Listed Species Mohave County, Arizona			
Common Name	Scientific Name	Federal Status	State Status
Mammals			
California leaf-nosed bat	*Macrotus californicus*		WSC
Hualapai Mexican vole	*Microtus mexicanus hualpaiensis*	E	WSC
Reptiles			
Desert tortoise	*Gopherus agassizii (Xerobates)*	T	
Sonoran desert tortoise	*Gopherus agassizii (Sonoran population)*		WSC
Threatened (T), Endangered (E), Candidate (C), Wildlife of Special Concern (WSC) **Source:** U.S. Fish and Wildlife Service, Mohave County Species List (http://www.fws.gov/southwest/es/arizona/Documents/CountyLists/Mohave.pdf) and Arizona Game and Fish Species List by Watershed, (http://www.azgfd.gov/w_c/edits/documents/ssspecies_bywatershed_001.pdf), accessed August 2008.			

The amphibian, bird, and fish species listed in the table above are not present within the airport environs due to the habitat requirements of the species. Each of the listed species requires open water or riparian habitats, neither of which is present on airport property.

According to the Arizona Game and Fish Department's *On-Line Environmental Review Tool*, (accessed August 2008), the Southwestern willow flycatcher, Sonoran desert tortoise, Yuma clapper rail, and Razorback sucker have been documented to occur within three miles of Lake Havasu City Municipal Airport. In addition, there is critical habitat for the Bonytail chub within three miles of the airport. The Bonytail chub and Razorback sucker are both fish, however, due to the lack of water resources within the immediate airport environs, it is not anticipated these species will be impacted by future development at the airport. Additionally, the two birds' habitats, the southwestern willow flycatcher and Yuma clapper rail, consist of riparian areas. Again, due to the lack of water resources within the airport environs, it is not likely this species will be impacted by planned future airport development. Habitat for the Sonoran desert tortoise and other remaining listed species such as the desert tortoise, the Jones cycladenia, or the Siler pincushion cactus, may be present in the areas proposed for development, especially in the southern portions of airport property; therefore, prior to development in areas that are not regularly maintained, additional studies should be undertaken to ensure that none of the listed species are present. If any of these species are found, further coordination with the USFWS and the Arizona Fish and Game Department would be required.

CONSTRUCTION IMPACTS

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

Construction-related noise impacts are not anticipated as the area immediately surrounding the airport is either undeveloped or utilized for industrial purposes. Any possible impacts would be short-term in nature.

Construction-related air quality impacts would be expected as described in the Air Quality section above. Air emissions related to construction activities would be short-term in nature and will be included in the air emissions inventory, if one is requested.

DEPARTMENT OF TRANSPORTATION ACT SECTION 4(f) PROPERTIES

A significant impact would occur when a proposed action involves more than a minimal physical use of a Section 4(f) property, (publicly owned land from a public park, recreation 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) or is deemed a "constructive use" substantially impairing the Section 4(f) property where mitigation measures do not reduce or eliminate the impacts. Substantial impairment would occur when impacts to Section 4(f) lands are sufficiently serious to the value of the site in terms of its prior significance and enjoyment being substantially reduced or lost.

A number of potential Section 4(f) properties are located in the vicinity of the airport including the Havasu National Wildlife Refuge and Lake Havasu State Park. It is not anticipated that future airport development will impact these resources as the types of development planned at the airport will not necessarily change the types or manner in which aircraft operate at the airport. For example, flight tracks over the potential Section 4(f) resources will likely not change significantly with implementation of any of the proposed airport improvements.

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. Floodplain impacts resulting from airport development would be considered significant if the encroachment would result in either: (1) a high probability of loss of human life; or (2) substantial encroachment-associated costs or damage, including interrupting aircraft service or loss of a vital transportation facility; or (3) adverse impacts on natural and beneficial floodplain values.

The City of Lake Havasu is in the process of seeking a revision to the Federal Emergency Management Agency (FEMA) maps for the airport environs. In 2005, the city submitted a request for a Conditional Letter of Map Revision (CLOMR) to FEMA to reflect anticipated floodplain boundaries resulting from proposed development west of the airport along Highway 95. This proposed development was located within 100-year floodplains, thereby resulting in a detailed hydraulic analysis of the area. The hydraulic analysis resulted in a need for additional floodwater storage; therefore, to ensure flood protection, a floodwater detention system was constructed east of the airport. This system results in portions of airport property being removed from the designated 100-year floodplain along with the development which has since been constructed west of Highway 95.

The anticipated limits of the 100-year floodplain in the vicinity of the airport are depicted on **Exhibit 5B.** As indicated on the exhibit, the central portions of the airport are anticipated to not be located within a designated 100-year floodplain. Development undertaken in the northern or southern portions of airport property will require consultation with the public, and appropriate state and local agencies, to ensure the development will not result in significant floodplain impacts. This coordination will be undertaken in accordance with Executive Order 11988, *Floodplain Management*.

HAZARDOUS MATERIALS, POLLUTION PREVENTION, AND SOLID WASTE

According to the EPA *Enviromapper*, there are no known contaminated sites at the airport. The *Enviromapper* does indicate that Sunwestern Flyers (now known as Desert Skies Executive Air Terminal), an FBO at the airport, is a hazardous waste generator. The actions in this plan should not have any immediate effect on hazardous waste. Prior to the acquisition of land, an Environmental Due Diligence Audit (EDDA) will likely be required by the FAA to establish an environmental baseline for the property and for the identification of any known hazardous materials or environmental contamination.

The airport must comply with applicable pollution control statutes and requirements. The airport will need to comply with the AZPDES operations permit requirements. With regard to construction activities, the airport and all applicable contractors will need to 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 project construction activities.

As a result of increased operations at the airport, solid waste may slightly increase; however, these increases are not anticipated to be significant.

HISTORICAL, ARCHITECTURAL, ARCHAEOLOGICAL, 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 a 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.

As previously stated in Chapter One, there are no known or previously recorded significant archaeological sites in the airport environs. However, prior to development in previously undisturbed areas, field surveys will likely be required to confirm the lack of resources in the development area. This would pertain, for the most part, to the areas proposed for development in the southern portions of airport property (development of hangar facilities, aprons, access road extensions, etc.).

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 Light (REIL), would produce glare on any adjoining site, particularly residential uses.

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.

Landside development at the airport will create several new hangar complexes as well as privately leased aviation development parcels. These new facilities are not anticipated to create an annoyance among people or interfere with normal activities as the areas planned for development are surrounded by open space and industrial land uses.

05MP08-5B-9/11/08

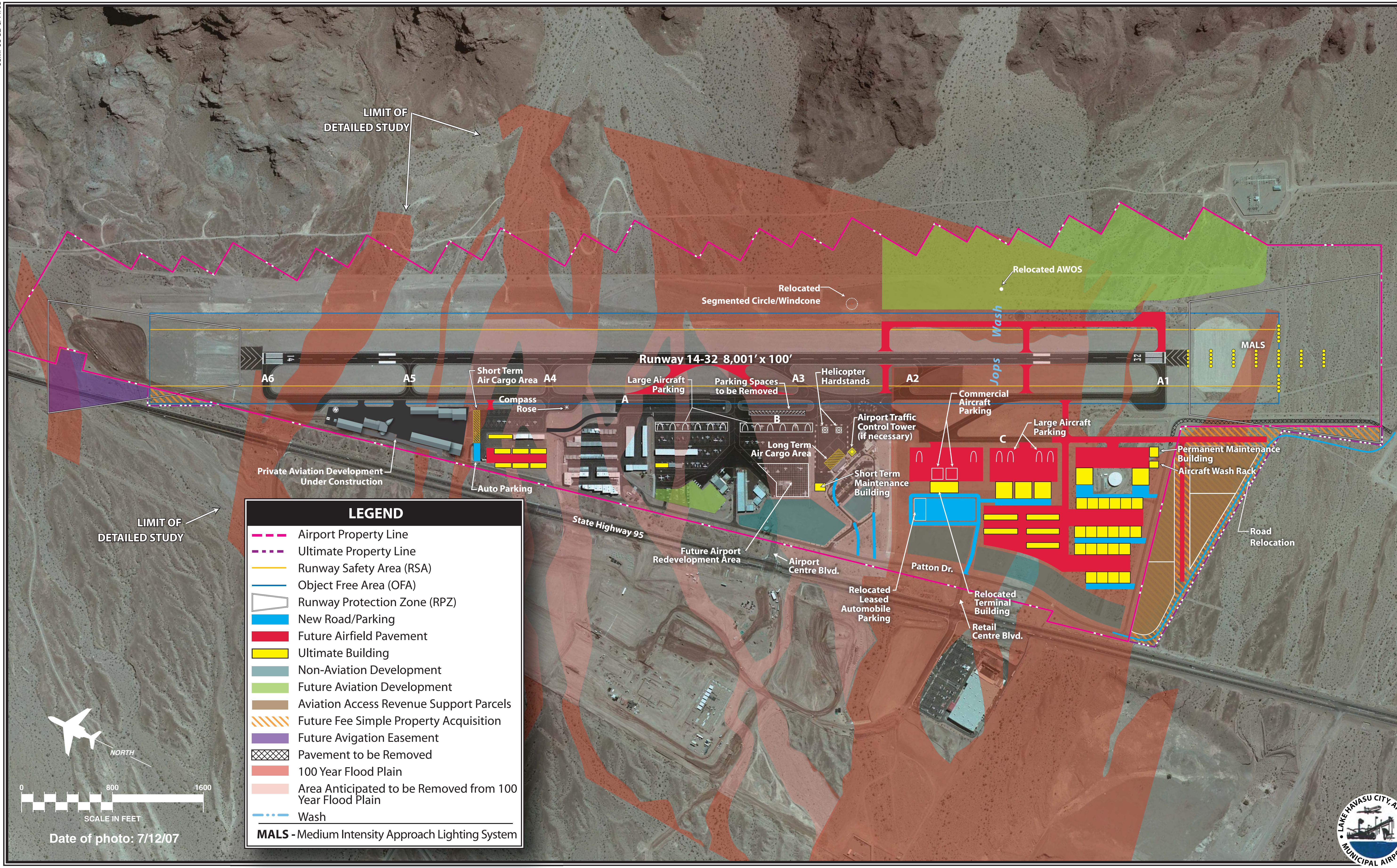


Exhibit 5B
MASTER PLAN CONCEPT
WITH FLOOD PLAINS

ENERGY SUPPLIES, NATURAL RESOURCES, AND SUSTAINABLE DESIGN

In instances of major proposed actions, 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 facilities.

Increased use of energy and natural resources are anticipated as the operations at the airport grow. None of the planned development projects are anticipated to result in significant increases in energy consumption.

In accordance with Executive Order 13213, *Greening the Government Through Efficient Energy Management* (1999), any projects using federal funding should undergo a life-cycle energy-efficiency analysis. This analysis should result in using the most energy efficient construction, appliances, and energy sources.

NOISE AND COMPATIBLE LAND USE

The standard methodology for analyzing noise conditions at airports involves the use of a computer simulation model. The Federal Aviation Administration (FAA) has approved the Integrated Noise Model (INM) for use in modeling noise for airports.

The INM describes aircraft noise in the *Yearly Day-Night Average Sound Level* (DNL). DNL accounts for the increased sensitivity to noise at night (10:00 p.m. to 7:00 a.m.) and is the metric preferred by the FAA, EPA, and Department of Housing and Urban Development (HUD), among others, as an appropriate measure of cumulative noise exposure.

The INM works by defining a network of grid points at ground level around the airport. It then selects the shortest distance from each grid point to each flight track and computes the noise exposure for each aircraft operation by aircraft type and engine thrust level, along each flight track. Corrections are applied for air-to-ground acoustical attenuation, acoustical shielding of the aircraft engines by the aircraft itself, and aircraft speed variations. The noise exposure levels for each aircraft are summed at each grid location. The DNL at all grid points is used to develop noise exposure contours for selected values (e.g., 65, 70, and 75 DNL). Noise contours are then plotted on a base map of the airport environs using the DNL metrics.

In addition to the mathematical procedures defined in the model, the INM has another very important element. This is a database containing tables correlating noise, thrust settings, and flight profiles for most of the civilian aircraft and many common military aircraft operating in the United States. This database, often referred to as the noise curve data, has been developed under FAA guidance based on rigorous noise monitoring in controlled settings. In fact, the INM database was developed through more than a decade of research, including extensive field measurements of more than 10,000 aircraft operations. The database also includes performance data for each aircraft to allow for the computation of airport-specific flight profiles (rates of climb and descent). The most recent version of the INM, Version 7.0, was used for modeling the noise condition for this Master Plan.

INM Input

A variety of user-supplied input data is required to use the INM. This includes the airport elevation, average annual temperature, airport area terrain, a mathematical definition of the airport runways, the mathematical description of ground tracks above which aircraft fly, and the assignment of specific take-off weights to individual flight tracks. In addition, aircraft not included in the model's database may be defined for modeling, subject to FAA approval.

- **Activity Data**

Airport activity is defined as the take-offs and landings by aircraft operating at the facility; this is also referred to as aircraft operations. Activity is further described as either *local*, indicating aircraft practicing take-offs and landings (i.e., performing touch-and-go's), or *itinerant*, referring to the initial departure from or final arrival at the airport.

Existing airport activity (i.e., take-offs and landings, or operations by aircraft) was estimated using data prepared during the development of this Master Plan. **Table 5C** provides a breakdown of operations for the existing condition as well as the ultimate forecast year.

TABLE 5C
Operations Summary and Fleet Mix Data
Lake Havasu Municipal Airport, Lake Havasu, Arizona

Aircraft Type	Existing	Ultimate
Fixed Propeller	21,187	38,825
Variable Propeller	21,187	38,825
Multi-engine Piston	2,500	6,000
Turboprop	1,850	3,750
Light Fanjet	850	1,700
Medium Fanjet	250	500
Large Fanjet	100	300
Helicopter	1,250	2,500
Total	49,174	92,400

- **Runway Use**

Runway usage data is another essential input to the INM. For modeling purposes, wind data analysis usually determines runway use percentages. Aircraft will normally land and take-off into the wind. However, wind analysis provides only the directional availability of a runway and does not consider pilot selection, primary runway operations, or local operating conventions.

The runway usage at the airport was established through conversations with airport staff as well as an analysis of wind conditions. For the purposes of this noise modeling effort, it was assumed that Runway 14 was used 35 percent of the time and Runway 32 was used 65 percent of the time.

- **Time-of-Day**

The time-of-day at which operations occur is important as input to the INM due to the 10 decibel weighting of nighttime (10:00 p.m. to 7:00 a.m.) flights. In calculating airport noise exposure, one operation at night has the same noise emission value as 10 operations during the day by the same aircraft. For noise modeling purposes, it was assumed that 97 percent of the operations occurred during the daytime and evening hours and three percent occurred during the nighttime hours.

INM Output

Output data selected for calculation by the INM are annual average noise contours in DNL. The DNL is a measure of the 24-hour noise level of a community to allow for comparison between the no action and proposed action alternatives. DNL is the metric currently accepted by the FAA, EPA, and HUD, as an appropriate measure of cumulative noise exposure.

Impact Assessment

To standardize the assessment of airport land use compatibility and noise, the FAA has established guidelines, codified within 14 CFR Part 150, that identify suitable land uses for development near airport facilities. These guidelines state that residential development, including standard construction (residential construction without acoustic treatment), mobile homes, and transient lodging are all incompatible with noise above 65 DNL. Homes of standard construction and transient lodging may be considered compatible where local communities have determined these uses are permissible; however, sound insulation methods are recommended. Schools and other public use facilities are also generally considered to be incompatible with noise exposure above 65 DNL.

The results of the noise analysis are depicted on **Exhibit 5C**. The existing noise contours are entirely contained within existing airport property. The future noise contours would extend slightly off the property to the northwest and southeast of Runway 14-32. No residences or other noise-sensitive development are located within the 65 DNL noise contour; therefore, existing and anticipated future operations at the airport will not likely result in significant noise or compatible land use impacts.

SECONDARY (INDUCED) IMPACTS

These impacts address those secondary impacts 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, 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 tourism, industry, and trade, and to enhance the future growth and expansion of the community's economic base. Any future socioeconomic impacts resulting from the proposed development are anticipated to be primarily positive in nature.

SOCIOECONOMIC IMPACTS, ENVIRONMENTAL JUSTICE, AND CHILDRENS RISK AND SAFETY

The proposed development plan calls for the acquisition of property through either fee simple acquisition or the acquisition of easements. All the property proposed for acquisition is currently owned by the State of Arizona and is classified as State Trust properties. Further coordination with the Arizona State Land Department will be needed to assess the potential impact of the property acquisition.

The EPA's *Environmental Justice Geographic Assessment Tool* was consulted regarding the presence of environmental justice areas within the airport environs. According to the tool, areas southwest of the airport are classified as environmental justice areas; however, planned airport development will not likely impact these areas as they are located outside the 65 DNL noise contour and the presence or lack of flight patterns over the area will not likely change due to the planned airport development projects.

Planned development will, for the most part, occur entirely on existing airport property which is not easily accessible by children; therefore, impacts to children's health and welfare are not anticipated.

WATER QUALITY

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

05MP08-5C-8/26/08

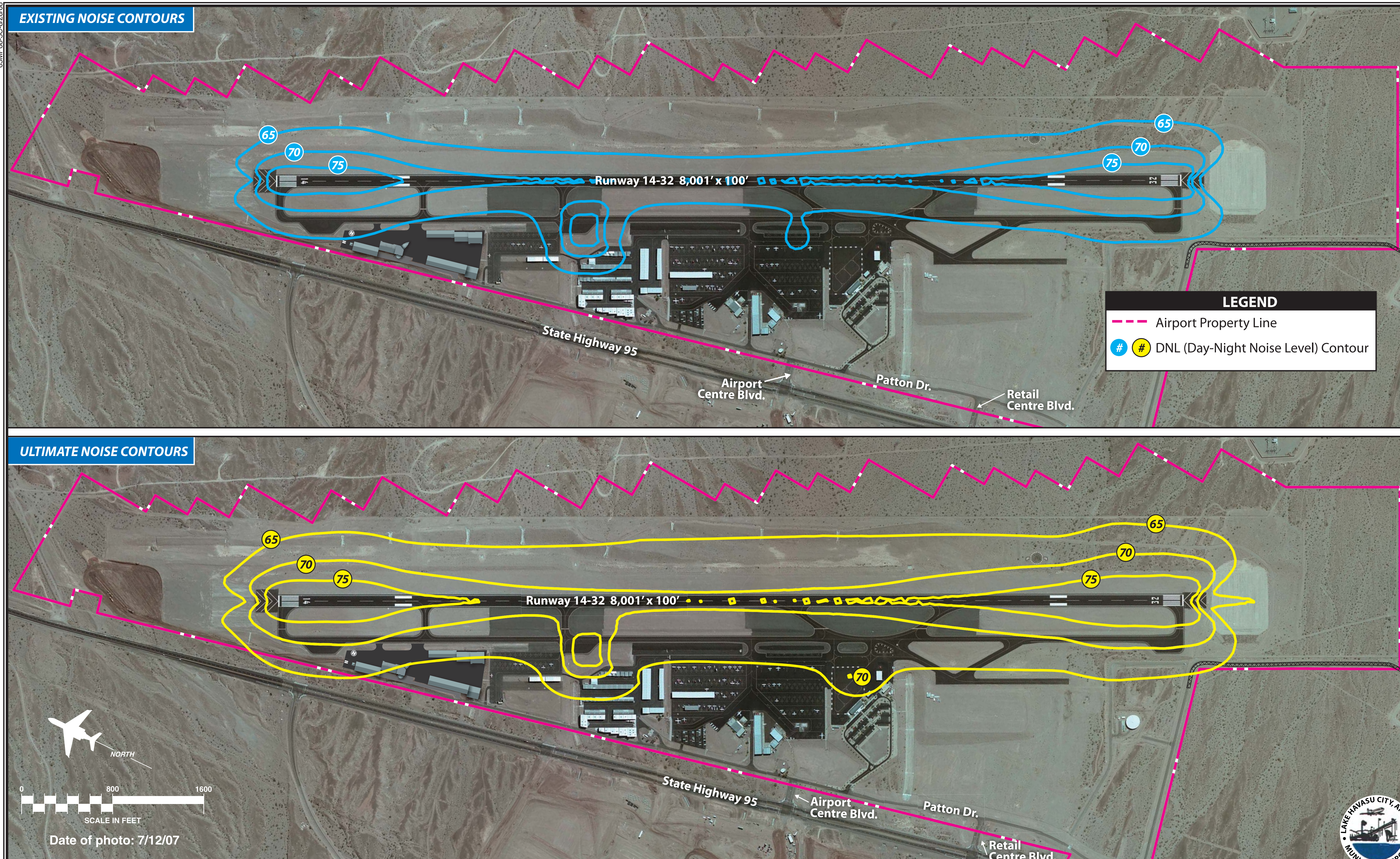


Exhibit 5C
NOISE CONTOURS

As development occurs at the airport, the AZPDES permit would possibly need to be modified to reflect the additional impervious surfaces and requirements for any stormwater retention facilities. The addition and removal of impervious surfaces may require modifications to this permit should drainage patterns be modified.

WETLANDS AND WATERS OF THE UNITED STATES

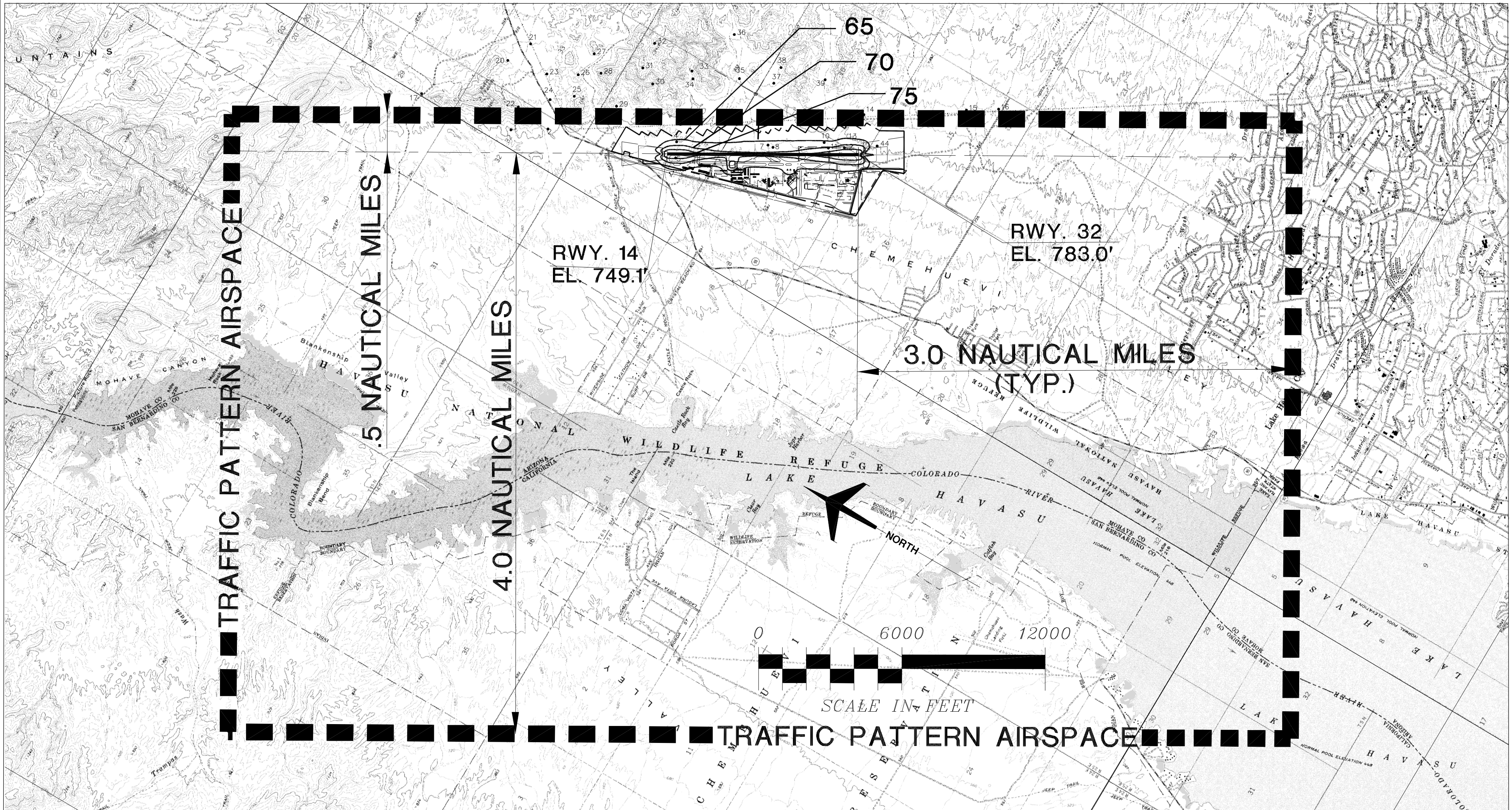
According to the online USFWS *Wetland Mapper*, there are no known wetlands on the airport property. This source provides a general overview, and before any development, this should be backed up by a "ground truth" survey to ensure that this information is accurate. If any wetlands are found and impacted, there would be a requirement to acquire appropriate permits and possibly provide mitigation.

As described in Chapter One, the only present potential Waters of the U.S. are ephemeral washes that flow southwest to the Colorado River and Lake Havasu. The approximate location of the washes is depicted on **Exhibit 5B**. Before any development activities that could impact these washes is undertaken, the limits of the major washes should be defined in the field, and a determination should be requested from the U.S. Army Corps of Engineers regarding jurisdiction. Planned developments that could occur within these areas include the expansion of taxiways on the south end of the airport, and possibly, the planned airside development in the southern portion of airport property.

PUBLIC AIRPORT DISCLOSURE MAP

As previously discussed in Chapter One, Arizona Revised Statutes (ARS) 28-8486, *Public Airport Disclosure*, provides for a public airport owner to publish a map depicting the "territory in the vicinity of the airport." The territory in the vicinity of the airport is defined as the traffic pattern airspace and the property that experiences 60 DNL or higher in counties with a population of more than 500,000 and 65 DNL or higher in counties with less than 500,000 residents. ARS 28-8486 provides for the State Real Estate Office to prepare a disclosure map in conjunction with the airport owner. The Disclosure Map is recorded with the County Recorder

Exhibit 5D depicts the Disclosure Map for Lake Havasu City Municipal Airport. Traffic pattern airspace is a function of the approach category for the runway.



NOTES:

1. This map has been prepared inaccordance with the Arizona Revised Statutes, Section 28-8486, relating to Public Airport Disclosure.
2. Traffic Pattern Airspace Boundaries have been established in accordance with the guidelines provided in the FAA Order JO 7400.2G
3. The Airport Noise Contours have been developed with the Integrated Noise Model (Version 7.0a) and are based on the Total Annual Operations (Take-offs and Landings) of 92,400.
4. 1 Nautical mile = 6,080 feet or 1, 516 statute miles.
5. Base map derived from electronic USGS quadrangles Topock, Lake Havasu City South, Lake Havasu City North, Havasu Lake, Castle Rock.

LEGEND:

- TRAFFIC PATTERN AIRSPACE
- 65 — NOISE CONTOURS DAY NIGHT LEVEL (DNL)
- EXISTING AIRPORT PROPERTY LINE
- EXTENDED RUNWAY CENTERLINE

LAKE HAVASU CITY AIRPORT

PUBLIC AIRPORT DISCLOSURE MAP

LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P.E.
March 9, 2010 SHEET 1 OF 1

Coffman Associates
Airport Consultants
www.coffmanassociates.com

Exhibit 5D
Public Airport Disclosure Map

Chapter Six

CAPITAL IMPROVEMENT PROGRAM

Chapter Six

CAPITAL IMPROVEMENT PROGRAM

The analyses conducted in previous chapters outlined airport development needs to meet projected aviation demand for the next 20 years based on forecast activity, facility needs, and operational efficiency. Next, basic economic, financial, and management rationale is applied to each development item so that the feasibility of each item contained in the plan can be assessed. The purpose of this chapter is to identify capital needs at Lake Havasu City Municipal Airport and identify when these should be implemented according to need, function, and demand.

The presentation of the capital improvement program (CIP) has been organized into two sections. First, the airport's capital needs, based on the projected CIP, are presented in narrative and graphic form. Second, capital improvement funding sources on the federal, state, and local levels are identified and discussed.

DEMAND-BASED PLAN

The Lake Havasu City Municipal Airport Master Plan has been developed according to a demand-based schedule. Demand-based planning establishes guidelines for the airport based upon airport activity levels instead of guidelines based upon subjective factors such as points 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 this Master Plan is that the facility improvements needed to serve

new levels of demand should only be implemented when the levels of demand experienced at the airport justify their implementation.

As discussed, most development items included in the recommended concept will need to follow demand indicators. For example, the plan includes the construction of new hangar aprons and taxilanes. Based aircraft will be the indicator for additional hangar needs. If based aircraft growth occurs as projected, additional hangars will need to be constructed to meet the demand. If growth slows or does not occur as projected, hangars and pavement projects can be delayed. As a result, capital expenditures will be undertaken as needed, which leads to a responsible use of capital assets. Some development items do not correspond specifically to actual demand levels, such as maintenance. Maintenance projects are typically associated with day-to-day operations or aging factors and should be monitored and identified by airport staff.

A demand-based Master Plan does not specifically require the implementation of any of the demand-based improvements. Instead, it is envisioned that implementation of any Master Plan improvement would be examined against the demand levels prior to implementation. In many ways, this Master Plan is similar to a community's general plan. 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 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 Milestone Summary
Lake Havasu City Municipal Airport

	2006	Short Term	Intermediate Term	Long Term
BASED AIRCRAFT	**229**	**265**	**295**	**355**
ANNUAL ENPLANED PASSENGERS	**6,085**	**9,500**	**11,000**	**16,000**
Itinerant Operations				
Air Carrier	1,254	1,800	1,900	2,400
Air Taxi	1,600	2,100	2,700	4,400
General Aviation	22,600	28,000	29,900	38,300
Military	360	400	400	400
Total Itinerant	25,814	32,300	34,900	45,500
Local Operations				
General Aviation	23,360	30,300	36,500	46,900
Total Local	23,360	30,300	36,500	46,900
TOTAL ANNUAL OPERATIONS	**49,174**	**62,600**	**71,400**	**92,400**

AIRPORT DEVELOPMENT SCHEDULE AND COST SUMMARIES

Once 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 cost 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 planning horizons: short term, intermediate term, and long term. Each year, Lake Havasu City Municipal Airport will need to reexamine the priorities for funding, adding or removing projects on the capital programming lists.

While some projects will be demand-based, others will be dictated by design standards, safety, or rehabilitation needs. In putting together a listing of projects, an attempt has been made to include anticipated rehabilitation needs and capital replacement needs through the planning period.

Exhibit 6A summarizes the CIP for Lake Havasu City Municipal Airport through the planning period of this Master Plan. An estimate has been included with each project of federal and state funding eligibility, although this amount is not guaranteed. **Exhibit 6B** graphically depicts development staging. As a Master Plan is a conceptual document, implementation of these capital projects should only be undertaken after further refinement of their design and costs through architectural and engineering analyses.

The cost estimates presented in this chapter have been increased to allow for contingencies that may arise on the project. Capital costs presented here should be viewed only as estimates subject to further refinement during design. Nevertheless, these estimates are considered sufficiently accurate for planning purposes. Cost estimates for each of the development projects listed in the CIP are listed in current (2008) dollars. Adjustments will need to be applied over time as construction costs or capital equipment costs change.

In an effort to further identify capital needs at the airport, 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 Evaluation (Chapter Five).

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-related commercial and industrial developments. In most cases, projects under this category will be listed as intermediate or long term to be implemented as marketing opportunities present themselves.

Each capital need is categorized according to this schedule. The applicable category (or categories) included are presented in **Table 6B**.

The projects listed in the short term period include all categories and focus heavily on safety and security as well as efficiency. Items include upgrading airfield signage, improving existing utility infrastructure on the airfield, and enhancing aircraft parking apron and beacon lighting. Also included in the short term is the relocation of air cargo operations to a more desirable location farther north. This will not only provide a safer and more secure environment, but also be more efficient for aircraft and vehicles transporting cargo. Also included is the construction of an additional high-speed taxiway exit connecting Runway 14-32 to parallel Taxiway A. Finally, existing airfield pavements are to be assessed and rehabilitated as warranted.

Intermediate term improvements relate to the development of the southwest side of the airport with the construction of a new passenger terminal building and extension of Taxiway C farther south. Additional aircraft parking aprons are proposed to support aviation-related growth. Demand will dictate the timeframe and to what extent these projects occur. Safety projects related to the airport transitioning to Airport Reference Code (ARC) C/D-II status are called for during this time and include the relocation of the perimeter road on the southwest side of the airport and land acquisition on the north side of the airport. Projects related to improved instrument approach procedures on Runway 32 are also identified in the intermediate term.

Long term improvements focus on the continued development of the southwest area of the airport while also calling for continued rehabilitation of existing airfield infrastructure. It is during this time that the existing passenger terminal building can be transformed to accommodate air cargo operations and other potential aviation-related activities. Toward the end of

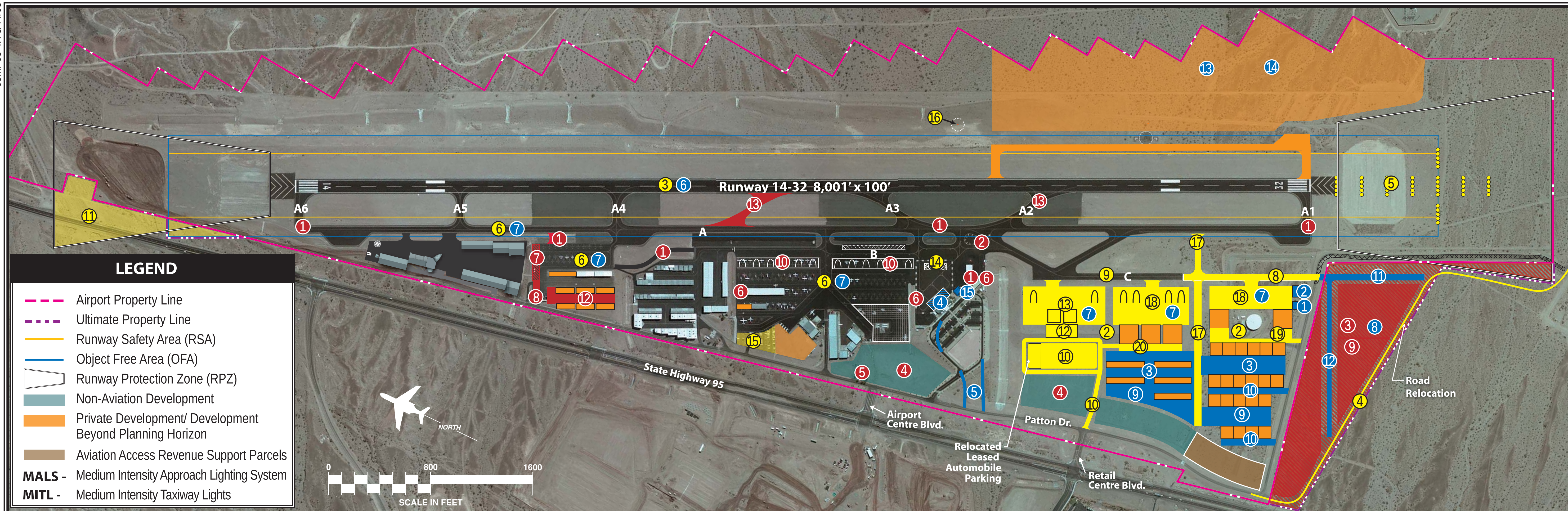
05MP08-6A-10/1/08

	CAPITAL IMPROVEMENT PROGRAM	TOTAL COST	FAA ELIGIBLE	ADOT ELIGIBLE	LOCAL SHARE
Short Term Program (0-5 Years)					
2010					
1	Airfield Signage Improvements and Modifications / Pavement Modifications	$572,000	$543,400	$14,300	$14,300
Subtotal 2010		**$572,000**	**$543,400**	**$14,300**	**$14,300**
2011					
2	Improve Existing Utility Infrastructure	$173,000	$164,350	$4,325	$4,325
3	Environmental Assessment for Land Acquisition	150,000	142,500	3,750	3,750
4	Land Assessment for Non-Aeronautical Use of Specific Parcels on Airport Property	25,000	0	0	25,000
Subtotal 2011		**$348,000**	**$306,850**	**$8,075**	**$33,075**
2012					
5	Remove Water Tank Adjacent to Patton Drive	$140,500	$0	$0	$140,500
6	Aircraft Parking Apron Lighting Enhancements	268,000	254,600	6,700	6,700
7	Designate Area on North Parking Apron for Air Cargo Operations	210,500	199,975	5,263	5,262
8	Construct Auto Truck Access/Parking on North Apron to Support Air Cargo Operations	282,400	268,280	7,060	7,060
Subtotal 2012		**$901,400**	**$722,855**	**$19,023**	**$159,522**
2013					
9	Acquire Approximately 23 Acres of Land Southwest of Airport (Approach Protection, Aviation Development, Buffer)	$4,025,000	$3,823,750	$100,625	$100,625
10	Redesignate Areas on Main Parking Apron for Large Aircraft Parking	171,500	162,925	4,287	4,288
11	Assess Airport Pavement Conditions for Future Rehabilitation Projects (Crack Seal)	30,000	28,500	750	750
Subtotal 2013		**$4,226,500**	**$4,015,175**	**$105,662**	**$105,663**
2014					
12	Construct Additional Apron/Taxilanes for Hangar Development	$488,100	$463,695	$12,203	$12,202
13	Construct High-Speed Taxiway Exit on West Side of Runway 14-32	539,000	512,050	13,475	13,475
14	Crack Seal Airport Pavements As Needed	147,600	140,220	3,690	3,690
Subtotal 2014		**$1,174,700**	**$1,115,965**	**$29,368**	**$29,368**
Short Term Program Totals (0-5 Years)		***$7,222,600***	***$6,704,245***	***$176,428***	***$341,927***
Intermediate Term Program (6-10 Years)					
1	Assess Airport Pavement Conditions for Future Rehabilitation Projects (Crack Seal)	$30,000	$28,500	$750	$750
2	Improve Infrastructure and Utilities for Southwest Development Area (Phase I)	189,000	179,550	4,725	4,725
3	Rehabilitate Runway 14-32	1,768,000	1,679,600	44,200	44,200
4	Relocate Airport Perimeter Road Southwest Side of Airport	1,130,000	1,073,500	28,250	28,250
5	Install MALS on Runway 32	738,000	701,100	18,450	18,450
6	Rehabilitate Active Taxiways, Taxilanes, and Aircraft Parking Aprons	2,309,000	2,193,550	57,725	57,725
7	Crack Seal Airport Pavements as Needed Extend Taxiway C 1,000' South for Aviation	240,000	228,000	6,000	6,000
8	Extend Taxiway C 1,000' South for Aviation Development	617,800	586,910	15,445	15,445
9	Install MITL on Existing Taxiway C	214,000	203,300	5,350	5,350

	CAPITAL IMPROVEMENT PROGRAM	TOTAL COST	FAA ELIGIBLE	ADOT ELIGIBLE	LOCAL SHARE
Intermediate Term Program (6-10 Years) ***continued***					
10	Construct Automobile Access Road and Parking Leading to New Terminal Building	1,756,000	1,668,200	43,900	43,900
11	Acquire Approximately 7.5 Acres of Land North of Runway (Safety Areas and Approach Protection)	1,312,500	1,246,875	32,813	32,812
12	Design and Construct New Terminal Building	6,003,000	5,702,850	150,075	150,075
13	Construct New Terminal Apron	1,987,000	1,887,650	49,675	49,675
14	Redesignate Portions of Existing Terminal Apron to Accommodate Helicopter Parking	193,000	183,350	4,825	4,825
15	Redesignate Existing Leased Automobile Parking Lot for Aviation Development	428,000	406,600	10,700	10,700
16	Relocate Segmented Circle and Wind Cone Farther Northeast on East Side of Runway 14-32	125,000	118,750	3,125	3,125
17	Construct Taxiway Extending from Parallel Taxiway A to the Southwest Development Area	850,500	807,975	21,262	21,263
18	Construct New Aircraft Aprons South of Relocated Terminal Area for Hangar Development, Aircraft Parking, and Aviation Support Facilities	2,664,000	2,530,800	66,600	66,600
19	Construct Additional Automobile Access Roads and Parking	665,700	632,415	16,643	16,642
Intermediate Term Program Totals (6-10 Years)		***$23,220,500***	***$22,059,475***	***$580,513***	***$580,512***
Long Term Program (11-20 Years)					
1	Construct Joint-Use Wash Rack for Aircraft and Airport Operations Equipment	$316,000	$300,200	$7,900	$7,900
2	Construct Permanent Airport Maintenance Facility	1,010,000	959,500	25,250	25,250
3	Construct Additional Apron/Taxilanes for Hangar Development and Aircraft Parking	2,099,300	1,994,335	52,482	52,483
4	Redesignate Existing Terminal Area for Air Cargo Operations	183,000	173,850	4,575	4,575
5	Realign Portions of Airport Centre Boulevard to Better Accommodate Ground Handling of Air Cargo	417,450	396,577	10,437	10,436
6	Rehabilitate Runway 14-32	1,869,500	1,776,025	46,738	46,737
7	Rehabilitate Active Taxiways, Taxilanes, and Aircraft Parking Aprons	5,103,000	4,847,850	127,575	127,575
8	Improve Infrastructure and Utilities for Southwest Development Area (Phase II)	470,000	446,500	11,750	11,750
9	Construct Additional Apron/Taxilanes for Hangar Development and Aircraft Parking	2,364,000	2,245,800	59,100	59,100
10	Construct Additional Automobile Access Roads and Parking	630,000	598,500	15,750	15,750
11	Extend Taxiway C 900 Feet South for Aviation Development	650,050	617,547	16,251	16,252
12	Construct Taxiway Leading to Aviation Access Revenue Support Parcels	767,250	728,887	19,181	19,182
13	Earthwork/Site Preparation for Development of Southeast Development Area	815,000	774,250	20,375	20,375
14	Improve Infrastructure and Utilities for Southeast Development Area	469,000	445,550	11,725	11,725
15	Construct Airport Traffic Control Tower (if necessary)	3,000,000	1,500,000	0	1,500,000
Long Term Program Totals (11-20 Years)		***$20,163,550***	***$17,805,371***	***$429,089***	***$1,929,090***
TOTAL PROGRAM COST		***$50,606,650***	***$46,569,091***	***$1,186,030***	***$2,185,529***

Exhibit 6A
CAPITAL IMPROVEMENT PROGRAM

05MP08-4K-3/11/08



SHORT TERM PROGRAM (0-5 Years)

2010

1. Airfield Signage Improvements and Modifications/Pavement Modifications

2011

2. Improve Existing Utility Infrastructure
3. Environmental Assessment for Land Acquisition
4. Land Assessment for Non-Aeronautical Use of Specific Parcels on Airport Property

2012

5. Remove Water Tank Adjacent to Patton Drive
6. Aircraft Parking Apron Lighting Enhancements
7. Designate Area on North Parking Apron for Air Cargo Operations
8. Construct Auto Truck Access/Parking on North Apron to Support Air Cargo Operations

2013

9. Acquire Approximately 23 Acres of Land Southwest of the Airport (Approach Protection, Aviation Development, Buffer).
10. Redesignate Areas on Main Parking Apron for Large Aircraft Parking
11. Assess Airport Pavement Conditions for Future Rehabilitation Projects (Crack Seal)*

2014

12. Construct Additional Apron/Taxilanes for Hangar Development
13. Construct High-Speed Taxiway Exit on West Side of Runway 14-32
14. Crack Seal Airport Pavement as Needed*

INTERMEDIATE TERM PROGRAM (6-10 Years)

1. Assess Airport Pavement Conditions for Future Rehabilitation Projects (Crack Seal)*
2. Improve Infrastructure and Utilities for Southwest Development Area (Phase I)
3. Rehabilitate Runway 14-32
4. Relocate Airport Perimeter Road on Southwest Side of Airport
5. Install MALS to Runway 32
6. Rehabilitate Active Taxiways, Taxilanes, and Aircraft Parking Aprons
7. Crack Seal Airport Pavement as Needed*
8. Extend Taxiway C 1,000 Feet South for Aviation Development
9. Install MITL on Existing Taxiway C
10. Construct Automobile Access Road and Parking Leading to New Terminal Building
11. Acquire Approximately 7.5 Acres of Land North of Runway (Safety Areas and Approach Protection)
12. Design and Construct New Terminal Building
13. Construct New Terminal Apron
14. Redesignate Portions of Existing Terminal Apron to Accommodate Helicopter Parking
15. Redesignate Existing Leased Automobile Parking Lot for Aviation Development
16. Relocate Segmented Circle and Wind Cone Farther Northeast on East Side of Runway 14-32
17. Construct Taxiway Extending from Parallel Taxiway A to the Southwest Development Area
18. Construct New Aircraft Aprons South of Relocated Terminal Area for Hangar Development, Aircraft Parking, and Aviation Support Facilities
19. Construct Additional Automobile Access Roads and Parking

LONG TERM PROGRAM (11-20 Years)

1. Construct Joint-Use Wash Rack for Aircraft and Airport Operations Equipment
2. Construct Permanent Airport Maintenance Facility
3. Construct Additional Apron/Taxilanes for Hangar Development and Aircraft Parking
4. Redesignate Existing Terminal Area for Air Cargo Operations
5. Realign Portions of Airport Centre Boulevard to Better Accommodate Ground Handling of Air Cargo
6. Rehabilitate Runway 14-32
7. Rehabilitate Active Taxiways, Taxilanes, and Aircraft Parking Aprons
8. Improve Infrastructure and Utilities for Southwest Development Area (Phase II)
9. Construct Additional Apron/Taxilanes for Hangar Development and Aircraft Parking
10. Construct Additional Automobile Access Roads and Parking
11. Extend Taxiway C 900 Feet South for Aviation Development
12. Construct Taxiway Leading to Aviation Access Revenues Support Parcels
13. Earthwork/Site Preparation for Development of Southeast Development Area
14. Improve Infrastructure and Utilities for Southeast Development Area
15. Construct Airport Traffic Control Tower (if necessary)

* Not Depicted on Exhibit

LAKE HAVASU CITY, ARIZONA MUNICIPAL AIRPORT

Exhibit 6B
DEVELOPMENT STAGING

the long term program, consideration is given to aviation-related development on the southeast side of the airport.

TABLE 6B Development Needs by Category Lake Havasu City Municipal Airport		
PROJECT DESCRIPTION		**CATEGORY**
SHORT TERM PROGRAM (0-5 YEARS)		
1	Airfield Signage Improvements and Modifications/Pavement Modifications	SS
2	Improve Existing Utility Infrastructure	SS
3	Environmental Assessment for Land Acquisition	EN
4	Land Assessment for Non-Aeronautical Use of Specific Parcels on Airport Property	OP
5	Remove Water Tank Adjacent to Patton Drive	OP
6	Aircraft Parking Apron Lighting Enhancements	SS
7	Designate Area on North Parking Apron for Air Cargo Operations	SS/EF
8	Construct Auto Truck Access/Parking on North Apron to Support Air Cargo Operations	SS/EF
9	Acquire Approximately 23 Acres of Land Southwest of Airport (Approach Protection, Aviation Development, Buffer)	SS/DM
10	Redesignate Areas on Main Parking Apron for Large Aircraft Parking	SS/DM
11	Assess Airport Pavement Conditions for Future Rehabilitation Projects (Crack Seal)	MN
12	Construct Additional Apron/Taxilanes for Hangar Development	DM
13	Construct High-Speed Taxiway Exit on West Side of Runway 14-32	SS/EF
14	Crack Seal Airport Pavements As Needed	MN
INTERMEDIATE TERM PROGRAM (6-10 YEARS)		
1	Assess Airport Pavement Conditions for Future Rehabilitation Projects (Crack Seal)	MN
2	Improve Infrastructure and Utilities for Southwest Development Area (Phase I)	DM
3	Rehabilitate Runway 14-32	MN
4	Relocate Airport Perimeter Road on Southwest Side of Airport	SS
5	Install MALS on Runway 32	SS/DM
6	Rehabilitate Active Taxiways, Taxilanes, and Aircraft Parking Aprons	MN
7	Crack Seal Airport Pavements As Needed	MN
8	Extend Taxiway C 1,000 Feet South for Aviation Development	DM
9	Install MITL on Existing Taxiway C	SS
10	Construct Automobile Access Road and Parking Leading to New Terminal Building	DM
11	Acquire Approximately 7.5 Acres of Land North of Runway (Safety Areas and Approach Protection)	SS
12	Design and Construct New Terminal Building	EF/DM
13	Construct New Terminal Apron	DM
14	Redesignate Portions of Existing Terminal Apron to Accommodate Helicopter Parking	SS/EF

TABLE 6B (Continued) Development Needs by Category Lake Havasu City Municipal Airport		
PROJECT DESCRIPTION		**CATEGORY**
INTERMEDIATE TERM PROGRAM (6-10 YEARS) (Continued)		
15	Redesignate Existing Leased Automobile Parking Lot for Aviation Development	DM/OP
16	Relocate Segmented Circle and Wind Cone Farther Northeast on East Side of Runway 14-32	SS
17	Construct Taxiway Extending from Parallel Taxiway A to the Southwest Development Area	EF/OP
18	Construct New Aircraft Aprons South of Relocated Terminal Area for Hangar Development, Aircraft Parking, and Aviation Support Facilities	DM
19	Construct Additional Automobile Access Roads and Parking	DM
LONG TERM PROGRAM (11-20 YEARS)		
1	Construct Joint-Use Wash Rack for Aircraft and Airport Operations Equipment	EN/DM
2	Construct Permanent Airport Maintenance Facility	EF
3	Construct Additional Apron/Taxilanes for Hangar Development and Aircraft Parking	DM
4	Redesignate Existing Terminal Area for Air Cargo Operations	OP
5	Realign Portions of Airport Centre Boulevard to Better Accommodate Ground Handling of Air Cargo	SS
6	Rehabilitate Runway 14-32	MN
7	Rehabilitate Active Taxiways, Taxilanes, and Aircraft Parking Aprons	MN
8	Improve Infrastructure and Utilities for Southwest Development Area (Phase II)	DM
9	Construct Additional Apron/Taxilanes for Hangar Development and Aircraft Parking	DM
10	Construct Additional Automobile Access Roads and Parking	DM
11	Extend Taxiway C 900 Feet South for Aviation Development	DM
12	Construct Taxiway Leading to Aviation Access Revenue Support Parcels	DM
13	Earthwork/Site Preparation for Development of Southeast Development Area	DM
14	Improve Infrastructure and Utilities for Southeast Development Area	DM
15	Construct Airport Traffic Control Tower (if necessary)	SS

MALS - Medium Intensity Approach Lighting System
MITL - Medium Intensity Taxiway Lights
Categories: SS - Safety/Security
EN - Environmental
MN - Maintenance
EF - Efficiency
DM - Demand
OP – Opportunities

A primary assumption in the capital improvement program is that all future hangar construction will be completely private. The capital plan does provide for the City to construct apron and taxilane improvements leading to proposed hangar development which is Federal Aviation Administration (FAA) and Arizona Department of Transportation (ADOT) – Aeronautics Division grant eligible. This reduces the overall development costs for the private hangar construction.

SHORT TERM PROGRAM

The short term planning horizon CIP considers 14 projects for the five-year period as presented on **Exhibit 6A** and illustrated on **Exhibit 6B**. The first year of the CIP considers projects that may be accomplished in the 2010 federal funding cycle (October 2009 to September 2010). A large majority of these projects deal with providing more efficient operational activity for aircraft utilizing the airport and improving and enhancing existing infrastructure at the airport.

The first project listed in the plan calls for signage improvements and other airfield modifications to provide a safer environment. This includes replacing the existing electrical vault on the southeast side of the airport rescue and firefighting (ARFF) facility with a newer and more efficient one, providing medium intensity taxiway lighting (MITL) on Taxiway B, and updating signage serving the runway and taxiway system. In addition, pavement modifications to the north area of the airport are proposed to help provide more efficient aircraft flow.

Another safety-related project in the short term program involves the replacement of a fire hydrant located east of the terminal building between Taxiways A and B with a flush mount unit. The existing fire hydrant protrudes upward and poses a potential hazard to aircraft taxiing in its vicinity. The flush mount unit will enhance safety and allow the area to be used for overflow parking of aircraft if other dedicated parking aprons are full.

The next project calls for an environmental assessment (EA) to comply with the *National Environmental Policy Act* (NEPA) and permit the fee simple acquisition of approximately 23 acres on the southwest side of the airport for future aviation development. Projects such as land acquisition require an EA under FAA guidance. A Finding of No Significant Impact (FONSI) will be required prior to the acquisition of land.

The next two projects deal specifically with maximizing land on airport property for revenue support. As previously discussed, portions of land on the west side of the airport are not provided airside access. As a result, the utility of these areas is limited to non-aviation development in the form of commercial and/or industrial activities. These uses are allowable by the FAA as long as they are not minimizing the availability of aviation-related property. Assessing certain parcels and coordinating with the FAA will determine whether portions of airport property can be used for non-aviation purposes. In addition, the removal of an abandoned water tank adjacent to Patton Drive will provide a more aesthetic appeal to property that may be utilized for commercial or industrial use in the future.

Making upgrades to the existing aircraft parking apron lighting is also included in the short term CIP, as is the replacement of the airport beacon. These improvements will provide a safer and more secure environment and allow for maximum identification of the airport environment during nighttime conditions.

The next two projects involve the relocation of air cargo operations to the north parking apron. Current air cargo activity is limited to the northwest corner of the main aircraft parking apron. Cargo aircraft must taxi adjacent to multiple aircraft parking areas and fixed base operator (FBO) activities in order to access the dedicated cargo area. Relocating air cargo to the north apron will provide aircraft more desirable access to the runway and taxiway system. A dedicated vehicle parking area immediately west of the cargo apron will allow for convenient automobile access from Patton Drive.

Once the EA is conducted on 23 acres of land adjacent to the southwest side of the airport, the fee simple property acquisition can occur. It is desirable for the airport to gain control over this property. With the onset of improved instrument approach procedures to Runway 32, the runway protection zone will expand significantly and include approximately 1.5 acres of this proposed land acquisition. The remaining property can be utilized for future aviation development and a buffer to proposed development farther south of the airport.

Additional parking space is needed for business turboprops and jets that operate at the airport. The current design of the main aircraft parking apron provides a limited number of marked tiedowns for large aircraft. This project would dedicate a minimum of 12 marked parking spaces adjacent to Taxiway B on the main aircraft parking apron that will allow for convenient access to and from the runway and taxiway system for these larger aircraft. As demand dictates, additional taxilanes and apron space should be constructed at this time to accommodate hangar development adjacent to the north aircraft parking apron. Private hangar development in the form of T-hangars or shade hangars is proposed in this area.

Other projects in the short term include the construction of one high-speed taxiway exit on the west side of Runway 14-32 that better accommodates the 8,001 feet of usable runway length. The construction of this high-speed taxiway exit will complement the existing high-speed Taxiways A2 and A3, which were originally constructed to accommodate a 5,500-foot runway.

Remaining projects include the ongoing maintenance pertaining to Runway 14-32 and all taxiways, taxilanes, and aircraft parking aprons. A pavement evaluation is proposed toward the end of the short term planning horizon to assess the condition of pavements and the need for crack sealing. Shortly thereafter, those airport pavements in need of repair can be crack sealed.

Short term projects listed on **Exhibit 6A** and graphically depicted on **Exhibit 6B** have been estimated to cost approximately $7.2 million. Of this total, $6.7 million is eligible for FAA grant funding, $176,400 is eligible for state funds, and the local share is projected to be approximately $341,900.

INTERMEDIATE TERM PROGRAM

The intermediate term CIP considers 19 projects for the airport during the six to ten-year timeframe. 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 listing and not prioritized by year. However, the project listing is intended to depict a prioritization of projects as now anticipated to meet future demand. Intermediate term improvements are listed on **Exhibit 6A** and depicted on **Exhibit 6B**.

The initial project is the continued assessment of active airfield pavements to determine deficiencies and the need for crack sealing and/or other rehabilitation. Similar to what was called for in the short term program, crack sealing areas in need of repair will follow the pavement study.

The next project listed in the intermediate term involves infrastructure and utility improvements in the southwest development area. As shown on the recommended plan, this area is to be dedicated for the continued growth and development of the airport by accommodating hangar development, a new terminal building, and additional aircraft parking aprons and taxiways. Extending utility services to this area will allow for the future development of these facilities.

The next project is associated with rehabilitating Runway 14-32. The condition of the runway pavement at this time will determine the scope of improvements needed. It can be expected that at least a slurry seal and re-application of runway markings will be needed.

Projects are also identified that relate to improved instrument approach procedures to Runway 32. The existing airport perimeter road located on the southwest side of the airport is to be relocated so it does not serve as a penetration to the proposed runway protection zone (RPZ) associated with a straight-in instrument approach procedure with visibility minimums as low as three-quarters of a mile. In order to obtain these proposed visibility minimums, a medium intensity approach lighting system (MALS) is to be implemented on Runway 32. Future design and engineering will determine the exact placement of the MALS, and as with any significant airport development, an EA will be conducted prior to the installation of the equipment. As previously discussed in Chapter Five, further analysis by the FAA will determine whether Runway 32 will be able to accommodate approach minimums with visibility as low as three-quarters of a mile. This determination could impact the degree to which these projects are implemented.

Next, projects are listed that call for improving conditions on existing airport pavements that could include crack sealing, slurry sealing, and/or other rehabilitation projects. The areas to be addressed include active Taxiways A, B, and C, taxilanes leading to hangar storage facilities, and the terminal, main, and north aircraft parking aprons that support aircraft tiedowns and commercial aviation activities.

Extending Taxiway C 1,000 feet to the south and installing MITL on existing portions of the taxiway are also included in the intermediate term CIP. These improvements will provide for additional aviation development in the southwest area of the airport and enhance safety and guidance for aircraft utilizing Lake Havasu City Municipal Airport, especially during nighttime and/or poor weather conditions.

Three of the next four projects are associated with the relocated terminal facility to the southwest development area. As previously discussed, forecasts predict that additional terminal building space will be needed to accommodate the future demands of passengers utilizing the airport if the airport is to regain scheduled commercial airline service. The plan calls for the design and construction of a new terminal building to be located approximately 900 feet south of the existing facility. A large aircraft parking apron is planned immediately east of the new terminal building which would be dedicated for commercial airline activities. Adjacent to the west of the terminal building is an automobile parking lot with direct access being provided by a new roadway extending east from Retail Centre Boulevard.

As larger aircraft utilize the airport on a more frequent basis, it can be expected that the airport's ARC classification will transition to C/D-II. As a result, the object free area (OFA) and RPZ will expand to include approximately 7.5 acres of land currently located outside airport property north of the airport. Additional property would need to be acquired to secure the RPZ and OFA. At this time, the plan considers the fee simple acquisition of approximately 1.2 acres of this land located within the proposed OFA. The RPZ extends farther north across State Highway 95 and encompasses the remaining 6.3 acres. It is recommended that this area be controlled through an avigation easement.

When airport terminal facilities are shifted to the southwest development area, the existing terminal apron can be used for other aviation-related activities. Locating two helicopter hardstands in this area will provide adequate separation of fixed wing and rotary aircraft. In addition, the leased automobile parking lot that currently exists in the northwest corner of the main aircraft parking apron can be redesignated for aviation development since the parking lot associated with the new terminal facility will accommodate those automobiles that lease parking space at the airport.

Another project associated with the airport transitioning to ARC C/D-II includes relocating the segmented circle and wind cone farther northeast of its current location. In doing so, the facility will not penetrate the expanded OFA and will provide a more desirable midfield location that will be more visible to pilots utilizing the airport.

Remaining projects in the intermediate term deal specifically with the continued development of the southwest area of the airport. The construction of a taxiway extending approximately 1,500 feet west of Taxiway A designed to accommodate airplane design group (ADG) II aircraft will lead to future aviation development in this area. Two aircraft aprons are identified that could support hangar development, aircraft parking, and other aviation support facilities. Finally, as demand warrants, additional automobile access roads and parking can be constructed in this area that will lead to private hangar development that serves commercial aviation activities and aircraft storage.

The total investment necessary for the intermediate term CIP is approximately $23.2 million, as presented on **Exhibit 6A** and graphically depicted on **Exhibit 6B**. Of this total, $22.1 million is eligible for FAA grant funding, and $580,500 is eligible for state funds, with the City responsible for $580,500.

LONG TERM PROGRAM

The long term CIP considers 15 projects for the ten-year period focused on several areas to include the expansion of the southwest development area, additional aviation uses within the existing terminal area, continued maintenance of the runway, taxiways, and aircraft parking aprons, and potential development of the southeast side of the airport. These improvements are listed on **Exhibit 6A** and illustrated on **Exhibit 6B**.

The first two projects in the long term include the construction of a wash rack and permanent airport maintenance facility in the southwest area of the airport adjacent to the Taxiway C extension. The construction of an aircraft wash rack will give aircraft owners a designated area to wash their aircraft while also properly collecting cleaning fluids used during the cleaning process. This facility could also accommodate airport operations and maintenance equipment. Immediately to the east of the wash rack, a permanent airport maintenance building is proposed. This will provide a more desirable location for airport maintenance compared to the current utilization of an aircraft hangar and other outside locations for equipment storage.

Continued private hangar development in the southwest area of the airport is expected. As demand warrants, projects including apron expansion and taxilane construction will support this hangar infrastructure.

At this point in the planning horizon, the existing terminal area can be transformed to accommodate air cargo operations at the airport. The terminal facility will provide a more secure location for the screening of cargo and vehicles and provide adequate parking adjacent to the west side of the building for larger vehicles associated with the ground movement of cargo. The realignment of the roadway entering and exiting this area is also proposed to allow easier access for larger vehicles carrying cargo to and from the facility.

The next two projects in the long term are associated with rehabilitating the runway, taxiways, taxilanes, and aircraft parking aprons. As with other rehabilitation projects called out in the short and intermediate term planning horizons, pavement analysis done leading up to these projects will determine the scope and degree to which rehabilitation in these areas will be needed.

Toward the end of the long term program, several projects regarding the continued expansion of the southwest side of the airport are called out. Additional utilities, aircraft parking aprons, taxilanes, and automobile access roads and parking are included that would provide the necessary infrastructure to meet the potential aviation demand. The extension of Taxiway C 900 feet to the south is also proposed which will open up additional land for aviation development. A taxiway extending to the west of the proposed Taxiway C extension will lead to aviation access revenue support parcels that could support aviation businesses and/or aircraft storage.

All projects previously mentioned occur on the west side of Runway 14-32 and would provide for potential build-out of the west side of the airport. In order to maximize the amount of airport property for aviation use and revenue support, the last projects involve the potential development of the southeast side of the airport. These projects call for site preparations and the extension of utilities in order to support aviation-related development. As is the case with a large majority of projects listed in the CIP, demand will dictate the need to utilize this area of the airport for future development. In the event that this area is to be utilized, it is most likely that this will occur beyond the 20-year planning horizon of this Master Plan. The last project to be considered deals with the construction of an airport traffic control tower (ATCT). An area adjacent to the south side of the existing terminal building is set aside for the potential development of the ATCT should airport operations ever justify one.

Total long term projects listed on **Exhibit 6A** and graphically depicted on **Exhibit 6B** have been estimated to cost approximately $20.2 million in today's (2008) dollars. Of this total, $17.8 million is eligible for FAA grant funding, $429,100 is eligible for state funds, and $1.9 million is the responsibility of the airport sponsor. The total CIP program costs are estimated at approximately $50.6 million.

CIP PROGRAM SUMMARY

The CIP covers potential demand-based development at Lake Havasu City Municipal Airport over the next 20 years. Many of the planned facilities at the airport are not included in the CIP, as they are either projected to be necessary beyond the scope of this plan or assumed to be private development, as is the case with future hangar construction at the airport.

Several airport improvements presented in the recommended concept are demand-based. These facilities should be constructed to serve an existing demand at the airport at that time. This plan does not support building facilities in order to attract activity. Because the plan is demand-based rather than time-based, it provides Lake Havasu City with the flexibility to develop facilities as needed. Should demand increase at a rate greater than forecast, implementation of these improvements can be advanced. Should demand slow, the life of the Master Plan is effectively increased.

CAPITAL IMPROVEMENTS FUNDING

Financing capital improvements at Lake Havasu City Municipal Airport will not rely solely on the financial resources of the airport. Capital improvement funding is available through various grant-in-aid programs on both the federal and state levels. The following discussion outlines key sources of funding potentially available for capital improvements at Lake Havasu City Municipal Airport.

FEDERAL GRANTS

The United States Congress has long recognized the need to develop and maintain a system of aviation facilities across the nation for purposes of national defense and promotion of interstate commerce. Various grant-in-aid programs to public airports have been established over the years for this purpose. The most recent legislation is the Airport Improvement Program (AIP) of 1982. The AIP has been reauthorized several times, with the most recent legislation enacted in late 2003 and entitled the *Vision 100 – Century of Aviation Reauthorization Act*. *Vision 100's* enacted four-year program covered FAA fiscal years 2004, 2005, 2006, and 2007.

The source for *Vision 100* funds was 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, taxes on airline tickets, aviation fuel, and various aircraft parts. Funds are distributed each year by the FAA from appropriations by Congress. A portion of the annual distribution is to primary commercial service airports based on enplanement levels. General aviation airports, however, also received entitlements under the last reauthorization. After all specific funding mechanisms are distributed, the remaining AIP funds are disbursed by the FAA, based upon the priority of the project for which they have requested federal assistance through discretionary apportionments. A national priority system is used to evaluate and rank each airport project. Those projects with the highest priority are given preference in funding.

Vision 100 expired on September 30, 2007. Currently (September 2008), the United States Congress has not passed a reauthorization or long term AIP program. The federal government has been operating on a series of continuing resolutions which allows the continued collection of aviation taxes at 2007 levels. Both the Senate and House of Representatives have considered legislation reauthorizing the

AIP program and reestablishing the Aviation Trust Fund; however, Senate and House versions vary and neither bill has been passed. While different in make-up, both bills retained the fundamentals of the current program for eligibility and matching levels. Therefore, the CIP assumes a similar funding system will be in place through the planning period of this Master Plan.

Primary Entitlement Funds

AIP provides funding for eligible projects at airports through an entitlement program. Primary commercial service airports receive a guaranteed minimum of federal assistance each year, based on their enplaned passenger levels and Congressional appropriation levels. A primary airport is defined as any commercial service airport enplaning at least 10,000 passengers annually.

Under the entitlement formula, airports enplaning 10,000 or more passengers annually will receive the higher of $1.0 million or an amount based upon the entitlement formula. The entitlement formula is based upon $15.60 per enplaned passenger for the first 50,000 enplanements and $10.40 per enplanement for the next 50,000 boardings. The next 400,000 enplanements provide $5.20 each, and an airport receives $1.30 for the next 500,000 boardings.

As previously discussed, scheduled commercial airline service ceased operations at Lake Havasu City Municipal Airport in May 2007. Prior to this time, annual enplanement levels had historically been below 10,000. Only in 2004 did enplanements exceed 10,000. In the event that the airport regains commercial airline service, the projected forecast does anticipate adequate demand in the area to reach the 10,000 annual enplanement mark by the intermediate term of the Master Plan. If that were the case, the airport could expect to receive annual entitlements of $1.0 million.

Non-Primary Entitlement Funds

Funds are distributed each year by the FAA from appropriations by Congress. As mentioned above, a portion of the annual distribution is to primary commercial service airports based upon enplanement levels. For those airports that do not meet the criteria for a primary commercial service airport, eligible airports could receive up to $150,000 of funding each year in Non-Primary Entitlement (NPE) funds. Eligible airports comprise those that are included in the *National Plan of Integrated Airport Systems* (NPIAS). Lake Havasu City Municipal Airport is currently eligible for full NPE funding.

Discretionary Funds

In a number of cases, airports face major projects that will require funds in excess of the airport's annual non-primary entitlements. Thus, additional funds from discretionary apportionments under AIP become desirable. The primary feature about discretionary funds is that they are distributed on a priority basis. These priorities are established by the FAA, utilizing a priority code system. Under this system, projects are ranked by their purpose. Projects ensuring airport safety and security are ranked as the most important priorities, followed by maintaining current infrastructure development, mitigating noise and other environmental impacts, meeting standards, and increasing system capacity.

Whereas entitlement monies are guaranteed on an annual basis, discretionary funds are not assured. If the combination of entitlement and discretionary funds does not provide enough capital for planned development, projects would either be delayed or require funding from the airport's revenue or other authorized sources, such as those described in the following subsections.

Passenger Facility Charges

The *Aviation Safety and Capacity Expansion Act of 1990* contained a provision for airports to levy passenger facility charges (PFCs) for the purposes of enhancing airport safety, capacity, security, or to reduce noise or enhance competition.

Title 14 of the Code of Federal Regulations (CFR) Part 158 of May 29, 1991, establishes the regulations that must be followed by airports choosing to levy PFCs. Passenger facility charges may be imposed by public agencies controlling a commercial service airport with at least 2,500 annual passengers with scheduled service. Authorized agencies were allowed to impose a charge of $1.00, $2.00, or $3.00 per enplaned passenger. Legislation (*AIR-21*) passed in 2000 allowed the cap to increase to $4.50, which remains the current cap level.

Prior approval is required from the Department of Transportation (DOT) before an airport is allowed to levy a PFC. The DOT must find that the projected revenues are needed for specific, approved projects. Any AIP-eligible project, whether development or planning related, is eligible for PFC funding. Gates and related areas for the movement of passengers and baggage are eligible, as are on-airport ground access projects. Any project approved must preserve or enhance safety, security, or capacity; reduce/mitigate noise impacts; or enhance competition among carriers.

PFCs must be used only on approved projects. However, PFCs can be utilized to fund 100 percent of a project. They may also be used as matching funds for AIP grants or to augment AIP-funded projects. PFCs can be used for debt service and financing costs of bonds for eligible airport development. These funds may also be commingled with general revenue for bond debt service. Before submitting a PFC application, the airport must give notice and an opportunity for consultation with airlines operating at the airport.

PFCs are to be treated similar to other airport improvement grants, rather than as airport revenues, and are administered by the FAA. Airlines retain up to 11 cents per passenger for collecting PFCs. It should also be noted that only revenue passengers pay PFCs. Non-revenue passengers such as those using frequent flier rewards or airline personnel are counted as enplanements, but do not generate PFCs.

STATE FUNDING PROGRAM

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

Under the State of Arizona's grant program, an airport can receive funding for one-half (currently 2.5 percent) of the local share of projects receiving federal AIP funding. The state also provides 90 percent funding for projects which are typically not eligible for federal AIP funding or have not received federal funding. The maximum amount the state can grant for any single airport project is ten percent of the annual Aviation Fund amount. In recent history, the total annual Aviation Fund amount was approximately $20 million.

It should be noted that due to recent budget shortfalls, limitations have been placed on state funding programs. This has directly impacted the State's Aviation Fund, as the amount of money dedicated to airport improvements has been significantly reduced. It is projected that the Aviation Fund will return to normal levels within the next few years as the State's budget improves.

State Airport Loan Program

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

There are three ways in which the loan funds can be used: Grant Advance, Matching Funds, or Revenue-Generating Projects. The Grant Advance loan funds are provided when the airport can demonstrate the ability to accelerate the development and construction of a multi-phase project. The project(s) must be compatible with the Airport Master Plan and be included in the ADOT Five-Year Airport Development Program. The Matching Funds are provided to meet the local matching fund requirement for securing federal airport improvement grants or other federal or state grants. The Revenue-Generating funds are provided for airport-related construction projects that are not eligible for funding under another program.

Pavement Maintenance Program

The airport system in Arizona is a multi-million dollar investment of public and private funds that must be protected and preserved. State aviation fund dollars are limited and the State Transportation Board recognizes that need to protect and extend the maximum useful life of the airport system's pavement. The Arizona Pavement Preservation Program (APPP) has been established to assist in the preservation of the Arizona airport system infrastructure. Lake Havasu City Municipal Airport participates in this program.

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

The Arizona Airport Pavement Management System 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-Aeronautics ensures that the APMS database is kept current, in compliance with FAA requirements.

Every year, ADOT-Aeronautics 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-Aeronautics to participate in the APPP.

LOCAL FUNDING

The balance of project costs, after consideration has been given to grants, must be funded through local resources. Lake Havasu City Municipal Airport is operated by Lake Havasu City, and could receive some assistance from the City. The goal for the operation of the airport is to generate ample revenues to cover all operating and maintenance costs as well as the local matching share of capital expenditures. As with many airports, this is not possible and other financial methods will be needed.

According to **Exhibit 6A**, local funding will be needed in each planning horizon. This includes $341,900 in the short term, $580,500 in the intermediate term, and $1.9 million in the long term.

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

Local funding options may also include the solicitation of private developers to construct and manage hangar facilities at the airport. This practice is currently in place at Lake Havasu City Municipal Airport. The capital improvement program has assumed that much of the landside facility development would be undertaken in this manner. Outsourcing hangar development can benefit the airport sponsor by generating land lease revenue and relieving the sponsor of operations and maintenance costs.

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

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

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

Leasehold financing refers to a developer or tenant financing improvements under a long term ground lease. The obvious advantage of such an arrangement is that it relieves the community of all responsibility for raising the capital funds for improvements. However, the private development of facilities on a ground lease, particularly on property owned by a 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.

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

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

PLAN IMPLEMENTATION

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

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

The real value of a usable Master Plan is in keeping the issues and objectives in the minds of the managers and decision-makers so that they are better able to recognize change and its effect. In addition to adjustments in aviation demand, decisions made as to when to undertake the improvements recommended in this Master Plan will impact the period that the plan remains valid. As previously discussed, recommended improvements listed in the CIP will need to continuously be reexamined in order to determine their priority given the conditions surrounding the airport. It is likely that projects may be added or removed depending on funding, demand, and other factors. The format used in this plan is intended to reduce the need for formal and costly updates by simply adjusting the timing. Updating can be done by the manager, thereby improving the plan's effectiveness.

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

Appendix A

GLOSSARY OF TERMS

Glossary of Terms

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.

AUTOMATED 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.

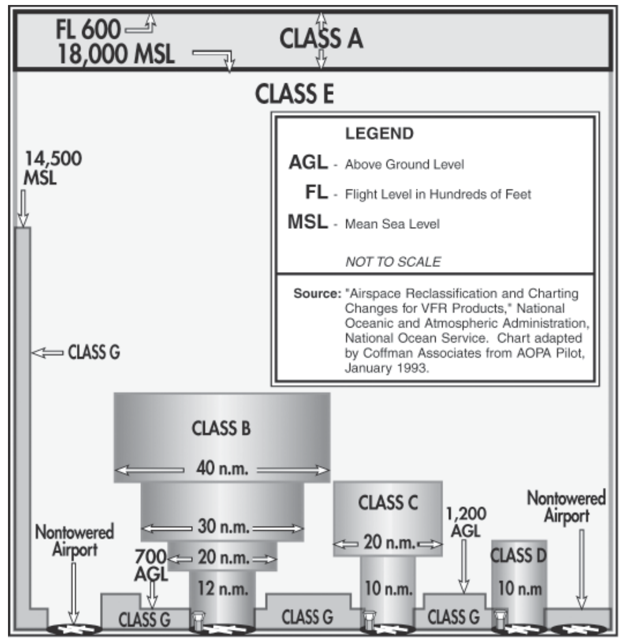
CATEGORY I: An Instrument Landing System (ILS) that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 100 feet above the horizontal plane containing the runway threshold.

CATEGORY II: An ILS that provides acceptable guidance information to an aircraft from the coverage limits of the ILS to the point at which the localizer course line intersects the glide path at a decision height of 50 feet above the horizontal plane containing the runway threshold.

CATEGORY III: An ILS that provides acceptable guidance information to a pilot from the coverage limits of the ILS with no decision height specified above the horizontal plane containing the runway threshold.

CEILING: The height above the ground surface to the location of the lowest layer of clouds which is reported as either broken or overcast.

CIRCLING APPROACH: A maneuver initiated by the pilot to align the aircraft with the runway for landing when flying a predetermined circling instrument approach under IFR.



CLASS A AIRSPACE: See Controlled Airspace.

CLASS B AIRSPACE: See Controlled Airspace.

CLASS C AIRSPACE: See Controlled Airspace.

CLASS D AIRSPACE: See Controlled Airspace.

CLASS E AIRSPACE: See Controlled Airspace.

CLASS G AIRSPACE: See Controlled Airspace.

CLEAR ZONE: See Runway Protection Zone.

COMMERCIAL SERVICE AIRPORT: A public airport providing scheduled passenger service that enplanes at least 2,500 annual passengers.

COMMON TRAFFIC ADVISORY FREQUENCY: A radio frequency identified in the appropriate aeronautical chart which is designated for the purpose of transmitting airport advisory information and procedures while operating to or from an uncontrolled airport.

COMPASS LOCATOR (LOM): A low power, low/medium frequency radio-beacon installed in conjunction with the instrument landing system at one or two of the marker sites.

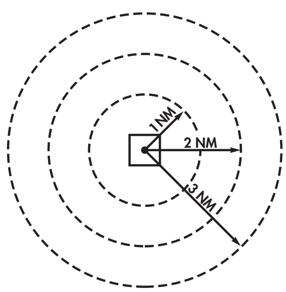
CONICAL SURFACE: An imaginary obstruction-limiting surface defined in FAR Part 77 that extends from the edge of the horizontal surface outward and upward at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

CONTROLLED AIRPORT: An airport that has an operating airport traffic control tower.

CONTROLLED AIRSPACE: Airspace of defined dimensions within which air traffic control services are provided to instrument flight rules (IFR) and visual flight rules (VFR) flights in accordance with the airspace classification. Controlled airspace in the United States is designated as follows:

- **CLASS A**: Generally, the airspace from 18,000 feet mean sea level (MSL) up to but not including flight level FL600. All persons must operate their aircraft under IFR.

- **CLASS B**: Generally, the airspace from the surface to 10,000 feet MSL surrounding the nation's busiest airports. The configuration of Class B airspace is unique to each airport, but typically consists of two or more layers of air space and is designed to contain all published instrument approach procedures to the airport. An air traffic control clearance is required for all aircraft to operate in the area.



- **CLASS C**: Generally, the airspace from the surface to 4,000 feet above the airport elevation (charted as MSL) surrounding those airports that have an operational control tower and radar approach control and are served by a qualifying number of IFR operations or passenger enplanements. Although individually tailored for each airport, Class C airspace typically consists of a surface area with a five nautical mile (nm) radius and an outer area with a 10 nautical mile radius that extends from 1,200 feet to 4,000 feet above the airport elevation. Two-way radio communication is required for all aircraft.

- **CLASS D**: Generally, that airspace from the surface to 2,500 feet above the air port elevation (charted as MSL) surrounding those airports that have an operational control tower. Class D airspace is individually tailored and configured to encompass published instrument approach 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: 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 designation for altitude within controlled airspace.

FLIGHT SERVICE STATION: An operations facility in the national flight advisory system which utilizes data interchange facilities for the collection and dissemination of Notices to Airmen, weather, and administrative data and which provides pre-flight and in-flight advisory services to pilots through air and ground based communication facilities.

FRANGIBLE NAVAID: A navigational aid which retains its structural integrity and stiffness up to a designated maximum load, but on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

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 24 satellites used as reference points to enable navigators equipped with GPS receivers to determine their latitude, longitude, and altitude.

GROUND ACCESS: The transportation system on and around the airport that provides access to and from the airport by ground transportation vehicles for passengers, employees, cargo, freight, and airport services.

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 clas- sification 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 END IDENTIFIER LIGHTS (REIL): Two synchronized flashing lights, one on each side of the runway threshold, which provide rapid and positive identification of the approach end of a particular runway.

RUNWAY GRADIENT: The average slope, measured in percent, between the two ends of a runway.

RUNWAY PROTECTION ZONE (RPZ): An area off the runway end to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape. Its dimensions are determined by the aircraft approach speed and runway approach type and minima.

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

RUNWAY VISIBILITY ZONE (RVZ): An area on the airport to be kept clear of permanent objects so that there is an unobstructed line of- site from any point five feet above the runway centerline to any point five feet above an intersecting runway centerline.

RUNWAY VISUAL RANGE (RVR): An instrumentally derived value, in feet, representing the horizontal distance a pilot can see down the runway from the runway end.

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 AIRPLANE: An airplane that has a maximum certified takeoff weight of up to 12,500 pounds.

SPECIAL-USE AIRSPACE: Airspace of defined dimensions identified by a surface area wherein activities must be confined because of their nature and/or wherein limitations may be imposed upon aircraft operations that are not a part of those activities. Special-use airspace classifications include:

- **ALERT AREA**: Airspace which may contain a high volume of pilot training activities or an unusual type of aerial activity, neither of which is hazardous to aircraft.

- **CONTROLLED FIRING AREA**: Airspace wherein activities are conducted under conditions so controlled as to eliminate hazards to nonparticipating aircraft and to ensure the safety of persons or property on the ground.

- **MILITARY OPERATIONS AREA (MOA)**: Designated airspace with defined vertical and lateral dimensions established outside Class A airspace to separate/segregate certain military activities from instrument flight rule (IFR) traffic and to identify for visual flight rule (VFR) traffic where these activities are conducted.

- **PROHIBITED AREA**: Designated airspace within which the flight of aircraft is prohibited.

- **RESTRICTED AREA**: Airspace designated under Federal Aviation Regulation (FAR) 73, within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated joint use. When not in use by the using agency, IFR/VFR operations can be authorized by the controlling air traffic control facility.

- **WARNING AREA**: Airspace which may contain hazards to nonparticipating aircraft.

STANDARD INSTRUMENT DEPARTURE (SID): A preplanned coded air traffic control IFR departure routing, preprinted for pilot use in graphic and textual form only.

STANDARD 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 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.

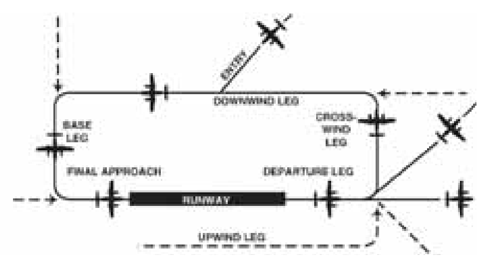
TOUCHDOWN AND LIFT-OFF AREA (TLOF): A load bearing, generally paved area, normally centered in the FATO, on which the helicopter lands or takes off.

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.



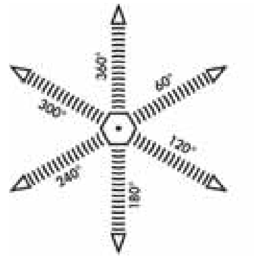
U

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 (100L)

AWOS: automated 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 ILS outer marker

LORAN: long range navigation

MALS: midium 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

REIL: runway end identifier lighting

RNAV: area navigation

RPZ: runway protection zone

RSA: runway safety area

RTR: remote transmitter/receiver

RVR: runway visibility range

RVZ: runway visibility zone

SALS: short approach lighting system

SASP: state aviation system plan

SEL: sound exposure level

SID: standard instrument departure

SM: statute mile (5,280 feet)

SRE: snow removal equipment

SSALF: simplified short approach lighting system with 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

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

AIRPORT LAYOUT DRAWINGS

Appendix B
AIRPORT LAYOUT DRAWINGS

Per Federal Aviation Administration (FAA) requirements, an official Airport Layout Plan (ALP) has been developed for Lake Havasu City Municipal Airport. The ALP is used in part by the FAA to determine funding eligibility for future development projects.

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

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

Airport Layout Plan (Sheet 1 of 9) – The Airport Layout Plan graphically presents the existing and ultimate airport layout and provides airport, runway, and wind data.

Terminal Area Drawings (Sheets 2 and 3 of 9) – The Terminal Area Drawings provide greater detail concerning landside improvements on the north and south sides of the airport and at a larger scale than on the Airport Layout Plan.

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. The Airport Airspace Drawing is intended to aid local authorities in determining if proposed development could present a hazard to the airport and obstruct the approach path to a runway end. These plans should be coordinated with local land use planners.

Inner Portion of the Approach Surface Drawing (Sheet 5 of 9) – The Inner Portion of the Approach Surface Drawings are scaled drawings of the runway protection zone (RPZ), runway safety area (RSA), obstacle free zone (OFZ), and object free area (OFA) for each runway end. A plan and profile view of each RPZ is provided to facilitate identification of obstructions that lie within these safety areas. Detailed obstruction and facility data is provided to identify planned improvements and the disposition of obstructions as appropriate.

Approach Surface Profile Drawing (Sheet 6 of 9) – The Approach Surface Profile Drawing provides both plan and profile views of 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.

Departure Surface Drawing (Sheet 7 of 9) – The Departure Surface Drawing provides information as it relates to the 40:1 departure surface on each runway end.

On-Airport Land Use Drawing (Sheet 8 of 9) – The On-Airport Land Use Drawing is a graphic depiction of the land use recommendations. When development is proposed, it should be directed to the appropriate land use area depicted on this plan.

Airport Property Map (Sheet 9 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 Airport Property Map.

ALP DISCLAIMER

The ALP drawing set has been developed in accordance with accepted FAA and Arizona Department of Transportation (ADOT) – Aeronautics Group standards; however, the ALP drawing set included in Appendix B has not yet been officially approved by FAA. The ALP drawing set has undergone revisions per comments received from FAA and the attached drawings reflect those changes.

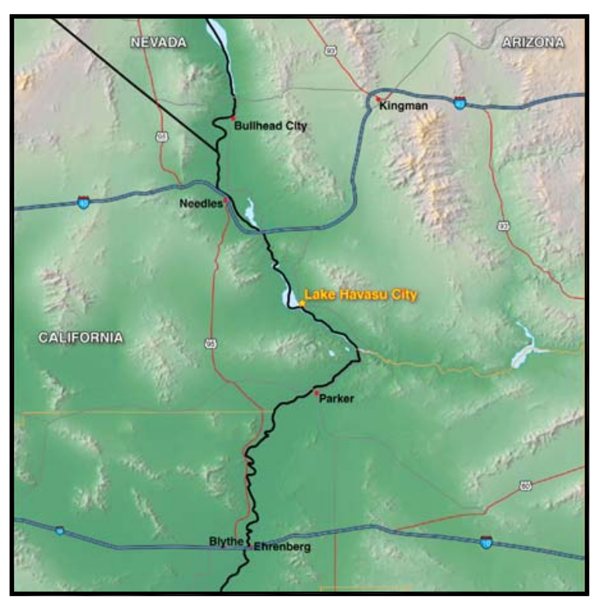
As detailed in the 2009 Master Plan Report, based upon the operational and physical characteristics of those aircraft currently utilizing Lake Havasu City Municipal Airport, the airport's existing ARC is B-II. The Master Plan calls for an ultimate ARC C/D-II designation for Lake Havasu City Municipal Airport. Per direction from FAA, the ALP identifies Lake Havasu City Municipal Airport as an existing and ultimate ARC C-III airport to reflect the designation on the previously approved 2003 ALP.

AIRPORT MASTER PLAN

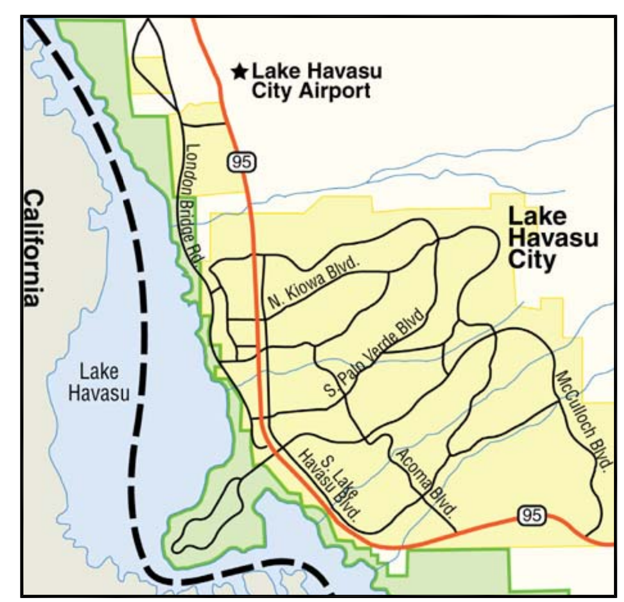
LAKE HAVASU CITY MUNICIPAL AIRPORT

AIRPORT LAYOUT PLAN SET

INDEX OF DRAWINGS



VICINITY MAP



LOCATION MAP

PREPARED FOR
LAKE HAVASU CITY, ARIZONA

Coffman Associates
Airport Consultants

RUNWAY DATA

RUNWAY DATA	RUNWAY 14-32 EXISTING 14	EXISTING 32	ULTIMATE 14	ULTIMATE 32
AIRCRAFT APPROACH CATEGORY-DESIGN GROUP	C-III*		C-III*	
FAR PART 77 CATEGORY	VISUAL	VISUAL	NONPREC	NONPREC
APPROACH VISIBILITY MINIMUMS	+1 Mile	+1 Mile	1 Mile	3/4 Mile
DESIGN CRITICAL AIRCRAFT	Global Express		SAME	
WINGSPAN OF DESIGN AIRCRAFT	94' 6"		SAME	
UNDERCARRIAGE WIDTH OF DESIGN AIRCRAFT	13' 9"		SAME	
APPROACH SPEED (KNOTS) OF DESIGN AIRCRAFT	126		SAME	
MAXIMUM CERTIFIED TAKEOFF WEIGHT (LBS) OF DESIGN AIRCRAFT	99,500		SAME	
RUNWAY EFFECTIVE GRADIENT	0.4%		SAME	
RUNWAY MAXIMUM GRADIENT	0.4%		SAME	
PAVEMENT DESIGN STRENGTH (in thousand lbs.)[1]	100(S)		SAME	
APPROACH SLOPE	20:1	20:1	34:1	34:1
RUNWAY END ELEVATION (MSL)	749.1'	783.0'	SAME	SAME
RUNWAY TOUCHDOWN ZONE ELEVATION (MSL)	759.4'	783.0'	SAME	SAME
RUNWAY HIGH POINT ELEVATION (MSL)	783.0'		SAME	
RUNWAY LOW POINT ELEVATION (MSL)	749.1'		SAME	
LINE OF SIGHT REQUIREMENT MET	YES		SAME	
RUNWAY LENGTH	8001.0'		SAME	
RUNWAY WIDTH	100'		SAME	
RUNWAY BEARING (TRUE)	149.64°	329.65°	SAME	SAME
RUNWAY SAFETY AREA LENGTH BEYOND STOP END OF RUNWAY	1000'	1000'	SAME	SAME
RUNWAY SAFETY AREA WIDTH	500'		SAME	
RUNWAY OBJECT FREE AREA LENGTH BEYOND STOP END OF RUNWAY	1000'	1000'	SAME	SAME
RUNWAY OBJECT FREE AREA WIDTH	800'		SAME	
RUNWAY OBSTACLE FREE ZONE LENGTH BEYOND RUNWAY END	200'	200'	SAME	SAME
RUNWAY OBSTACLE FREE ZONE WIDTH	400'		SAME	
DISTANCE FROM RUNWAY CENTERLINE TO HOLD BARS AND SIGNS	250'		SAME	
RUNWAY MARKING	NP	NP	SAME	SAME
STANDARD SEPARATION - RUNWAY CL TO PARALLEL TAXIWAY CL	340'		400'	
STANDARD SEPARATION - TAXIWAY CL TO FIXED OR MOVABLE OBJECT	93'		SAME	
RUNWAY SURFACE/PAVEMENT MATERIAL	Asphalt		SAME	
RUNWAY PAVEMENT SURFACE TREATMENT	None		SAME	
RUNWAY LIGHTING	MIRL		MIRL	
TAXIWAY WIDTH	35'-70'		SAME	
TAXIWAY SURFACE MATERIAL	Asphalt		SAME	
TAXIWAY OBJECT FREE AREA WIDTH	186'		SAME	
TAXIWAY SAFETY AREA WIDTH	118'		SAME	
TAXIWAY WINGTIP CLEARANCE	34'		SAME	
TAXIWAY MARKING	Centerline		SAME	
TAXIWAY LIGHTING	MITL		SAME	
RUNWAY NAVIGATIONAL AIDS	GPS		SAME	
RUNWAY VISUAL AIDS	Airport Beacon PAPIs-4 REILS Segmented Circle Wind Cone		SAME SAME SAME SAME SAME MALS (32)	

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

*Per direction from FAA, the ALP identifies Lake Havasu City Municipal Airport as an Existing and Ultimate ARC C-III airport to reflect the designation on the previously approved 2003 ALP. The ARC C-III designation does not reflect 500 annual operations by the critical aircraft.

DEVIATIONS FROM FAA AIRPORT DESIGN STANDARDS

DEVIATION DESCRIPTION	EFFECTED DESIGN STANDARD	STANDARD	EXISTING	PROPOSED DISPOSITION
TAXIWAY "A" SEPARATION	C-III STANDARD SEPARATION	400' FROM RUNWAY CL	340' FROM RUNWAY CL	SEE GENERAL NOTE #15

ALL WEATHER WIND COVERAGE

Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 14-32	91.30%	95.70%	99.01%	99.79%

IFR CAT-I WIND COVERAGE

Runway	10.5 Knots	13 Knots	16 Knots	20 Knots
Runway 14-32	85.71%	85.71%	87.60%	97.13%

AIRPORT DATA

LAKE HAVASU MUNICIPAL AIRPORT (HII)

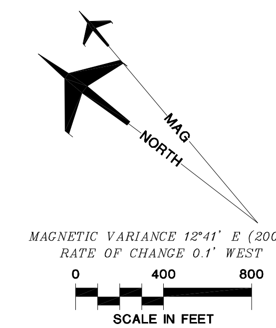
OWNER: LAKE HAVASU CITY, ARIZONA	AIRPORT NPIAS CODE: COMMERCIAL
CITY: LAKE HAVASU CITY, ARIZONA	COUNTY: MOHAVE
RANGE: R 20 W	TOWNSHIP: T 14 N

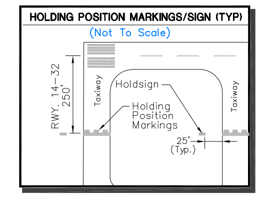
		EXISTING	ULTIMATE
AIRPORT REFERENCE CODE		C-III*	C-III*
AIRPORT ELEVATION (MSL)		783.0'	SAME
MEAN MAXIMUM TEMPERATURE OF HOTTEST MONTH		108.0° F JULY	SAME
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	Latitude	34° 34' 16.0000" N	SAME
	Longitude	114° 21' 29.8000" W	SAME
AIRPORT NAVAIDS		Airport Beacon PAPI-4s REILS Segmented Circle Wind Cone	Airport Beacon PAPI-4s REILS Segmented Circle Wind Cone MALS (32)
GPS AT AIRPORT		YES	YES

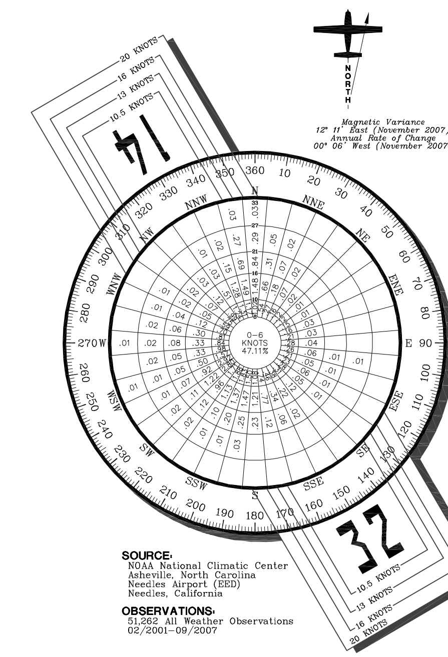
*Per direction from FAA, the ALP identifies Lake Havasu City Municipal Airport as an Existing and Ultimate ARC C-III airport to reflect the designation on the previously approved 2003 ALP. The ARC C-III designation does not reflect 500 annual operations by the critical aircraft.

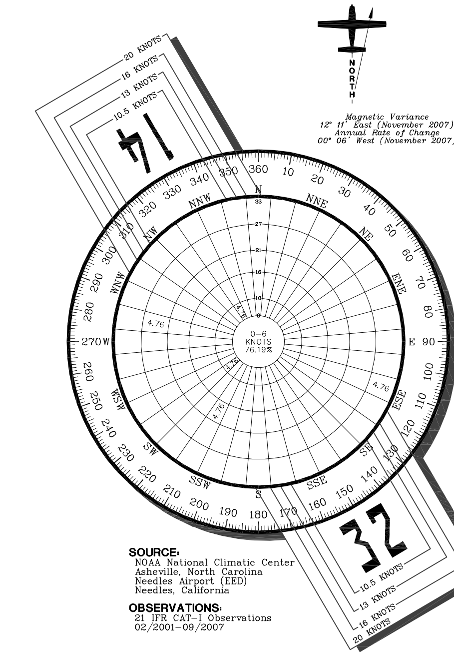
RUNWAY END COORDINATES (NAD 83)

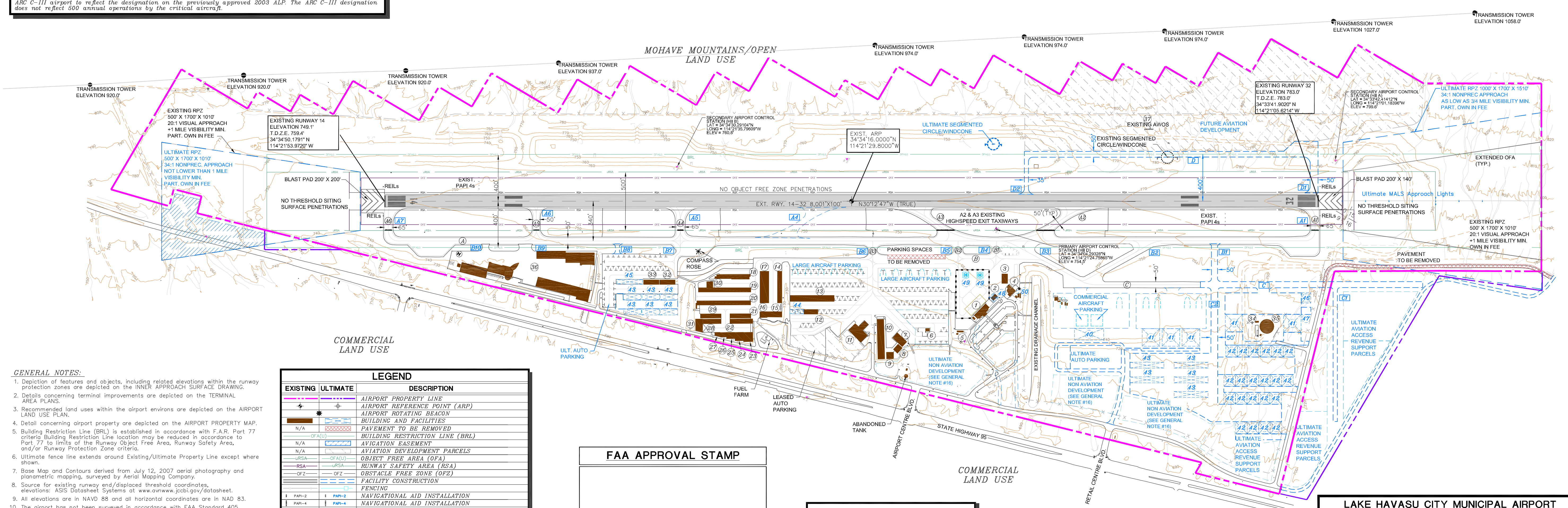
RUNWAY		EXISTING	ULTIMATE
Runway 14	Latitude	34°34'50.1791"N	SAME
	Longitude	114°21'53.9720"W	SAME
Runway 32	Latitude	34°33'41.9020"N	SAME
	Longitude	114°21'05.6214"W	SAME











GENERAL NOTES:

1. Depiction of features and objects, including related elevations within the runway protection zones are depicted on the INNER APPROACH SURFACE DRAWING.
2. Details concerning terminal improvements are depicted on the TERMINAL AREA PLANS.
3. Recommended land uses within the airport environs are depicted on the AIRPORT LAND USE PLAN.
4. Detail concerning airport property are depicted on the AIRPORT PROPERTY MAP.
5. Building Restriction Line (BRL) is established in accordance with F.A.R. Part 77 criteria Building Restriction Line location may be reduced in accordance to Part 77 to limits of the Runway Object Free Area, Runway Safety Area, and/or Runway Protection Zone criteria.
6. Ultimate fence line extends around Existing/Ultimate Property Line except where shown.
7. Base Map and Contours derived from July 12, 2007 aerial photography and planametric mapping, surveyed by Aerial Mapping Company.
8. Source for existing runway end/displaced threshold coordinates, elevations: ASIS Datasheet Systems at www.avnwww.jccbi.gov/datasheet.
9. All elevations are in NAVD 88 and all horizontal coordinates are in NAD 83.
10. The airport has not been surveyed in accordance with FAA Standard 405.
11. No threshold siting surface object penetrations.
12. All survey monuments enclosed in concrete casings.
13. Ultimate Taxiway A4 will be a high speed exit taxiway only.
14. All auto parking is for aeronautical use.
15. The design and construction of Taxiway A was funded by AIP-02. The 340' separation distance between Runway 14-32 and Taxiway A (centerline to centerline) was approved during the design phase under AIP-02 due to site terrain constraints.
16. Due to steep terrain, aeronautical development is not economically feasible. Per the original Bureau of Land Management Deed, the land is to be developed for airport purposes. FAA approval of this Airport Layout Plan (ALP) does not constitute approval for nonaeronautical use of the parcel. Use of land for nonaeronautical purposes is subject to separate FAA approval and release from Federal Obligations.

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING AND FACILITIES
N/A		PAVEMENT TO BE REMOVED
OFA(U)		BUILDING RESTRICTION LINE (BRL)
N/A		AVIGATION EASEMENT
N/A		AVIATION DEVELOPMENT PARCELS
uRSA	OFA(U)	OBJECT FREE AREA (OFA)
RSA	uRSA	RUNWAY SAFETY AREA (RSA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		FACILITY CONSTRUCTION
		FENCING
PAPI-2	PAPI-2	NAVIGATIONAL AID INSTALLATION
PAPI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		MALS
		RUNWAY PROTECTION ZONE (RPZ)
		SEGMENTED CIRCLE/LIGHTED WIND TEE
		WIND INDICATOR (Lighted)
1080		TOPOGRAPHIC CONTOURS
34 35 / 3 2		SECTION CORNER
B	B	TAXIWAY DESIGNATION
		PRIMARY AIRPORT CONTROL STATION (PACS)
		SECONDARY AIRPORT CONTROL STATION (SACS)
		HOLD POSITION MARKINGS
H	H	HELIPAD
		AUTOMATED WEATHER OBSERVATION STATION (AWOS)

FAA APPROVAL STAMP

SUBMITTED BY:
Coffman Associates

FOR APPROVAL BY:

APPROVED BY: ON THE DATE OF:

Airport Manager

No.	REVISIONS	DATE	BY	APP'D.
2	ALP REVALIDATION	4/2003	-	-
1	ALP UPDATES	5/2000	-	-

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LAKE HAVASU CITY MUNICIPAL AIRPORT

AIRPORT LAYOUT PLAN

DRAFT

LAKE HAVASU CITY, ARIZONA

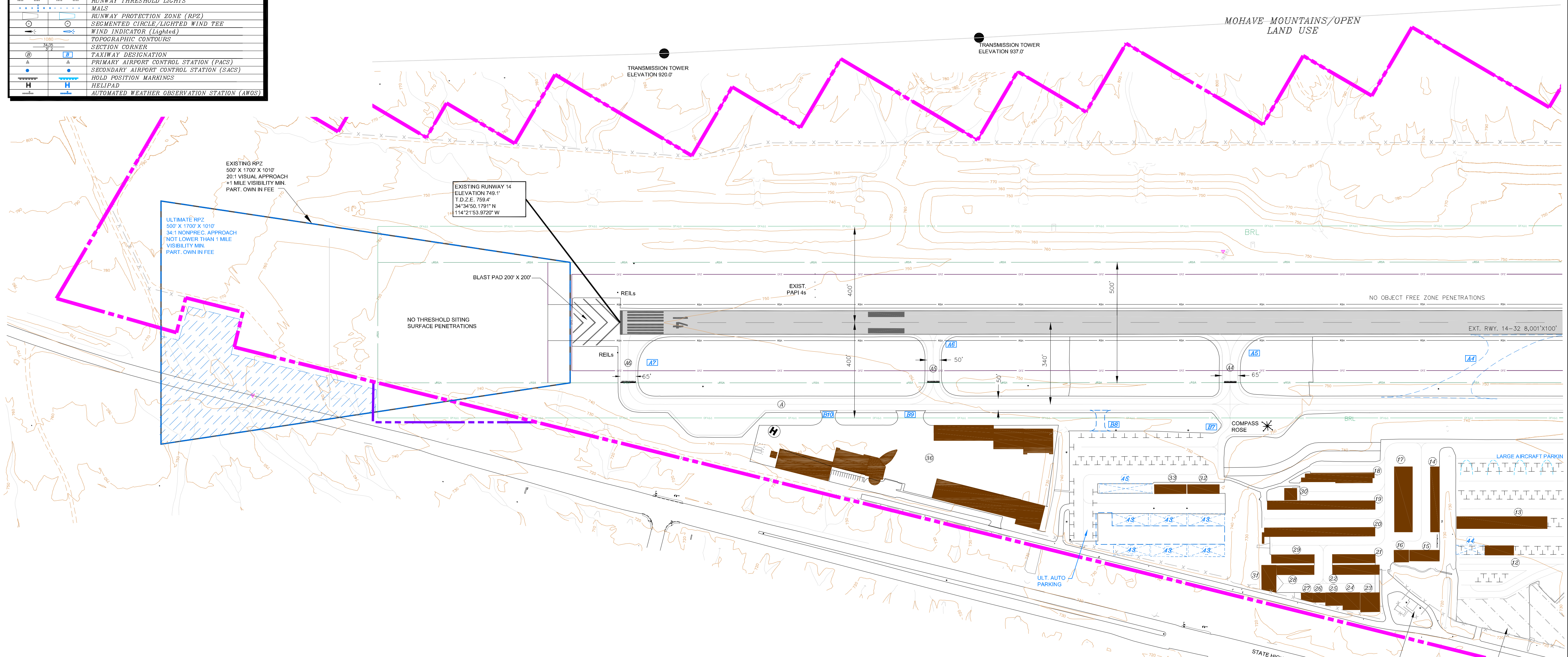
PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.
March 24, 2010 SHEET 1 OF 9

Coffman Associates
Airport Consultants
www.coffmanassociates.com

Coffman Associates D:\Cad\CAD\Havasu\2010\01 HII ALP 3 24 2010.dwg Printed Date: 3-31-10 09:38:01 AM Margaret Beaver

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING AND FACILITIES
N/A		PAVEMENT TO BE REMOVED
OFA(U)		BUILDING RESTRICTION LINE (BRL)
N/A		AVIGATION EASMENT
N/A		AVIATION DEVELOPMENT PARCELS
uRSA	OFA(U)	OBJECT FREE AREA (OFA)
RSA	uRSA	RUNWAY SAFETY AREA (RSA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		FACILITY CONSTRUCTION
		FENCING
PAPI-2	PAPI-2	NAVIGATIONAL AID INSTALLATION
PAPI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		MALS
		RUNWAY PROTECTION ZONE (RPZ)
		SEGMENTED CIRCLE/LIGHTED WIND TEE
		WIND INDICATOR (Lighted)
1080		TOPOGRAPHIC CONTOURS
34 35 / 3 2		SECTION CORNER
B	B	TAXIWAY DESIGNATION
		PRIMARY AIRPORT CONTROL STATION (PACS)
		SECONDARY AIRPORT CONTROL STATION (SACS)
		HOLD POSITION MARKINGS
H	H	HELIPAD
		AUTOMATED WEATHER OBSERVATION STATION (AWOS)



COMMERCIAL LAND USE

BUILDINGS/FACILITIES

EXISTING	DESCRIPTION	EL.
1	TERMINAL BUILDING	771.9'
2	AIRPORT OPERATION VEHICLE PARKING	763.6'
3	AIR EVAC SHADE HANGAR	774.5'
4	CITY FIRE STATION #6	771.1'
5	AIRPORT MAINTENANCE BUILDING	759.3'
6	FUEL FARM	768.0'
7	D2 AERO GENERAL SERVICES	762.3'
8	D2 AERO GENERAL SERVICES	759.3'
9	D2 AERO GENERAL SERVICES	759.8'
10	D2 AERO GENERAL SERVICES	766.4'
11	DESERT SKIES EXECUTIVE AIR TERMINAL	764.0'
12	SHADE HANGAR	742.9'
13	SHADE HANGAR	747.4'
14	BOX HANGARS	752.5'
15	EXECUTIVE HANGARS	759.4'
16	EXECUTIVE HANGARS	756.5'
17	BOX HANGARS	755.5'
18	STORAGE HANGARS	755.5'
19	STORAGE HANGARS	750.1'

BUILDINGS/FACILITIES

EXISTING	DESCRIPTION	EL.
20	STORAGE HANGARS	750.2'
21	STORAGE HANGARS	749.8'
22	STORAGE HANGARS	762.6'
23	EXECUTIVE HANGARS	762.9'
24	EXECUTIVE HANGARS	765.3'
25	EXECUTIVE HANGARS	763.4'
26	EXECUTIVE HANGARS	762.7'
27	EXECUTIVE HANGARS	758.3'
28	STORAGE HANGARS	736.4'
29	STORAGE HANGARS	749.1'
30	STORAGE HANGARS	758.9'
31	STORAGE HANGARS	763.1'
32	BOX HANGARS	771.8'
33	BOX HANGAR	770.7'
34	PUMP HOUSE	740.5'
35	TANK	764.9'
36	HAVASU AIR CENTER/CONVENTIONAL HANGARS	768.0'
37	AUTOMATED WEATHER OBSERVATION STATION (AWOS)	822.0'

BUILDINGS/FACILITIES

ULTIMATE	DESCRIPTION	EL.
40	TERMINAL BUILDING	750.2'
41	CONVENTIONAL HANGARS	749.8'
42	EXECUTIVE HANGAR	762.6'
43	T-HANGARS	762.9'
44	SHADE HANGARS	765.3'
45	BOX HANGARS	763.4'
46	PERMANENT MAINTENANCE BUILDING	762.7'
47	AIRCRAFT WASH RACK	758.3'
48	AIR TRAFFIC CONTROL TOWER (ACTC) (if necessary)	736.4'
49	HELICOPTER HARDSTANDS	749.1'
50	ELECTRICAL VAULT	748.2"

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

DRAFT

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LAKE HAVASU CITY MUNICIPAL AIRPORT

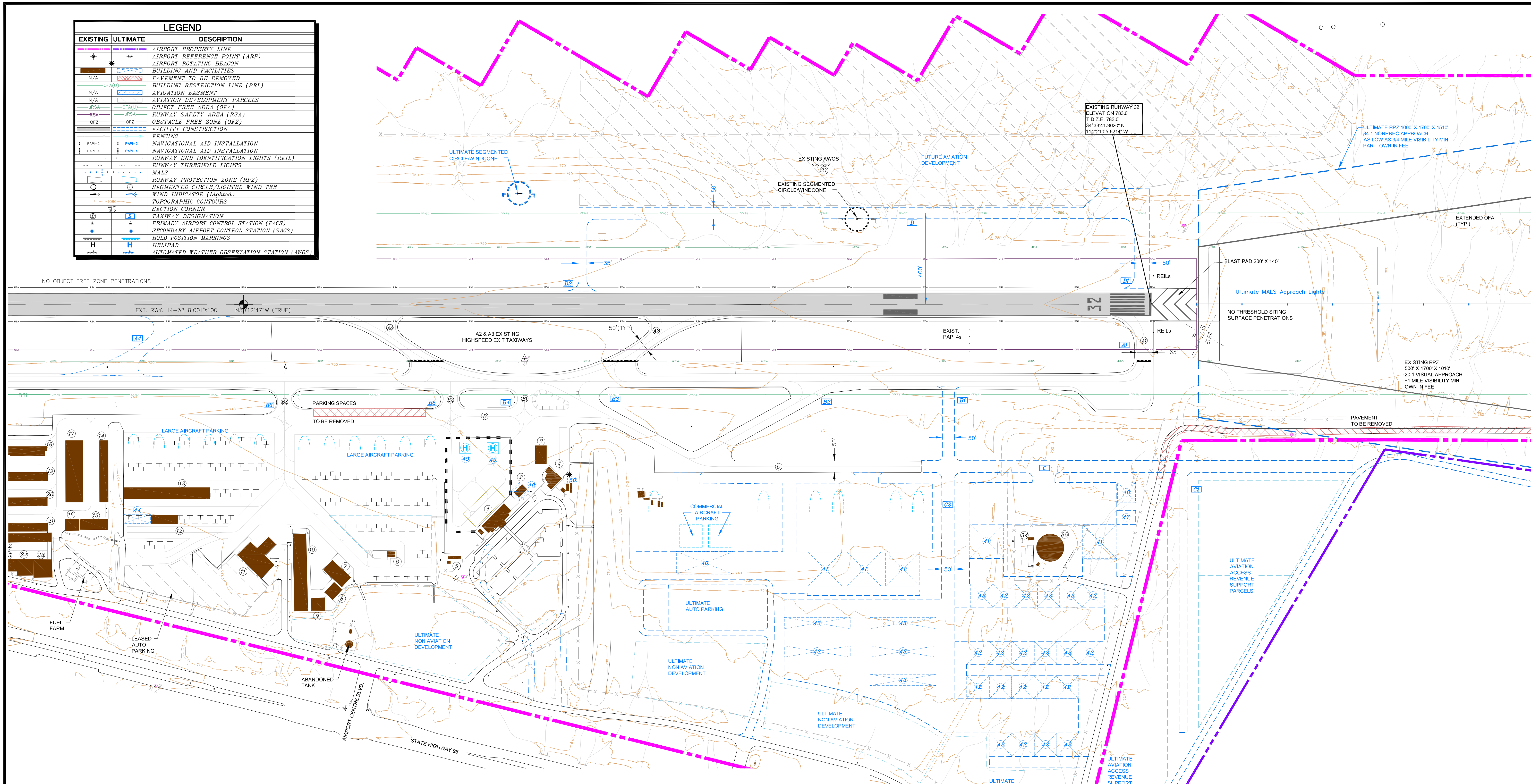
NORTH TERMINAL AREA PLAN

LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.

March 24, 2010

Coffman Associates
Airport Consultants
www.coffmanassociates.com



LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING AND FACILITIES
N/A		PAVEMENT TO BE REMOVED
OFA(U)		BUILDING RESTRICTION LINE (BRL)
N/A		AVIGATION EASMENT
N/A		AVIATION DEVELOPMENT PARCELS
uRSA	OFA(U)	OBJECT FREE AREA (OFA)
RSA	uRSA	RUNWAY SAFETY AREA (RSA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		FACILITY CONSTRUCTION
		FENCING
PAPI-2	PAPI-2	NAVIGATIONAL AID INSTALLATION
PAPI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		MALS
		RUNWAY PROTECTION ZONE (RPZ)
		SEGMENTED CIRCLE/LIGHTED WIND TEE
		WIND INDICATOR (Lighted)
1080		TOPOGRAPHIC CONTOURS
34 35 / 3 2		SECTION CORNER
B	B	TAXIWAY DESIGNATION
		PRIMARY AIRPORT CONTROL STATION (PACS)
		SECONDARY AIRPORT CONTROL STATION (SACS)
		HOLD POSITION MARKINGS
H	H	HELIPAD
		AUTOMATED WEATHER OBSERVATION STATION (AWOS)

BUILDINGS/FACILITIES

EXISTING	DESCRIPTION	EL.
1	TERMINAL BUILDING	771.9'
2	AIRPORT OPERATION VEHICLE PARKING	763.6'
3	AIR EVAC SHADE HANGAR	774.5'
4	CITY FIRE STATION #6	771.1'
5	AIRPORT MAINTENANCE BUILDING	759.3'
6	FUEL FARM	768.0'
7	D2 AERO GENERAL SERVICES	762.3'
8	D2 AERO GENERAL SERVICES	759.3'
9	D2 AERO GENERAL SERVICES	759.8'
10	D2 AERO GENERAL SERVICES	766.4'
11	DESERT SKIES EXECUTIVE AIR TERMINAL	764.0'
12	SHADE HANGAR	742.9'
13	SHADE HANGAR	747.4'
14	BOX HANGARS	752.5'
15	EXECUTIVE HANGARS	759.4'
16	EXECUTIVE HANGARS	756.5'
17	BOX HANGARS	755.5'
18	STORAGE HANGARS	755.5'
19	STORAGE HANGARS	750.1'

BUILDINGS/FACILITIES

EXISTING	DESCRIPTION	EL.
20	STORAGE HANGARS	750.2'
21	STORAGE HANGARS	749.8'
22	STORAGE HANGARS	762.6'
23	EXECUTIVE HANGARS	762.9'
24	EXECUTIVE HANGARS	765.3'
25	EXECUTIVE HANGARS	763.4'
26	EXECUTIVE HANGARS	762.7'
27	EXECUTIVE HANGARS	758.3'
28	STORAGE HANGARS	736.4'
29	STORAGE HANGARS	749.1'
30	STORAGE HANGARS	758.9'
31	STORAGE HANGARS	763.1'
32	BOX HANGARS	771.8'
33	BOX HANGAR	770.7'
34	PUMP HOUSE	740.5'
35	TANK	764.9'
36	HAVASU AIR CENTER/CONVENTIONAL HANGARS	768.0'
37	AUTOMATED WEATHER OBSERVATION STATION (AWOS)	822.0'

BUILDINGS/FACILITIES

ULTIMATE	DESCRIPTION	EL.
40	TERMINAL BUILDING	750.2'
41	CONVENTIONAL HANGARS	749.8'
42	EXECUTIVE HANGAR	762.6'
43	T-HANGARS	762.9'
44	SHADE HANGARS	765.3'
45	BOX HANGARS	763.4'
46	PERMANENT MAINTENANCE BUILDING	762.7'
47	AIRCRAFT WASH RACK	758.3'
48	AIR TRAFFIC CONTROL TOWER (ACTC) (if necessary)	736.4'
49	HELICOPTER HARDSTANDS	749.1'
50	ELECTRICAL VAULT	748.2"

DRAFT

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

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LAKE HAVASU CITY MUNICIPAL AIRPORT

SOUTH TERMINAL AREA PLAN

LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.

March 24, 2010 | SHEET 3 OF 9

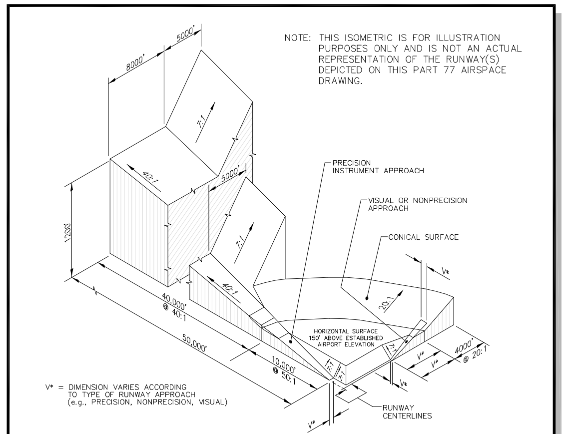
Coffman Associates
Airport Consultants
www.coffmanassociates.com

Coffman Associates D:\Cad\CAD\Havasu\2010\03 HII SOUTH TAP 3 24 2010.dwg Printed Date: 3-31-10 09:41:28 AM Margaret Beaver

OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. Transmission Tower	974'	Approach	930.7'	43.3'	Obs. Light
2. Transmission Tower	903'	Approach	885'	18'	Obs. Light
3. Transmission Tower	920'	Transition	864'	56'	Obs. Light
4. Bush	790'	Primary	747'	43'	①
5. O.L. on Windsock	762'	Primary	747'	15'	To Remain Lighted
6. O.L. on Floodlight	817'	Transition	776'	41'	To Remain Lighted
7. O.L. on Windsock	803'	Primary	763'	40	To Remain Lighted
8. Bush	790'	Primary	764'	26'	①
9. Transmission Tower	937'	Transition	919'	18'	Obs. Light
10. Bush	825'	Transition	774'	51'	①
11. Bush	818'	Primary	775'	43'	①
12. Bush	819'	Primary	778'	41'	①
13. Bush	840'	Primary	780'	60'	①
14. Transmission Tower	974'	Horizontal	930.7'	43.3'	Obs. Light
15. Transmission Tower	1027'	Horizontal	930.7'	96.3'	Obs. Light
16. O.L. on Trans. Tower	1058'	Horizontal	930.7'	127.3'	To Remain Lighted
17. O.L. Antenna	1368'	Conical	951'	417'	To Remain Lighted
18. Bush	1035'	Approach	1006'	29'	①
19. Terrain	1314'	Horizontal	930.7'	383.3'	①
20. Terrain	1133'	Horizontal	930.7'	202.3'	①
21. Terrain	1103'	Horizontal	930.7'	172.3'	①
22. Terrain	1154'	Horizontal	930.7'	223.3'	①
23. Terrain	1255'	Horizontal	930.7'	324.3'	①
24. Terrain	1035'	Horizontal	930.7'	104.3'	①
25. Bush	1077'	Horizontal	930.7'	146.3'	①
26. Terrain	1326'	Horizontal	930.7'	395.3'	①
27. O.L. Pole	1429'	Horizontal	930.7'	498.3'	To Remain Lighted
28. Bush	1321'	Horizontal	930.7'	390.3'	①
29. Terrain	986'	Horizontal	930.7'	55.3'	①
30. Terrain	1157'	Horizontal	930.7'	226.3'	①
31. Terrain	1195'	Horizontal	930.7'	264.3'	①
32. Terrain	1278'	Horizontal	930.7'	347.3'	①
33. Terrain	1053'	Horizontal	930.7'	122.3'	①
34. Terrain	1020'	Horizontal	930.7'	89.3'	①
35. Bush	1098'	Horizontal	930.7'	167.3'	①
36. Bush	1233'	Horizontal	930.7'	302.3'	①
37. Terrain	1046'	Horizontal	930.7'	115.3'	①
38. Terrain	1092'	Horizontal	930.7'	161.3'	①
39. Post	1006'	Horizontal	930.7'	75.3'	①
40. Terrain	1435'	Horizontal	930.7'	504.3'	①
41. Terrain	1405'	Horizontal	930.7'	474.3'	①
42. Terrain	1164'	Horizontal	930.7'	233.3'	①
43. O.L. Pole	1512'	Horizontal	930.7'	581.3'	To Remain Lighted
44. Terrain	800'	Approach	795'	5'	To Be Removed
45. Terrain	931'+	Conical	Varies	Varies	①
46. Hangar	766'	Primary	744'	22'	①

① Request FAA Aeronautical Study.



ISOMETRIC VIEW OF SECTION THRU CENTERLINE OF RUNWAYS

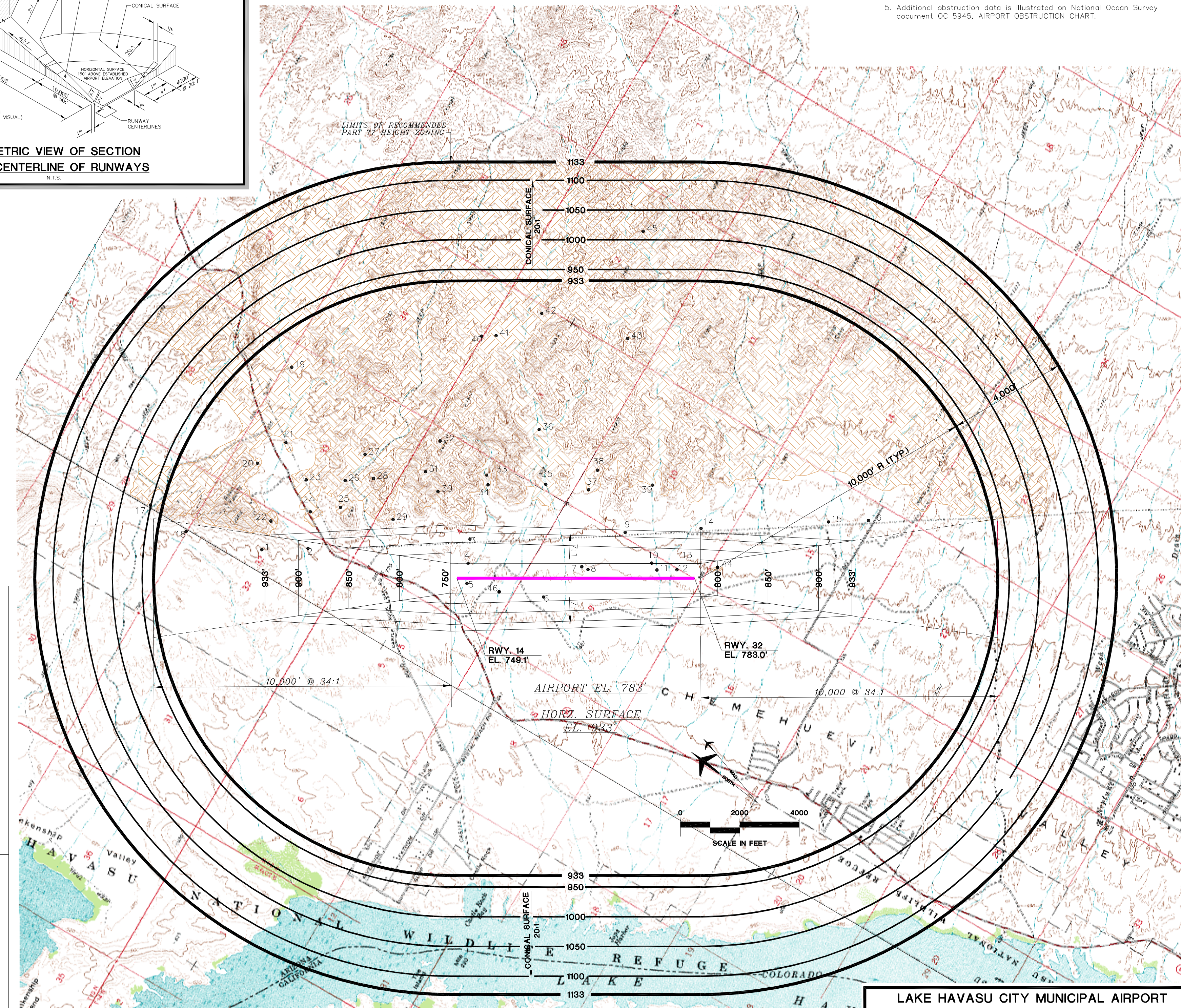
N.T.S.

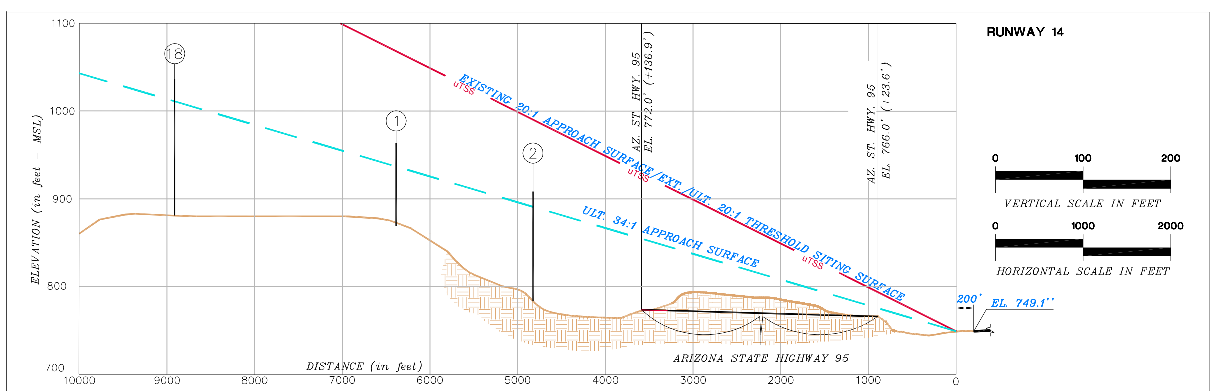
OBSTRUCTION LEGEND

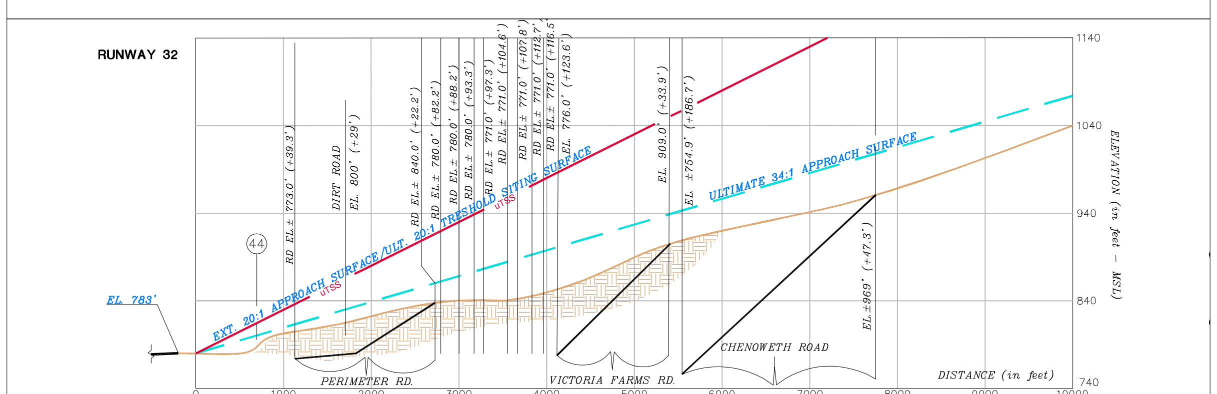
- OBSTRUCTION
- GROUP or MULTIPLE OBSTRUCTIONS

GENERAL NOTES:

1. Obstructions, clearances, and locations are calculated from ultimate runway end elevations and ultimate approach surfaces, unless otherwise noted.
2. Depiction of features and objects within the primary, transitional, and horizontal Part 77 surfaces, are illustrated on the AIRPORT AIRSPACE PLAN, this sheet.
3. Depiction of features and objects within the inner portion of the approach surfaces, are illustrated on the PROTECTION ZONES PLAN, Sheet 6 of these plans.
4. Depiction of features and objects within the outer portion of the approach surfaces, are illustrated on the APPROACH ZONES PROFILES, Sheet 5 of these plans.
5. Additional obstruction data is illustrated on National Ocean Survey document OC 5945, AIRPORT OBSTRUCTION CHART.







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

DRAFT

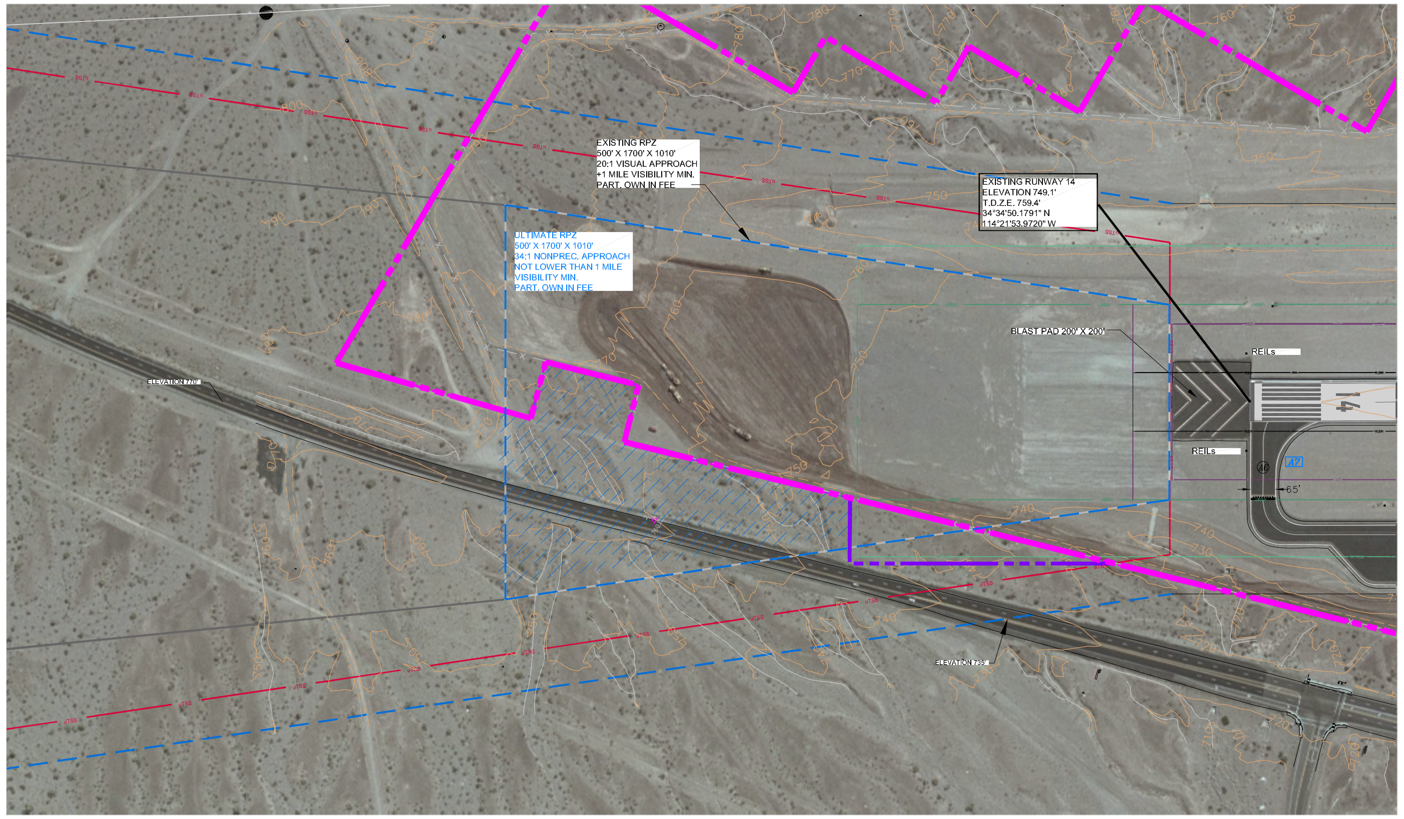
"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

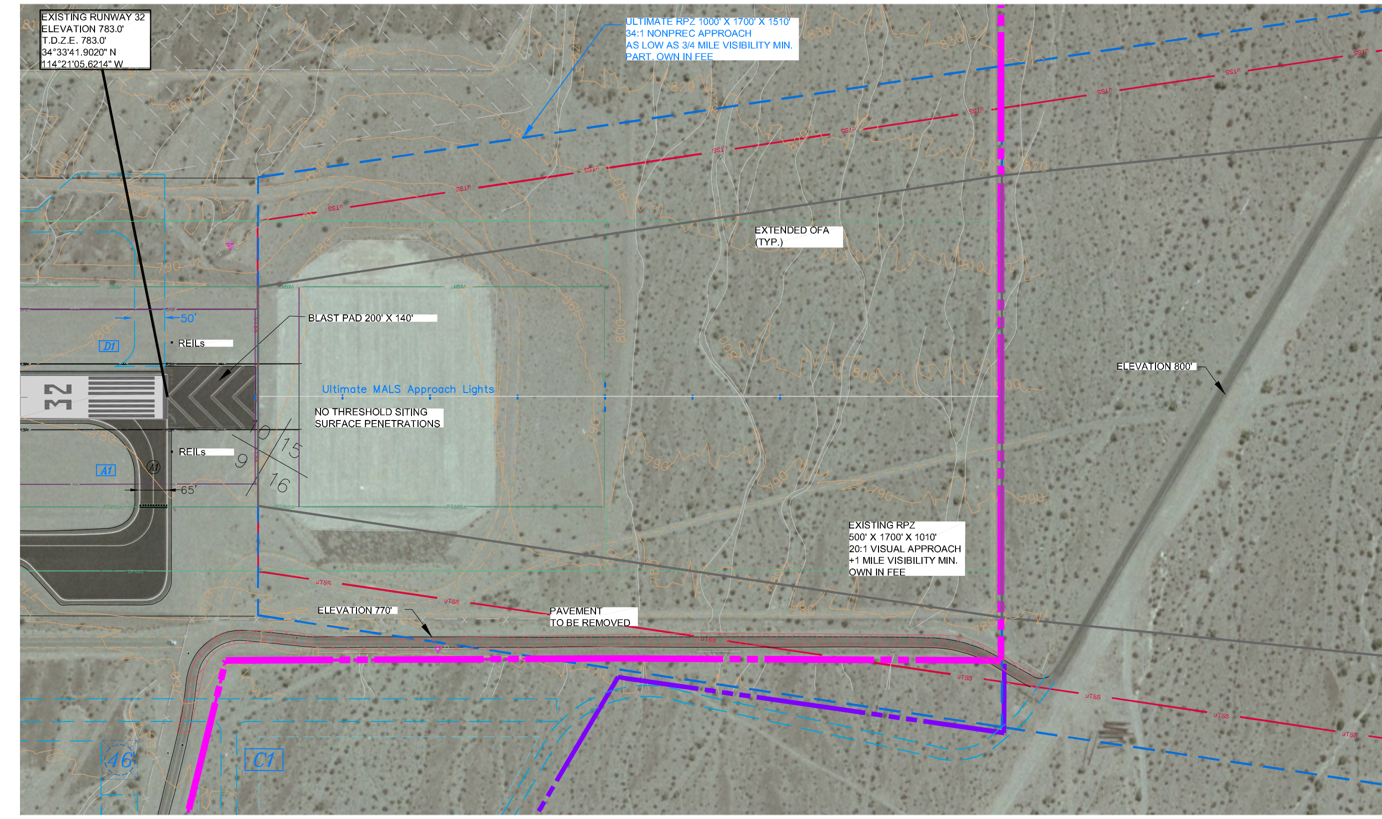
LAKE HAVASU CITY MUNICIPAL AIRPORT
AIRPORT AIRSPACE DRAWING
LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.

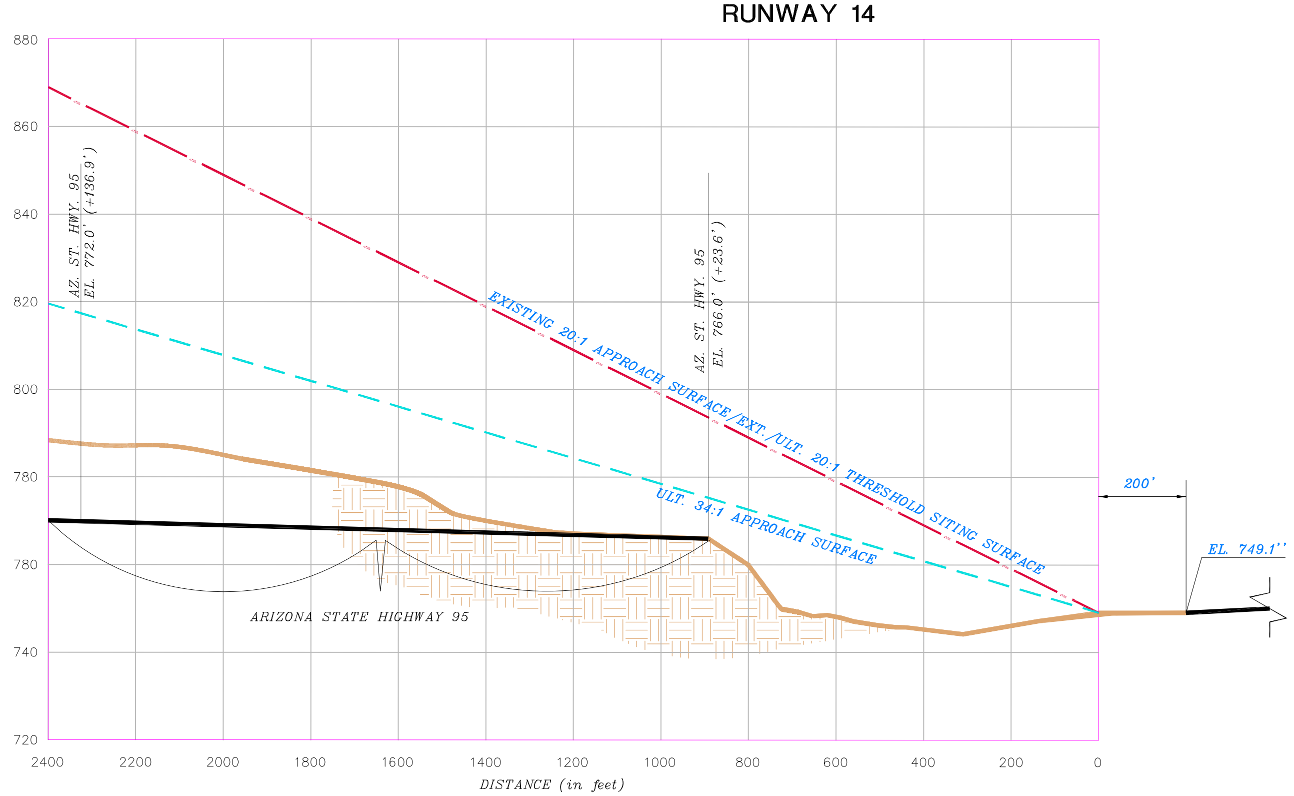
March 24, 2010 — SHEET 4 OF 9

Coffman Associates Airport Consultants www.coffmanassociates.com

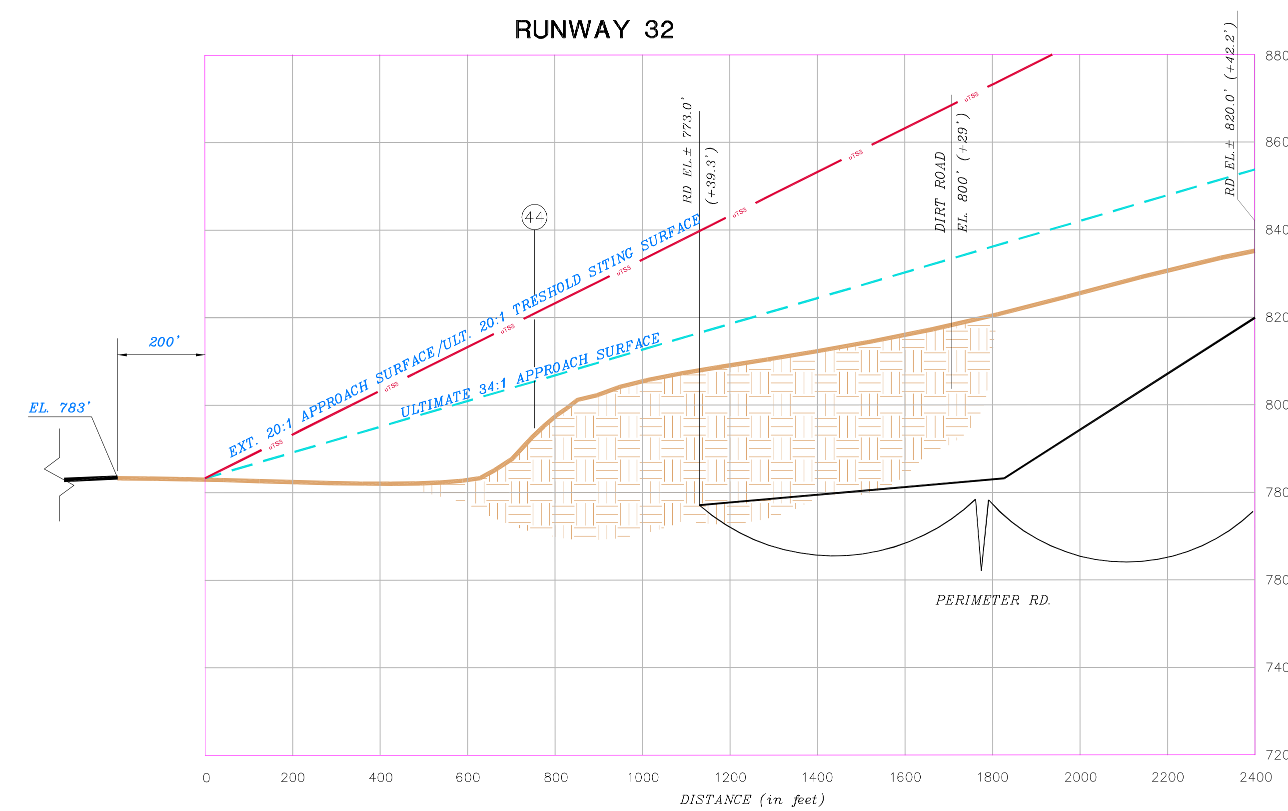




RUNWAY 14



RUNWAY 32



OBSTRUCTION TABLE					
Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. Transmission Tower	974'	Approach	930.7'	43.3'	Obs. Light
2. Transmission Tower	903'	Approach	885'	18'	Obs. Light
18. Bush	1035'	Approach	1006'	29'	(1)
44. Terrain	800'	Approach	795'	5'	To Be Removed

0 20 40
VERTICAL SCALE IN FEET

0 200 400
HORIZONTAL SCALE IN FEET

DRAFT

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

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

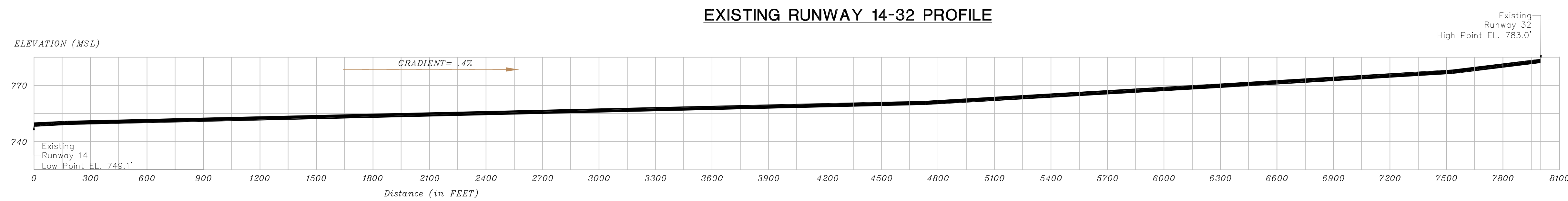
LAKE HAVASU CITY MUNICIPAL AIRPORT
INNER PORTION OF THE RUNWAY 14-32 APPROACH SURFACE DRAWING
LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.

March 24, 2010 SHEET 5 OF 9

Coffman Associates
Airport Consultants
www.coffmanassociates.com

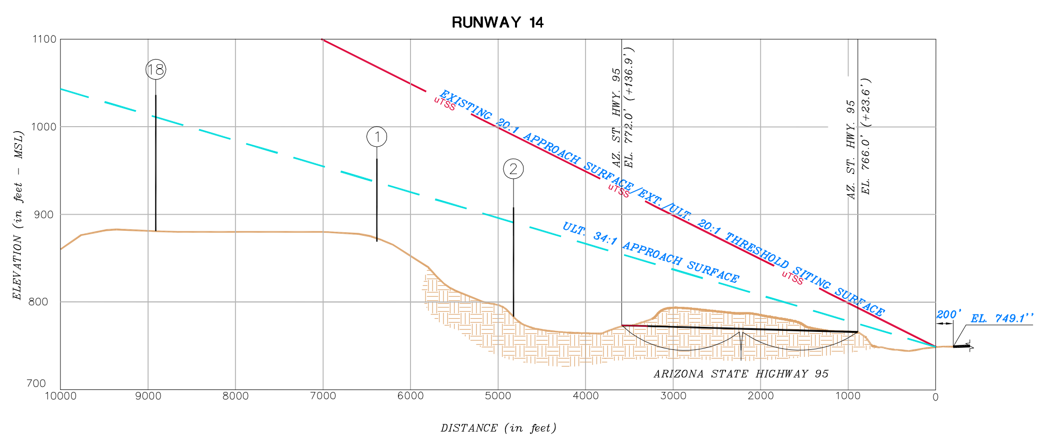
EXISTING RUNWAY 14-32 PROFILE



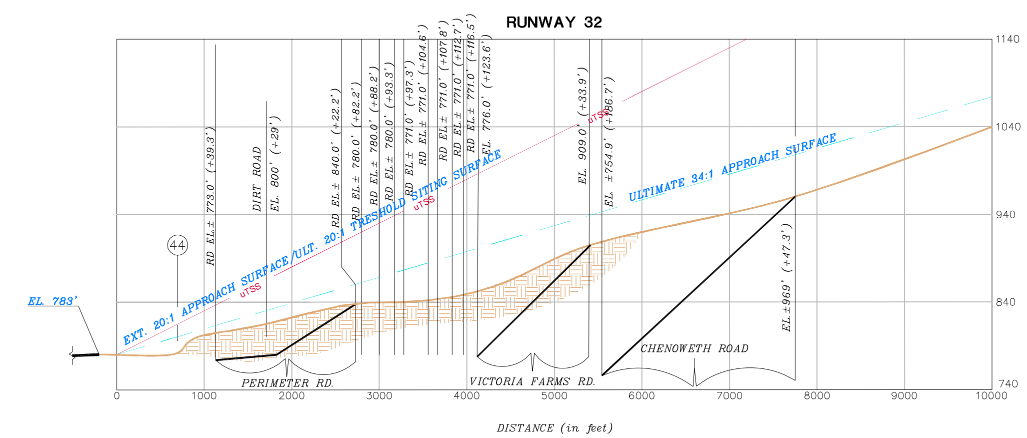
VERTICAL SCALE IN FEET (0, 30, 60)

HORIZONTAL SCALE IN FEET (0, 300, 600)

RUNWAY 14



RUNWAY 32



VERTICAL SCALE IN FEET (0, 100, 200)

HORIZONTAL SCALE IN FEET (0, 1000, 2000)

OBSTRUCTION TABLE

Object Description	Object Elevation	Obstructed Part 77 Surface	Surface Elevation	Object Penetration	Proposed Object Disposition
1. Transmission Tower	974'	Approach	930.7'	43.3'	Obs. Light
2. Transmission Tower	903'	Approach	885'	18'	Obs. Light
18. Bush	1035'	Approach	1006'	29'	(1)
44. Terrain	800'	Approach	795'	5'	To Be Removed

DRAFT

No.	REVISIONS	DATE	BY	APP'D

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LAKE HAVASU CITY MUNICIPAL AIRPORT

RUNWAY 14-32 PROFILE & OUTER APPROACH SURFACE DRAWING

LAKE HAVASU CITY, ARIZONA

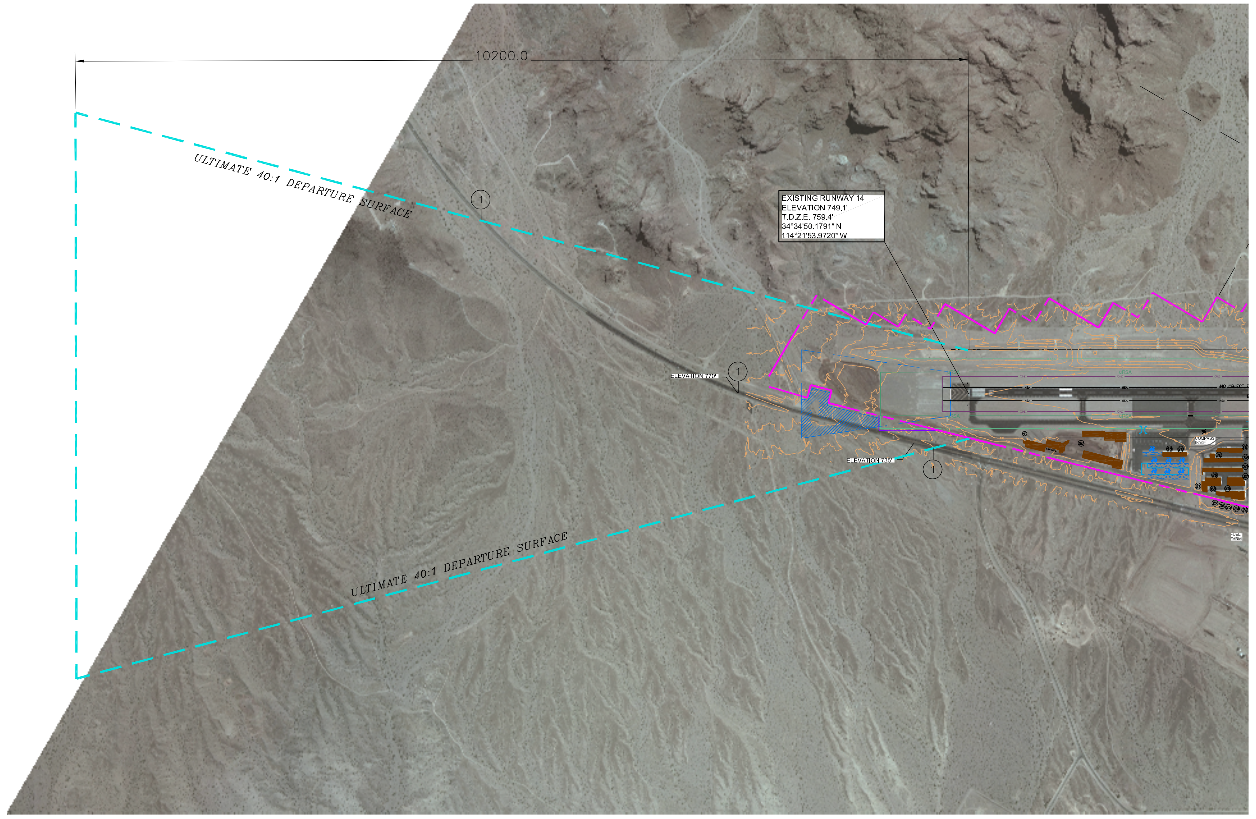
PLANNED BY: Matt Quick

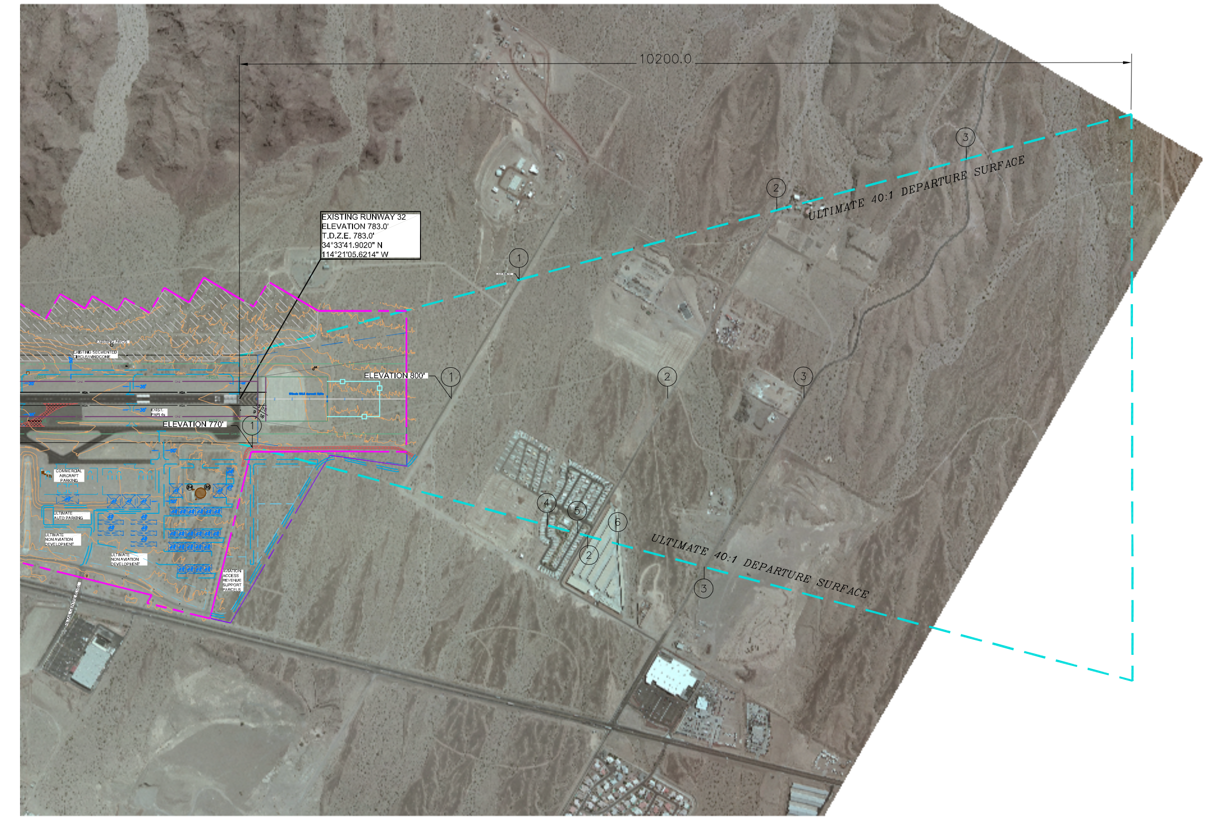
DETAILED BY: Maggie Beaver

APPROVED BY: James M. Harris, P. E.

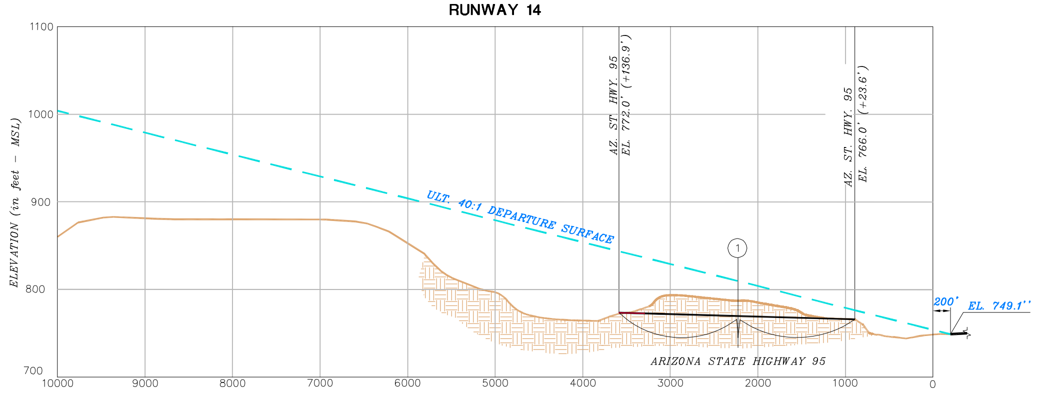
March 24, 2010 SHEET 6 OF 9

Coffman Associates Airport Consultants www.coffmanassociates.com

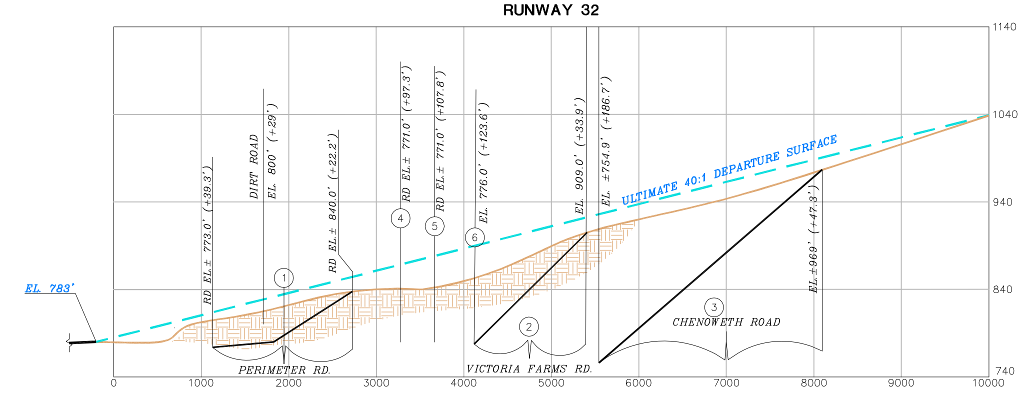


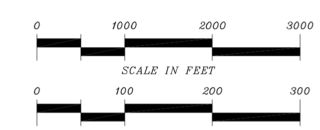


RUNWAY 14



RUNWAY 32





OBSTACLE IDENTIFICATION SURFACE (OIS)

Object Description/Elevation	40:1 Departure Surface		Obstacle Clearance Requirements (Remove, Relocate, or Lower Object)
	Elevation	Penetrations	
– 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. Standard in AC 150/5300-13 CHG 11 Appendix 2, Runway End Siting Requirements are not appliable for identifying objects affecting navigable airspace. See CFR Part 77 Title 14.
3. Roads and Buildings Clearance of more than 50 feet AGL are not detail in Departure Surface Profiles.

DRAFT

No.	REVISIONS	DATE	BY	APP'D.
	–	–	–	–
	–	–	–	–

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LAKE HAVASU CITY MUNICIPAL AIRPORT

DEPARTURE SURFACE DRAWING

LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.

March 24, 2010 — SHEET 7 OF 9

Coffman Associates
Airport Consultants
www.coffmanassociates.com

LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING AND FACILITIES
N/A		PAVEMENT TO BE REMOVED
OFA(U)		BUILDING RESTRICTION LINE (BRL)
N/A		AVIGATION EASMENT
N/A		AVIATION DEVELOPMENT PARCELS
uRSA	OFA(U)	OBJECT FREE AREA (OFA)
RSA	uRSA	RUNWAY SAFETY AREA (RSA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		FACILITY CONSTRUCTION
		FENCING
PAPI-2	PAPI-2	NAVIGATIONAL AID INSTALLATION
PAPI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		MALS
		RUNWAY PROTECTION ZONE (RPZ)
		SEGMENTED CIRCLE/LIGHTED WIND TEE
		WIND INDICATOR (Lighted)
1080		TOPOGRAPHIC CONTOURS
34 35 / 3 2		SECTION CORNER
(B)	B	TAXIWAY DESIGNATION
		PRIMARY AIRPORT CONTROL STATION (PACS)
		SECONDARY AIRPORT CONTROL STATION (SACS)
		HOLD POSITION MARKINGS
H	H	HELIPAD
		AUTOMATED WEATHER OBSERVATION STATION (AWOS)

ON-AIRPORT LAND USE LEGEND

AO	AIRFIELD OPERATIONS (± 381.84 ACRES)
GA	GENERAL AVIATION (± 71.95 ACRES)
ARS	AVIATION RELATED REVENUE SUPPORT (± 136.42 ACRES)
NRS	NON-AVIATION REVENUE SUPPORT (± 20.50 ACRES)
COM	COMMERCIAL (± 14.55 ACRES)
75	DNL NOISE CONTOURS

BASE MAP: AERIAL PHOTO TAKEN JULY 2007

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

DRAFT

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LAKE HAVASU CITY MUNICIPAL AIRPORT

ON-AIRPORT LAND USE DRAWING

LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.

March 24, 2010 — SHEET 8 OF 9

Coffman Associates
Airport Consultants
www.coffmanassociates.com

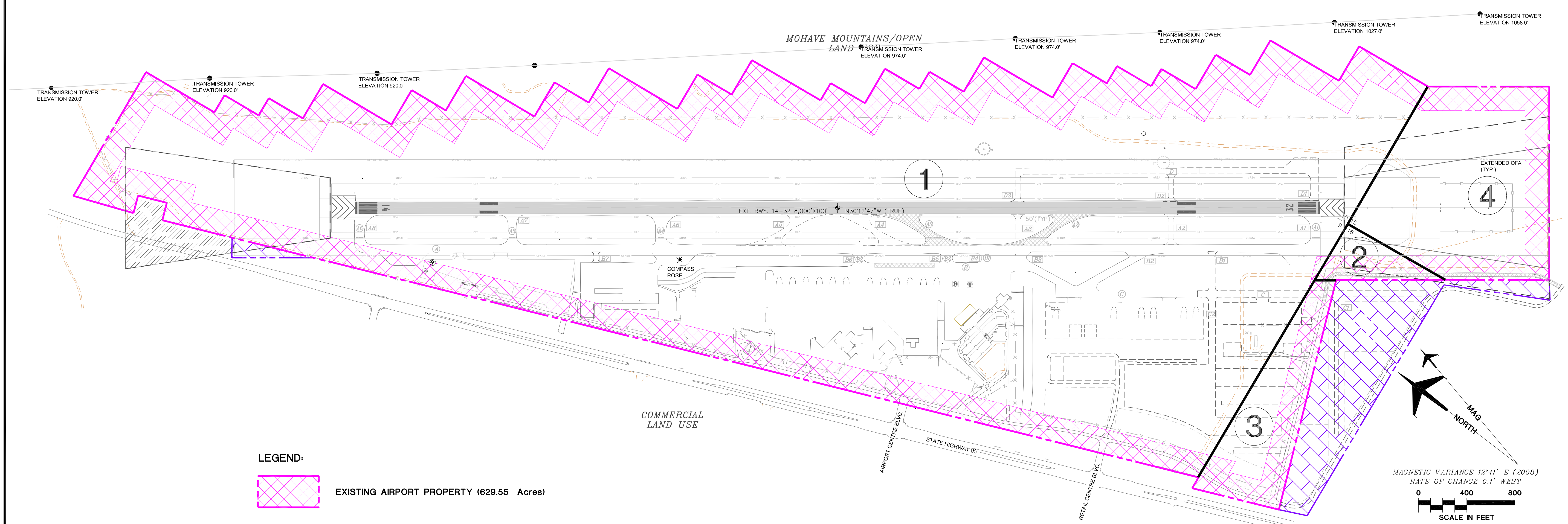
LEGEND

EXISTING	ULTIMATE	DESCRIPTION
		AIRPORT PROPERTY LINE
		AIRPORT REFERENCE POINT (ARP)
		AIRPORT ROTATING BEACON
		BUILDING AND FACILITIES
N/A		PAVEMENT TO BE REMOVED
OFA(U)		BUILDING RESTRICTION LINE (BRL)
N/A		AVIGATION EASEMENT
N/A		AVIATION DEVELOPMENT PARCELS
uRSA	OFA(U)	OBJECT FREE AREA (OFA)
RSA	uRSA	RUNWAY SAFETY AREA (RSA)
OFZ	OFZ	OBSTACLE FREE ZONE (OFZ)
		FACILITY CONSTRUCTION
		FENCING
PAPI-2	PAPI-2	NAVIGATIONAL AID INSTALLATION
PAPI-4	PAPI-4	NAVIGATIONAL AID INSTALLATION
		RUNWAY END IDENTIFICATION LIGHTS (REIL)
		RUNWAY THRESHOLD LIGHTS
		MALS
		RUNWAY PROTECTION ZONE (RPZ)
		SEGMENTED CIRCLE/LIGHTED WIND TEE
		WIND INDICATOR (Lighted)
1080		TOPOGRAPHIC CONTOURS
34 35 / 3 2		SECTION CORNER
B	B	TAXIWAY DESIGNATION
		PRIMARY AIRPORT CONTROL STATION (PACS)
		SECONDARY AIRPORT CONTROL STATION (SACS)
		HOLD POSITION MARKINGS
H	H	HELIPAD
		AUTOMATED WEATHER OBSERVATION STATION (AWOS)

RECORDING INFORMATION (County Assessor - Mohave County, Arizona.)

Parcel	Owner:	Acreage	Date Recorded	Recording Information	Grantor/Method	Notes:
1	Lake Havasu City, AZ	±555.05	9/5/1989	Parcel # 120-01-033 Book: 1596 Page: 723/733	U.S. Government Patents	--
2	Lake Havasu City, AZ	±5.78	6/10/1999	Parcel # 120-01-037 Book: 3319 Page: 728	Poli-Gold Condemnation	FAA AIP #3-04-0071-02
3	Lake Havasu City, AZ	±20.21	12/17/1981	Parcel # 120-01-037 Book: 3319 Page: 728	Poli-Gold Condemnation	FAA AIP #3-04-0071-02
4	Lake Havasu City, AZ	±48.51	12/17/1981	Parcel # 120-03-044 Book: 768 Page: 444	State of Arizona --	FAA AIP #3-04-0071-02
5	--- ---	---	---	--- ---	-- --	--
Total Acreage	**± 629.55**					

Please note: The total acreage shown in this table is the cumulative sum of the above described parcels, whose individual. acreages were obtained from the County of Mohave, Arizona Graphic Information Systems.



LEGEND:

- EXISTING AIRPORT PROPERTY (629.55 Acres)
- PROPERTY TO BE ACQUIRED
- PARCEL LINE

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

DRAFT

"THE PREPARATION OF THESE DOCUMENTS WAS FINANCED IN PART THROUGH A PLANNING GRANT FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER SECTION 505 OF THE AIRPORT AND AIRWAY IMPROVEMENT ACT OF 1982, AS AMENDED. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THESE DOCUMENTS BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED HEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS."

LAKE HAVASU CITY MUNICIPAL AIRPORT

"EXHIBIT A" AIRPORT PROPERTY MAP

LAKE HAVASU CITY, ARIZONA

PLANNED BY: Matt Quick
DETAILED BY: Maggie Beaver
APPROVED BY: James M. Harris, P. E.

March 24, 2010 SHEET 9 OF 9

Coffman Associates Airport Consultants www.coffmanassociates.com

Coffman Associates
Airport Consultants

KANSAS CITY
(816) 524-3500

237 N.W. Blue Parkway
Suite 100
Lee's Summit, MO 64063

PHOENIX
(602) 993-6999

4835 E. Cactus Road
Suite 235
Scottsdale, AZ 85254