

AIRPORT  
MASTER  
PLAN



**BOULDER CITY**  
**MUNICIPAL AIRPORT**



# AIRPORT MASTER PLAN

## BOULDER CITY MUNICIPAL AIRPORT Boulder City, Nevada

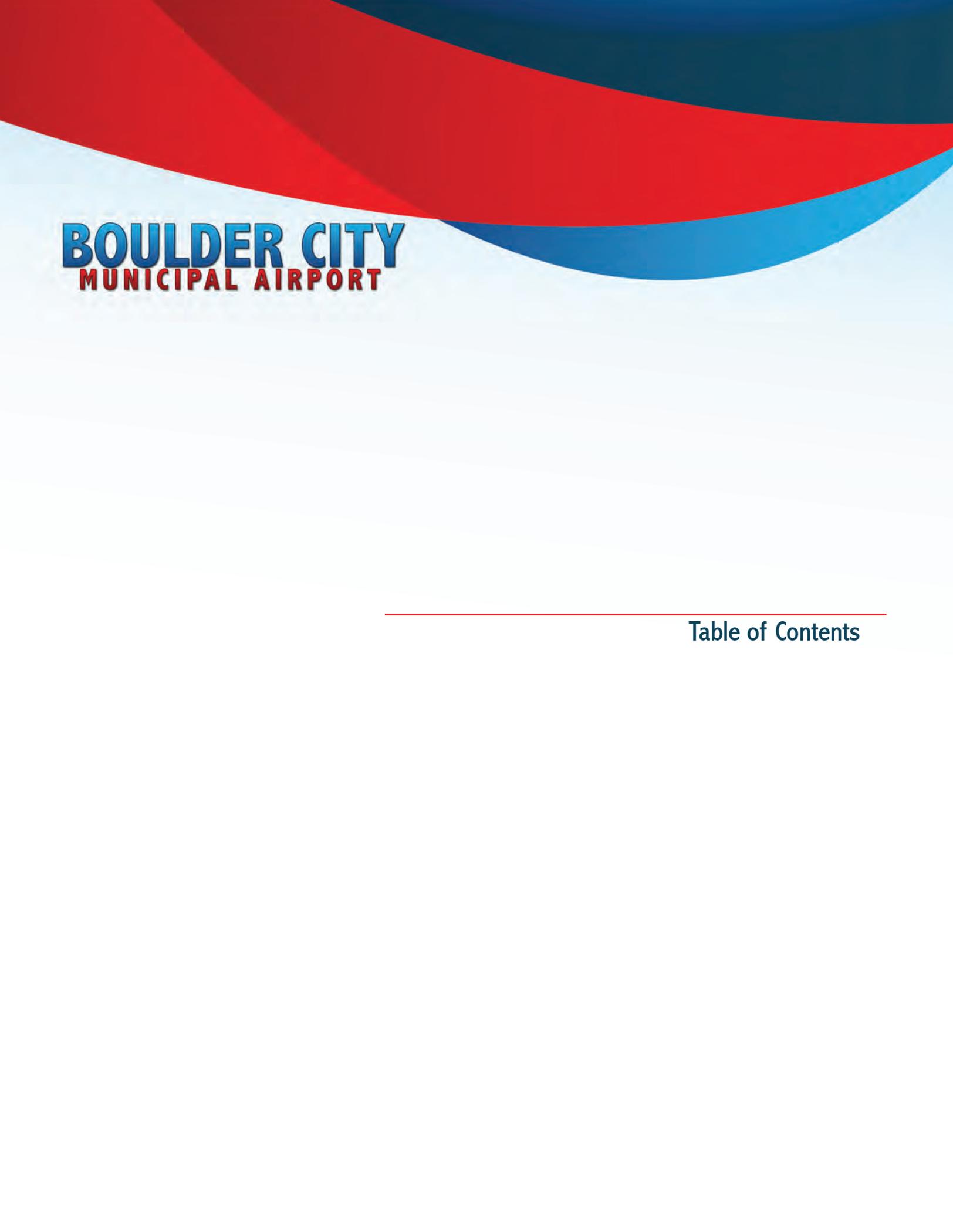
Prepared for:

The City of Boulder City

Prepared by:



October 2018



**BOULDER CITY**  
**MUNICIPAL AIRPORT**

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**BOULDER CITY**  
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Introduction

# BOULDER CITY MUNICIPAL AIRPORT



## INTRODUCTION

An Airport Master Plan is an evaluation of the airport's aviation demand and an overview of the development that will best meet those demands. The Master Plan establishes development objectives and provides for a 20-year planning period. The process entails development of rationale for various study elements to include airfield configuration, facility development, land use recommendations, and support facilities. It also serves as a strategic tool for establishing airport improvement priorities and obtaining federal and state funding assistance.

Boulder City Municipal Airport is owned and operated by the City of Boulder City, Nevada. The Airport Master Plan 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 projected demand. The ultimate goal of the Master Plan is to provide guidelines for the airport's overall maintenance, development, and operation in an environmentally and fiscally responsible manner while adhering to appropriate safety design standards.



The Federal Aviation Administration (FAA) recommends that airports update their long term planning documents every seven to ten years, or as necessary, to address local changes at the airport. This document will serve as the first Airport Master Plan for the Boulder City Municipal Airport. The preparation of this Master Plan is necessary as a timely reassessment of the development direction of Boulder City Municipal Airport that will meet the needs of a dynamic local economy, robust aviation demand, including sight-seeing operations and an ever-changing air transportation industry in general.

Boulder City has contracted with Kimley-Horn and Associates and Coffman Associates, Inc. to undertake the Master Plan. The Airport Master Plan is prepared in accordance with FAA requirements, including Advisory Circular (AC) 150/5300-13A, *Airport Design*, and AC 150/5070-6B, *Airport Master Plans*. The scope of services, budget, and schedule has been approved by Boulder City, following review by the FAA and the Nevada Department of Transportation – Aviation Planning Section (NDOT).

Boulder City is responsible for funding capital improvements at the airport and obtaining FAA and NDOT development grants. In addition, the city oversees facility enhancements and infrastructure development conducted by private entities at the airport. The Master Plan is intended to provide guidance for future development and justification for projects which the airport may receive funding participation through FAA and NDOT airport improvement programs.

Following a systematic approach outlined by the FAA, the Master Plan identifies, and then plans for, future facility needs well in advance of the actual need for the improvements. This is done to ensure that Boulder City can coordinate environmental reviews, project approvals, design, financing, and construction to minimize the detrimental effects of maintaining and operating inadequate or inefficient facilities. The output from the master planning process is a recommended development concept which outlines the proposed uses for all areas of airport property, including areas which may be required for environmental mitigation/preservation.

The preparation of this master plan is evidence that the decision-makers of Boulder City recognize the importance of air transportation to the community, as well as the unique challenges operating an airport presents. The investment in an airport yields many benefits to the community and the region. With a sound and realistic master plan, Boulder City Municipal Airport will remain 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 overall objective of the Airport Master Plan is to provide Boulder City with guidance for future development of the airport and meeting the needs of existing and future users, while also being compatible with area development, other transportation modes, and the environment. Accomplishing this objective requires an evaluation of the existing airport so as to make a determination of what actions

should be taken to maintain a safe, adequate, and reliable airport facility. The completed Airport Master Plan will produce a development concept which will provide airport officials with a program for future capital needs to aid in planning, scheduling, and budgeting.

While an Airport Master Plan must be developed according to FAA requirements, it can also be prepared in a manner which makes it useful in strategic planning for the airport. The FAA requires specific elements within a Master Plan. The elements, to be detailed in the following section, are guidelines which allow for a systematic and technical approach to reach the final recommended plan.

This Master Plan will provide a vision for the airport covering the next 20 years. With this vision, the City of Boulder City will have advance notice of potential future airport funding needs so that appropriate steps can be taken to ensure that adequate funds are budgeted and planned.

The specific goals to be considered in the Master Plan include:

- Research and evaluate socioeconomic factors likely to affect the air transportation demand in the region.
- Be reflective of the goals and visions of the surrounding area, especially those related to quality of life, business and development, and land use.
- Definition of current and future aviation demand.
- Analysis of existing and future airfield design parameters to meet existing and forecasted demand.
- Determine the projected facility needs of airport users, which are further supported by airport development alternatives.
- Recommend improvements that will enhance the airport's safety capabilities to the maximum extent possible.
- Produce current and accurate airport base maps and updated airport layout plan (ALP) drawings.
- Establish a schedule of development priorities and a program for the improvements proposed in the Master Plan.
- Prioritize the airport's capital improvement program (CIP) and develop a detailed financial plan.
- Develop the required level of environmental documentation for approval of the new Master Plan.
- Coordinate this Master Plan with local, state, and federal agencies.

## **BASELINE ASSUMPTIONS**

The Master Plan typically requires baseline assumptions that will be used throughout the analysis. The baseline assumptions identified for this study include:

- The airport will continue to operate as a publicly owned commercial service airport through the planning period.

- The airport will continue to serve general aviation and corporate business aviation-based tenants, as well as other itinerant operators.
- The aviation industry on the national level will grow as forecast by the FAA in its annual *Aerospace Forecasts*.
- The socioeconomic characteristics of the region will grow as forecast by local and regional agencies.
- A federal and state airport improvement program will be in place through the planning period to assist in funding future capital development needs.

## MASTER PLAN PROCESS

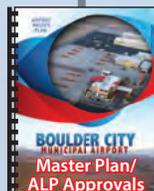
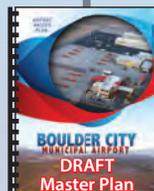
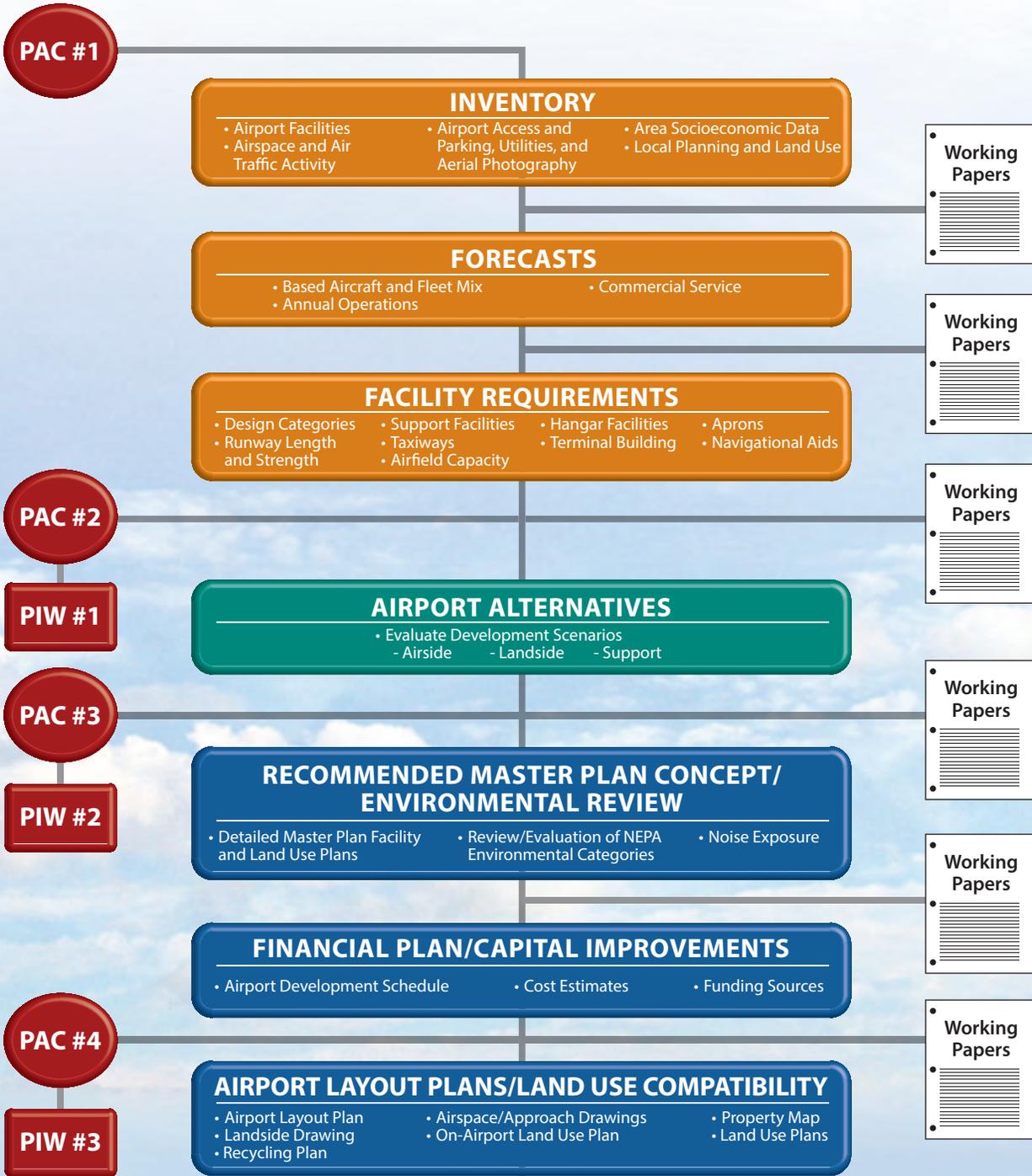
The Master Plan is being prepared in a systematic fashion following FAA guidelines and industry-accepted principles and practices. **Exhibit A** depicts the elements and process involved in the study. The Master Plan has six chapters and three appendices to assist in the discovery of future facility needs and provide the supporting rationale for their implementation.

**Element 1 – Study Initiation** includes the development of the scope of services, budget, and schedule. A Public Advisory Committee (PAC) is also formed and study material will be assembled in a workbook format. General background information will be established that will include outlining the goals and objectives to be accomplished during the Master Plan.

**Element 2 – Inventory** summarizes the existing conditions at the airport. 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 airfield, landside, and support facilities and operations. Local economic and demographic data is collected to define the local growth trends. A review of existing environmental documentation pertaining to the airport is also included. Planning studies which may have relevance to the Master Plan are also collected and reviewed.

**Element 3 – Forecasts** examines the potential aviation demand at the airport. The analysis utilizes local socioeconomic information, as well as national and regional air transportation trends, to quantify the levels of aviation activity which can reasonably be expected to occur at the airport. Demand forecasts for commercial service, general aviation, air taxi, and military activity are provided for five, ten, and 20-year planning periods. The results of this effort are used to determine the types and sizes of facilities which would be required to meet the projected aviation demand at the airport through the long term planning period.

**Element 4 – Facility Requirements** converts aviation demand needs into types and volumes of actual physical facilities required to meet existing and forecast demands in aviation activity, and identify short term corrective strategies for problems that demand immediate attention.



**Element 5 – Airport Alternatives** considers a variety of solutions to accommodate the projected facility needs identified in previous chapters. This chapter proposes various facility and site plan configurations which can meet the projected facility needs for both the airfield and landside. An analysis is completed to identify the strengths and weaknesses of each proposed alternative, with the intention of determining a single, preferred conceptual plan.

**Element 6 – Recommended Master Plan Concept and Capital Financial Plan** provides both a graphic and narrative description of the recommended development plan for the use, development, and operation of the airport. The Capital Program focuses on the capital needs program which defines the schedules, costs, and funding sources for the recommended capital projects. A detailed CIP is included in this chapter. The Master Plan then evaluates the potential funding sources to analyze financial strategies for successful implementation of the plan.

**Element 7 – Airport Layout Plans** are developed to depict existing and proposed facilities and provides the official ALP drawings that are produced as a result of the recommended development plan. These drawings are used by the FAA and NDOT in determining grant eligibility and funding.

**Element 8 – Environmental Evaluation** analyzes potential environmental impacts generated by the recommended development program for the airport.

**Element 9 – Public Coordination and Communication** provides opportunities to inform the public on the Master Plan process. Working papers are prepared at various milestones in the planning process. A series of MPAC meetings and Public Information Workshops are also planned during the process to discuss study findings. A project website is also developed to aid in disseminating information related to the Master Plan.

**Element 10 – Final Reports and Approvals** provides documents which depict all findings of the study effort and present the study and its recommendations to appropriate local organizations.

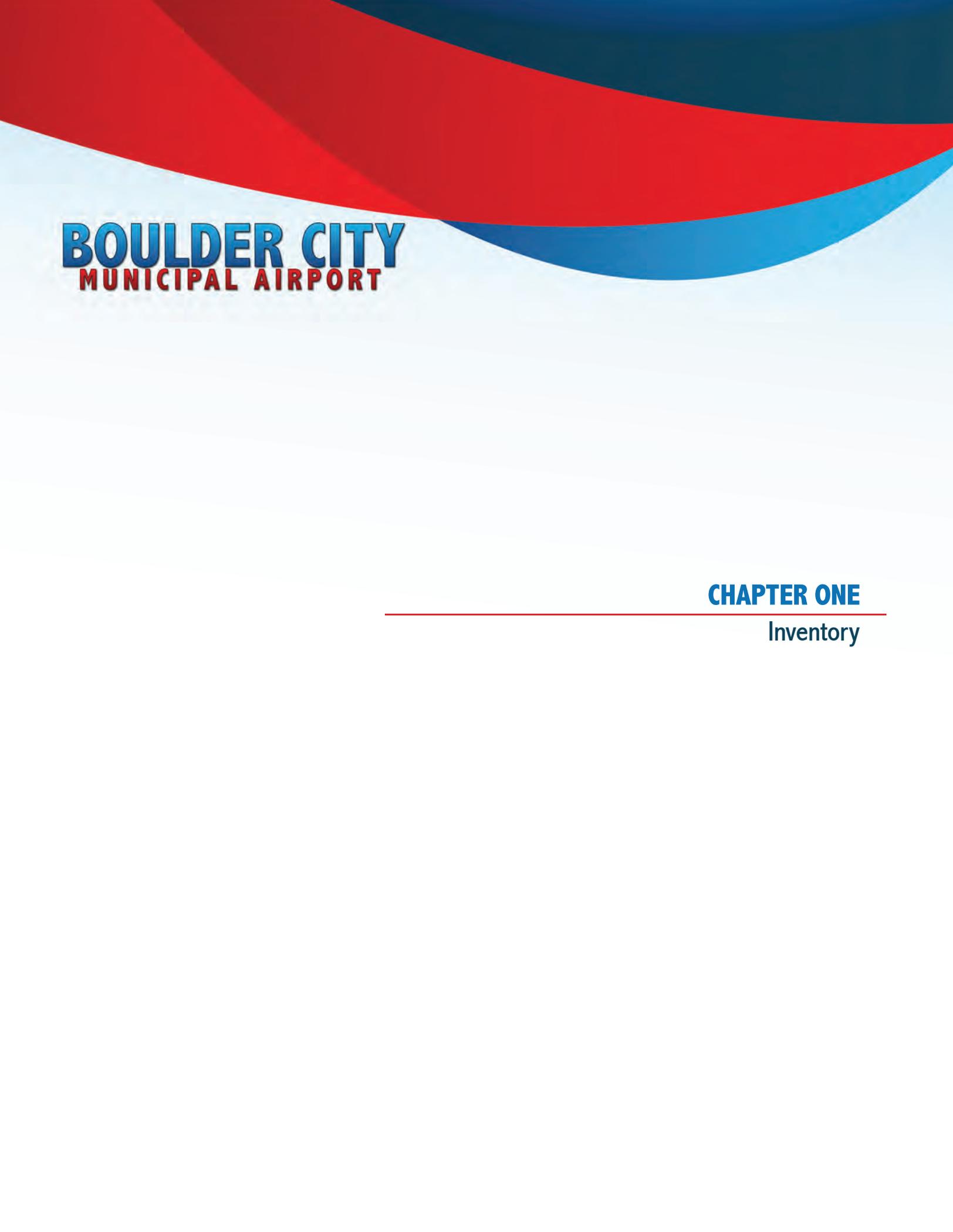
## **STUDY COORDINATION**

Boulder City Municipal Airport is of interest to many stakeholders within the surrounding area, including 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, Boulder City Municipal Airport is also of importance to both the FAA and NDOT, who are responsible for overseeing air transportation systems for federal and state governments, respectively.

A cross-section of community members and aviation interest groups with a vested interest in Boulder City Municipal Airport was identified to act in an advisory role in the development of the Master Plan.

Members of this Planning Advisory Committee (PAC) reviewed material and provided comments throughout the study to help ensure that a realistic, viable plan was developed.

The draft phase reports and other information related to the Master Plan are made available online via a website dedicated to the study at: [bouldercity.airportstudy.com](http://bouldercity.airportstudy.com).



**BOULDER CITY**  
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**CHAPTER ONE**

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Inventory

# BOULDER CITY MUNICIPAL AIRPORT



## CHAPTER ONE INVENTORY

The initial step in the preparation of the Master Plan for Boulder City Municipal Airport (BVU or Airport) is the collection of information pertaining directly to or influencing the airport and the area it serves. The information summarized in this chapter will be used in subsequent analyses within this study and includes:

- Background information related to Boulder City and the surrounding region, including descriptions of the local geography, regional climate, and surface transportation systems.
- Physical inventories and descriptions of current facilities and services offered at Boulder City Municipal Airport. The analysis will include airside and landside infrastructure and services as well as local and regional airspace, competing airport facilities, air traffic control, and aircraft operating procedures.
- Boulder City Municipal Airport's role in regional, state, and national aviation systems. Historical development at the airport will also be discussed.



- Socioeconomic data including population, employment, and income activity sectors will be analyzed. These sectors typically offer an indication of future trends that could influence commercial and general aviation activity at the airport.
- A review of existing local and regional plans and studies which will be utilized later in the process to determine their potential influence on the development and implementation of the Master Plan.

The information outlined in this chapter provides a foundation for all subsequent chapters. Much of the information was obtained through on-site inspections of the airport and interviews with airport staff, commercial operators, and other tenants. Information was also obtained from outside resources including documents prepared by the Federal Aviation Administration (FAA), Nevada Department of Transportation – Aviation Planning Section (NDOT), City of Boulder City, Clark County, and other pertinent regional planning and economic development agencies.

## **REGIONAL SETTING**

Boulder City is located approximately 22 miles to the southeast of Las Vegas, Nevada and is positioned in the southeastern quadrant of the state near the borders of Arizona and California. With the western portion of Lake Mead approximately six miles away by way of road, and the western rim of the Grand Canyon approximately 100 miles away by way of road and 50 miles away by air, the location of Boulder City provides easy access to numerous outdoor and site-seeing activities. In addition, Boulder City is the home of the state’s number one tourism attraction, the Hoover Dam. Considering the draw of Las Vegas and the abundance of national landmark sites in close proximity to Boulder City, the regional setting is ideal for supporting tourism as well as local resident lifestyles.

## **LOCAL OVERVIEW**

According to the 2014 Clark County population estimate, Boulder City has an estimated population of 15,852, making it the 5<sup>th</sup> largest city within Clark County, Nevada. The population of Boulder City includes a large retirement sector, and according to the Boulder City Chamber of Commerce, the City has a median age of 55. Major employers located within Boulder City include the Bureau of Reclamation, National Park Service, City of Boulder City, Clark County School District, and Fisher Space Pen. Aside from the national landmark attractions, Boulder City prides itself on its many local allures and outdoor activities.



## AIRPORT LOCATION

**Exhibit 1A** presents the location of Boulder City Municipal Airport in the southwestern quadrant of Boulder City, approximately 2.5 miles from the Central Business District (CBD). BVU encompasses approximately 530 acres which support both air and landside facilities. The airfield is situated at 2,203 feet above mean sea level (MSL).

## REGIONAL TRANSPORTATION NETWORK

Primary regional access to Boulder City is provided by two U.S. Highway systems, U.S. Highways 93 and 95. Both highways are north/south oriented. U.S. Highway 93 links Boulder City with cities such as Phoenix, Arizona to the southeast and Las Vegas, Nevada to the northwest, while U.S. Highway 95 links Boulder city with cities such as Yuma, Arizona to the south, and continues north ultimately reaching the U.S./Canadian border. Both highways connect to U.S. Interstate 40 to the south with Highway 93 linking near Kingman, AZ and Highway 95 near Needles, CA. U.S. Highway 93 becomes Interstate 515 immediately west of the City of Boulder City. It should be noted that a new interstate will soon be built to relieve congestion and improve travel between Arizona and Nevada. Interstate 11 Boulder City Bypass will be located approximately 1.5 miles south of the airport, connecting U.S. Highway 93 on the east and west sides of Boulder City.

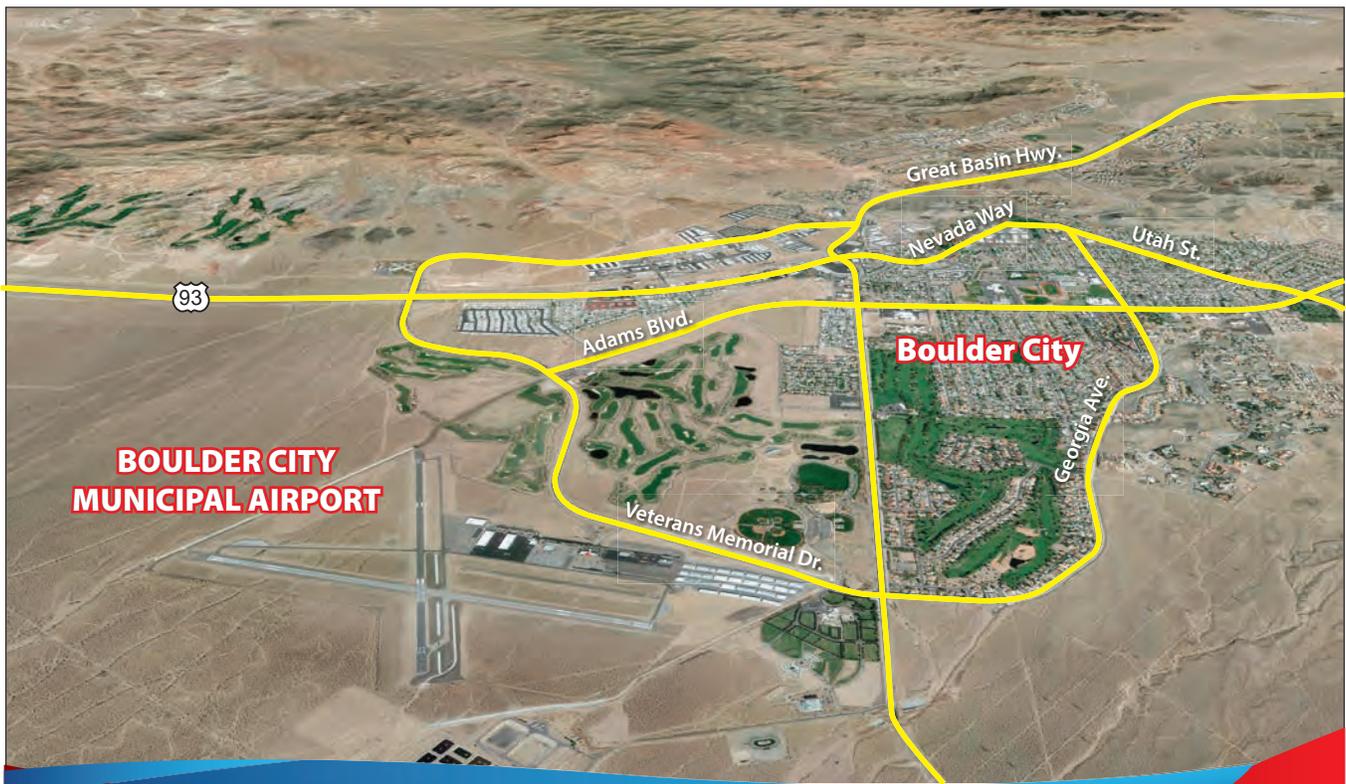
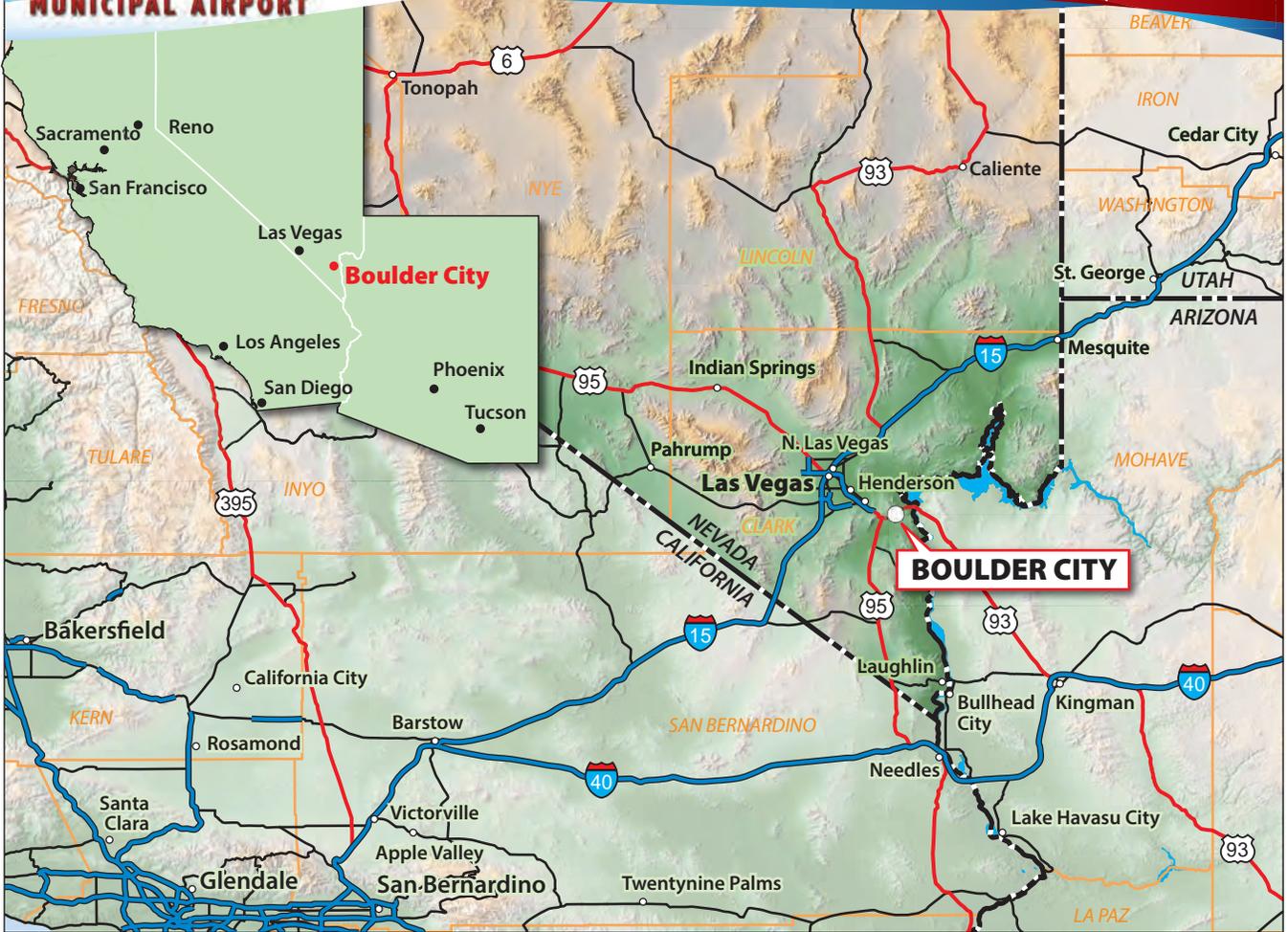
U.S. Highway 93 runs perpendicular to Veterans Memorial Drive, which is the primary roadway linking the Airport to Boulder City. Veterans Memorial Drive provides access to Airport Road, which is the BVU on-airport vehicular access road. Airport Road offers a direct interface to the air tour terminal building, the airport administration building, and other aviation-related facilities and businesses located on the airport.

## REGIONAL CLIMATE

Weather conditions must be considered in the planning and development of an airport. Temperature is a significant factor in determining runway length needs, while local wind patterns can affect the operation and capabilities of the runway system. The need for navigational aids and lighting can be determined by the visibility and cloud ceiling conditions.

*Temperature is a significant factor in determining runway length needs, while local wind patterns can affect the operation and capabilities of the runway system.*

At an elevation of approximately 2,400 feet MSL, Boulder City offers a mild, high-desert climate. Climates such as this tend to support short and scrubby vegetation, with semi-arid areas dominated by either grasses or shrubs. Summers are hot with infrequent showers and thunderstorms, usually occurring



through September. The spring and fall are typically drier, and winters are usually mild with little rain. The area of southern Nevada experiences winter weather primarily in the form of rainfall, usually occurring in the January thru March timeframe.

The climate in Boulder City and the State of Nevada is largely affected by the Sierra Nevada Mountain Range that lies approximately 215 miles to the west-northwest in the State of California. Boulder City and the State of Nevada are positioned on the lee side of the mountain range. This means that prevailing winds have to travel over the mountain range before reaching the State of Nevada. The prevailing winds are typically from the southwest. As the warm, moist air from the Pacific Ocean moves east and up the face or windward side of the Sierra Nevada Mountains, the air begins to cool and condense. Ultimately, the moisture contained in the air will fall as rain on the windward side of the mountain range before it reaches the lee side of the range.

**Table 1A** lists climate data for Boulder City. The average annual daily high temperature is 77.8 degrees Fahrenheit (F), with daily highs ranging from 54.5 degrees F in January to 101.6 degrees F in July. Average low temperatures range between 38.6 degrees F in January to 76.7 degrees F in July, with an average annual daily low temperature of 56.7 degrees F. The area experiences average annual precipitation of 5.5 inches.

**TABLE 1A**  
**Climate Summary**  
**Boulder City, Nevada**

	Avg. High Temp. (F)	Avg. Low Temp. (F)	Avg. Daily Temp. (F)	Avg. Precip. (in.)	Avg. Snowfall (in.)	Wind Speed (mph)
January	54.5	38.6	46.5	.66	0.6	6.6
February	59.9	42.3	51.1	0.64	0.1	7.5
March	67.6	47.0	57.3	0.66	0.1	8.6
April	76.4	53.8	65.2	0.34	0.0	10.3
May	85.9	61.9	73.9	0.18	0.0	10.1
June	95.9	70.4	83.2	0.09	0.0	10.1
July	101.6	76.7	89.1	0.49	0.0	8.9
August	99.5	75.4	87.4	0.71	0.0	8.4
September	92.6	69.0	80.8	0.51	0.0	7.9
October	79.8	58.5	69.2	0.32	0.0	7.1
November	64.5	46.6	55.6	0.43	0.0	6.3
December	55.6	39.7	47.6	0.51	0.1	6.5
<b>Annual</b>	<b>77.8</b>	<b>56.7</b>	<b>67.2</b>	<b>5.5</b>	<b>0.9</b>	<b>8.1</b>

Source: Western Regional Climate Center and [www.weather.com](http://www.weather.com)

## AIRPORT HISTORY

The Airport was opened on November 19, 1933 on land leased from the Bureau of Reclamation. At this time, the airport was named the Boulder City Airport; however, the airport was also referred to as Bull-ock's Field, after the individual originally leasing the land. At the airfield's inception, the airport was used for general aviation (GA) purposes only. The first commercial operator to base its operation at Boulder City Airport was Grand Canyon Airlines, providing air tours through the tour company Grand Canyon-Boulder Dam Tours (GCBDT) in 1936.

*The Airport was opened on November 19, 1933 on land leased from the Bureau of Reclamation.*

In February of 1938, the owner of Grand Canyon Airlines signed an agreement with Trans-Continental and Western Airlines (TWA). The agreement stated that GCBDT would improve the Boulder City Airport and terminal building on the condition that TWA began leasing the airport. During this time period, the Boulder City Airport became one of the largest airports in the western United States. Being the Las Vegas Valley's only airport with regular scheduled passenger service, the airport was able to thrive with a large number of operations being attributed to tourism. The Boulder City Airport was able to accommodate guests from all over the country, traveling to experience the Grand Canyon, Lake Mead National Recreation Area, the Hoover Dam, as well as Las Vegas.

The Boulder City Airport experienced consistent traffic through the late 1940s. During World War II, the rate of civilian air traffic slowed and the airport was largely used as a layover location for military aircraft. In the late 1940s, TWA left the Boulder City Airport. This resulted in a significant decrease in air traffic. With the sudden loss of TWA as a based air carrier, coupled with the increasing attraction of Las Vegas, many travelers began going straight to Las Vegas as opposed to Boulder City. This was made possible by the construction of the McCarran International Airport in Las Vegas.

Eventually, the Boulder City Airport was condemned in 1949. In 1958, the Boulder City Elks Club bought the terminal building to use as a meeting location. Shortly thereafter, the airport was reopened following renovations in 1961. During the early 1980s, construction began on a new airport in Boulder City. Following its completion, the historic Boulder City Airport was closed and the new Boulder City Municipal Airport was opened.

To this day, Boulder City Municipal Airport continues to provide facilities and activities to support both commercial service, in the form of air tour operations, and general aviation. Currently, the airport accommodates several organizations providing both tour and charter operations. These organizations include 5 Star Grand Canyon Helicopter Tours, Grand



Canyon Airlines, Papillon Grand Canyon Helicopters, and Serenity Helicopters. Other activities such as flight instruction and skydiving are also located on the airport.

## CAPITAL IMPROVEMENT HISTORY

To assist in funding capital improvements, the FAA has provided funding assistance to Boulder City Municipal Airport through the Airport Improvement Program (AIP). The AIP is the mechanism for funding federal grants through the Aviation Trust Fund, which was established in 1970 to provide funding for aviation capital investment programs, including aviation development, facilities and equipment, and research and development. The Aviation Trust Fund also finances a portion of the operation of the FAA. NDOT also provides funding assistance to the airport by providing matches to FAA grants and, in some instances, funding a project through a state grant only. **Table 1B** presents historical information for capital improvements at Boulder City Municipal Airport since 2000 with federal and state funding.

**TABLE 1B**  
**Capital Improvement History Since 2000**  
**Boulder City Municipal Airport**

Grant Number	Description	Year	Amount
<b>FAA GRANTS</b>			
3-32-0003-006	Install Airfield Guidance Signs; Extend Taxiway; Install Runway Lighting; Improve Airport Drainage; Rehabilitate Runway and Taxiway; Install Fencing	2000	\$1,139,063
3-32-0003-007	Conduct Airport Master Plan Study	2001	\$150,000
3-32-0003-008	Rehabilitate apron, runway, taxiway, improve airport drainage	2002	\$150,000
3-32-0003-009	Install Weather Reporting Equipment [AWOS]	2005	\$150,000
3-32-0003-010	Expand Apron [Phase I], Install Weather Reporting Equipment [Phase II]	2006	\$308,829
3-32-0003-011	Conduct Miscellaneous Study [Airfield Drainage Study], Construct Apron, Improve Runway Safety Area [Design Only] - 09R/27L	2007	\$1,754,693
3-32-0003-012	Install Perimeter Fencing [Approx. 13,000 lf]	2008	\$741,606
3-32-0003-013	Improve Runway Safety Area [Design] - 09R/27L	2009	\$588,424
3-32-0003-014	Construct Apron, Improve Runway Safety Area, Install Perimeter Fencing, Rehabilitate Apron, Rehabilitate Taxiway, Rehabilitate Taxiway Lighting	2009	\$791,898
3-32-0003-015	Rehabilitate Runway 09R/27L	2009	\$1,137,760
3-32-0003-016	Prepare Airport Layout Plan Narrative Report	2009	\$292,727
3-32-0003-017	Improve Runway Safety Area [Construction] - 15/33, Rehabilitate Runway [Construction] - 15/33	2010	\$970,437
3-32-0003-018	Rehabilitate Runway [Phase 2] - 15/33, Rehabilitate Taxiway [Construction]	2011	\$2,688,292
3-32-0003-019	Wildlife Hazard Assessments	2012	\$94,491
3-32-0003-020	Construct Access Road [Design], Improve Airport Drainage [Design and Construction - Phase I]	2013	\$908,990
3-32-0003-021	Construct Access Road [-Construction], Improve Airport Drainage [-Construction Phase II], Rehabilitate Runway [Design Phase I] - 09L/27R	2014	\$4,499,526
3-32-0003-022	Improve Airport Drainage, Rehabilitate Runway - 09L/27R	2015	\$1,386,613
3-32-0003-023	Update Airport Master Plan Study with AGIS	2015	\$478,125

Source: Airport Records; FAA Grant History.

## HISTORICAL AIRPORT ACTIVITY

At commercial service airports, the number of passenger boardings (enplanements) is a key indicator of operational strength and is typically the basis for federal grants-in-aid. Enplanement activity is also a good barometer of operational conditions as they can be used to measure the strength of commercial passenger airline services. The airport's based aircraft and annual operations (takeoffs and landings) in aggregate and type are also important aeronautical activity measures to consider. These indicators will be used in subsequent analyses in this master plan to project future aeronautical activity and determine future facility needs. Each of the activity segments is briefly described below.

### PASSENGER ENPLANEMENTS

Commercial service airports provide local and regional access to national and international aviation systems. As such, these airports are vital to interstate commerce as well as a key component to local and regional economic infrastructure. These facilities support and can even drive growth in all socioeconomic categories.

An enplanement includes any revenue passengers that board an aircraft for a fare at the airport. This statistic is important in that it is utilized by the FAA to determine the annual level of entitlement funding dedicated to the airport under the AIP. Currently, an airport must reach 10,000 annual enplanements to be eligible for a minimum one million dollars in annual entitlement funds. Historical enplanement data as presented in the FAA's *Terminal Area Forecast* (TAF) is provided on **Exhibit 1B**. Airline passenger enplanements will typically be influenced by many factors, including number of airlines serving the airport, frequency of daily departures, types of aircraft used, and diversity of services offered.

*It should be noted that the airline schedule is seasonal in nature, with more flights being offered in the summer months and fewer flights in the winter months.*

Boulder City Municipal Airport is currently served regularly by air tour service providers offering an approximate average of 580 daily enplanements according to the FAA's Office of Planning and Programming. It should be noted that the air tour service is seasonal in nature, with more flights being offered in the summer months and fewer flights in the winter

months. The following are the operators currently providing daily service at the airport:

- 5 Star Grand Canyon Helicopter Tours.
- Grand Canyon Airlines
- Papillon Grand Canyon Helicopters
- Serenity Helicopters

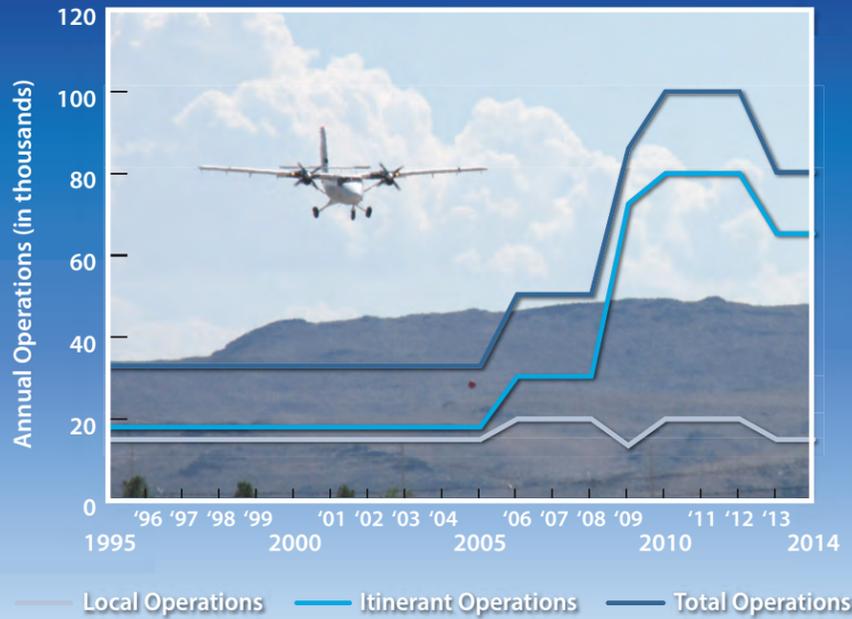
YEAR	ITINERANT OPERATIONS					LOCAL OPERATIONS			TOTAL OPERATIONS	ANNUAL ENPLANEMENTS
	AC	AT	GA	MIL	SUB	GA	MIL	SUB		
1995	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
1996	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	16,031
1997	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	3,916
1998	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
1999	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
2000	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
2001	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
2002	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
2003	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
2004	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	0
2005	0	3,000	15,000	0	18,000	15,000	0	15,000	33,000	17
2006	0	10,000	20,000	400	30,400	20,000	0	20,000	50,400	58
2007	0	10,000	20,000	400	30,400	20,000	0	20,000	50,400	80,097
2008	0	10,000	20,000	400	30,400	20,000	0	20,000	50,400	3,464
2009	0	62,220	10,000	400	72,620	13,500	0	13,500	86,120	69,799
2010	0	70,000	10,000	25	80,025	20,000	0	20,000	100,025	96,943
2011	0	70,000	10,000	25	80,025	20,000	0	20,000	100,025	100,936
2012	0	70,000	10,000	25	80,025	20,000	0	20,000	100,025	111,485
2013	0	60,000	5,000	300	65,300	15,000	0	15,000	80,300	108,032
2014	0	60,000	5,000	300	65,300	15,000	0	15,000	80,300	98,318

Source: FAA Terminal Area Forecast (January 2015).

KEY:

AC - Air Carrier (commercially operated aircraft having seating capacity more than 60 seats or a maximum payload capacity of 18,000 pounds) IFR - Instrument Flight Rules GA - General Aviation SUB - Subtotals  
 AT - Air Taxi (commercially operated aircraft having 60 or fewer passenger seats or less than 18,000 pounds maximum payload capacity) VFR - Visual Flight Rules MIL - Military

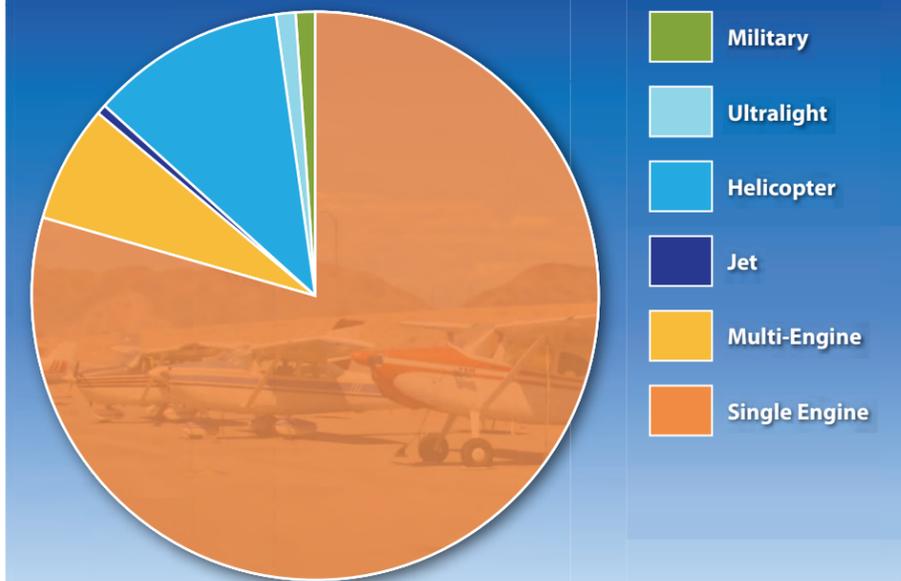
**ANNUAL OPERATIONS**



**ENPLANEMENTS**



**BASED AIRCRAFT FLEET MIX**



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## AIRCRAFT OPERATIONS

Aircraft operations, being a takeoff or landing, are classified as either local or itinerant. Local operations consist mostly of aircraft training operations conducted within the airport traffic pattern, including touch-and-go and stop-and-go operations. Itinerant operations are arriving or departing aircraft which have an origin or destination away from the airport.

Aircraft operations are further sub-classified into four general categories: air carrier, air taxi and commuter, general aviation, and military. Air carrier operations are defined as those conducted commercially by aircraft having a seating capacity of 60 or more and/or a maximum payload capacity of 18,000 pounds. Air taxi operations can include small commercial service aircraft operations as well as general aviation type aircraft for the “on-demand” commercial transport of persons and property in accordance with Title 14 Code of Federal Regulations (CFR) Part 135 and Subchapter K of Title 14 CFR Part 91. Commercial service operations at BVU fall under air taxi and commuter categories. Air carrier operations typically include mainline passenger and cargo airlines. Commercial service operations counted as air taxi and commuter are typically represented by regional airlines utilizing small regional jets or turboprop aircraft while hauling under the banner of the mainline carriers. However, the air tour service providers at Boulder City Municipal Airport are unique in that they do not operate under mainline carriers and specifically offer air tours and charter flights. General aviation operations include a wide array of aircraft use ranging from personal to business and corporate uses. Military aircraft also operate at the airport.

**Exhibit 1B** presents the annual aircraft operations as estimated by the FAA’s TAF at Boulder City Municipal Airport since 1995.

## BASED AIRCRAFT

Identifying the current number of based aircraft is important to the Master Plan analysis, yet it can be challenging because of the transient nature of aircraft storage. According to airport records, there are currently 245 based aircraft at the airport ranging from small single engine piston aircraft up to larger multi-engine turbine aircraft. Based aircraft fleet mix information is also presented on **Exhibit 1B**.

## AIRPORT ADMINISTRATION

Boulder City Municipal Airport is owned and operated by the City of Boulder City. The Airport Manager works under the City Airports Division which in turn responds to the Community Development Director. The Public Works Director is responsible for the day-to-day management of all Public Works Departments. Public Works Departments include the Engi-



neering Division, Water and Sewer Division, Electrical Division, Streets Division, and Airport Division. As a Public Works Department, the Airport Division has overall responsibility for safe operation of the Boulder City Municipal Airport. Responsibilities of the Airport Division include daily inspections of airport surfaces and electronic navigation aids, enforcement of the Airport's Rules and Regulations, and oversight of airport tenants to ensure legal occupancy and safe operation. In addition, the Airport Division maintains frequent contact with commercial tour operators on the airfield in order to ensure the priority of the voluntary "Fly Quiet" program.

The Airport Manager is tasked with ensuring all applicable Federal Laws and regulations that pertain to aviation are complied with at the Airport. In addition, the Airport Manager must frequently communicate with the FAA Airport District Office (ADO) assigned to Boulder City. The Airport maintains three full time employees and works in conjunction with an Airport Advisory Committee (AAC). The AAC consists of seven members serving four-year terms. The committee advises the City Council and City Manager regarding the Master Plan, Rules and Regulations, and maintenance of the Boulder City Municipal Airport. The Airport Advisory Committee meets on a quarterly basis at City Hall to discuss relevant matters.

### **AIRPORT SYSTEM PLANNING ROLE**

Airport planning exists on many levels, including national, state, and local. Each level has a different emphasis and purpose. On the national level, Boulder City Municipal Airport is included in the *National Plan of Integrated Airport Systems (NPIAS)*. On the regional and state levels, the airport is included in the *Nevada Airport Systems Plan*, last updated in 2009. An Airport Master Plan is the primary local airport planning document. This Master Plan will provide a vision of both airside and landside facilities over the course of the next 20 years.

*Airport planning exists on many levels, including national, state, and local. Each level has a different emphasis and purpose.*

### **FEDERAL AIRPORT PLANNING**

The role of the federal government in the development of airports cannot be overstated. Many of the nation's existing airports were either initially constructed by the federal government or their development and maintenance was partially funded through various federal grant-in-aid programs to local communities. The system of airports existing today is due, in large part, to the existence of federal policy that promotes the development of civil aviation. As part of a continuing effort to develop a national airport system to meet the needs of civil aviation and promote air commerce, the United States Congress has continually maintained a national plan for the development and maintenance of airports.

On the national level, Boulder City Municipal Airport is included in the NPIAS as a nonhub, primary commercial service airport. This designation includes 251 airports nationwide that provide regularly scheduled passenger commercial service. Airports with this designation record less than 0.05 percent of total U.S. passenger enplanements, but have more than 10,000 annual enplanements. Overall, the NPIAS identifies 3,331 existing airports which are considered significant to the national air transportation system. The NPIAS is published and used by the FAA in administering the AIP, which is the source of federal funds for airport improvement projects across the country. The AIP program is funded exclusively by user fees and user taxes, such as those on fuel and airline tickets. The 2015-2019 NPIAS estimates that \$33.5 billion worth of needed airport improvements are eligible for AIP funding across the country over the next five years. An airport must be included in the NPIAS to be eligible for federal funding assistance through the AIP.

The NPIAS supports the FAA's strategic goals for safety, system efficiency, and environmental compatibility by identifying specific airport improvements. The current NPIAS identifies approximately \$12.6 million in development needs at Boulder City Municipal Airport for the five-year planning horizon. This figure is not a guarantee of federal funding; instead, this figure represents development needs as presented to the FAA by the airport administration in the annual airport capital improvement program. Of the \$33.5 billion in airport development needs identified by the NPIAS nationally, approximately 62 percent, or \$20.8 billion, is proposed for the 389 primary commercial service airports, which includes Boulder City Municipal Airport.

## STATE AIRPORT PLANNING

At the regional and state level, Boulder City Municipal Airport is included in the 2009 *Nevada Airport System Plan* (NASP). The purpose of the NASP is to provide a framework for the integrated planning, operation, and development of Nevada's aviation assets. The NASP defines the specific role of each airport in the state's aviation system and established funding needs. The NASP provides policy guidelines that promote and maintain a safe aviation system in the state, assess the state's airport capital improvement needs, and identify resources and strategies to implement the plan.

*The NASP defines the specific role of each airport in the state's aviation system and established funding needs.*

For planning purposes, the Nevada Department of Transportation (NDOT) Office of Aviation Planning classifies all airports in two different categories as follows:

**Primary Airport System:** Includes all public-use airports in Nevada categorized as:

- A. Commercial Service, Reliever and/or General Aviation Airport.
- B. Airports that have 10 or more based aircraft, or
- C. Airports with 2,000 or more annual aircraft operations, or
- D. Airports projected to meet any of the above criteria within 10 years.

**Secondary Airport System:** Includes the public-use airports and heliports that are not eligible for inclusion in the Primary Airport System. This category includes a total of 19 public-use airports. Under the Primary and Secondary Airport System classifications, airports within the NASP are further categorized within the following designations:

1. **Commercial Service Airport:** A publicly-owned airport which enplanes 2,500 passengers or more annually and receives scheduled passenger service.
2. **Reliever Airport:** An airport that serves as a “reliever” of general aviation traffic for Commercial Service airports. These airports provide additional general aviation access to the overall community. A reliever airport should have a current or forecast activity level of 50 based aircraft and a minimum of 25,000 annual itinerant aircraft operations.
3. **General Aviation Airport:** Airports that do not fall into either the Commercial Service or Reliever status are categorized as General Aviation airports. The General Aviation airport category contains the following airport sub-categories:
  - A. **Community Airport:** A public-use airport located in the State of Nevada containing a paved runway and serves one or multiple communities in the immediate vicinity with a total population of more than 1,500 people.
  - B. **Rural Airport:** A public-use airport located in the State of Nevada containing a paved runway and serves a community with less than 1,500 people.
  - C. **Basic Airport:** A public-use airport/facility or area located in the State of Nevada containing an unpaved runway serving a community of less than 1,500 people.
  - D. **Private Airport:** A privately-owned, privately-used airport/facility or area located in the State of Nevada that restricts usage to select aircraft operators.
4. **New Urban Airport:** The construction of a new airport within 24 statute miles of the Urbanized Area Boundary of Clark or Washoe Counties requires approval from the State Transportation Board as well as legislative approval. Obtaining approval will allow for the revision of the State Aviation Trust Fund before the airport is deemed eligible to compete for state funding.

In general, the NASP airport categories are consistent with the NPIAS service levels with the exception of the sub-categories associated with General Aviation airports. The NASP also identifies each FAA Airport Reference Code (ARC) generally accommodated within each airport category. **Table 1C** presents each NASP airport category and the associated ARC.

**TABLE 1C**  
**State Aviation System Plan Airport Categories**

Airport Category	FAA Airport Reference Codes
Commercial Service Airport	C-II through D-V
Reliever Airport	B-II through C-II
Community Airport	B-I through B-II
Rural Airport	A-I through B-I
Basic Airport	A-I

Source: Nevada Airport System Plan (2009)

Within the 2009 NASP, BVU is one of 49 airports included that is classified within the Primary Airport System. In addition, the Airport is identified as a Commercial Service airport under the Primary Airport designation. **Table 1D** further presents the NASP airport criteria for a Primary Commercial Service Airport.

**TABLE 1D**  
**Facility and Service Criteria**  
**NASP - Primary Commercial Service Airports**

Airport Criteria	Minimum Objectives
Airport Reference Code	C-II or greater
Runway Length	Design Aircraft or 75 percent of large aircraft at 90 percent useful load
Runway Width	150 to 200 feet
Runway Strength	90,000 pounds
Taxiway System	Full parallel and connecting taxiways
Instrument Approach	ILS, VOR, DME, GPS, LPV
Visual Aids	Rotating beacon, PAPI, VASI, REILs, MALS, MALSF, MALSR
Runway Lighting	HIRL
Taxiway Lighting	MITL
Weather Reporting Aids	AWOS, ASOS
Wind Coverage	95 percent combined coverage
Land Area	500 Acres or more
Fuel Availability	Jet A and 100 LL
Fencing	Security and perimeter chain link fencing

**Definitions**

- ILS: Instrument Landing System
- VOR: VHF Omnidirectional Range
- DME: Distance Measuring Equipment
- GPS: Global Positioning System
- LPV: Localizer Performance with Vertical guidance
- REIL: Runway End Identification Lights
- VASI: Visual Approach Slope Indicator
- MALS: Medium Intensity Approach Lighting System
- MALSF: Medium Intensity Approach Lighting System with Sequence Flashing Lights
- MALSR: Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
- HIRL/MIRL: High/Medium Intensity Runway Lights
- AWOS/ASOS: Automated Weather Observation System/Automated Surface Observation System

Source: Nevada Airport System Plan (2009)

## LOCAL PLANNING ROLE

The Airport Master Plan is the primary local planning document. The Master Plan is intended to provide a 20-year vision for airport development based on aviation demand forecasts. Over time, the forecast element of a Master Plan typically becomes less reliable due to changes in aviation activity and/or the economy. As a result, the FAA recommends that airports update their Master Plans every five to 10 years, or as necessary to address any significant changes.

*An important component of the Airport Master Plan is a set of airport layout plans (ALP) drawings that are used to depict existing and future development on the airfield.*

An important component of the Airport Master Plan is a set of airport layout plan (ALP) drawings that are used to depict existing and future development on the airfield. Grant funding requires any proposed development to be depicted on the ALP. The airport's ALP drawings are being updated during this Master Plan process.

## AIRPORT INVENTORY

This section provides a description of the existing facilities at Boulder City Municipal Airport. These facilities can be divided into two distinct categories: airside and landside. Airside facilities include those directly associated with aircraft operations, such as runways, taxiways, lighting and signage, weather, and instrument approach aids. Landside facilities include those necessary to provide a safe transition from surface to air transportation and support aircraft servicing, maintenance, and operational safety on the ground.

### AIRSIDE FACILITIES

Airside facilities are depicted on an aerial photograph for visual reference on **Exhibit 1C**. A summary of the facility data is provided on **Exhibit 1D** and discussed in detail in the following sections.

#### Runways

The Airport is served by two active intersecting runways, Runway 9-27 and Runway 15-33. Runway 9-27 is the airport's primary runway, while Runway 15-33 is designated as the airport's crosswind runway. The airport also contains a runway parallel to 9-27, which was closed in 2015. As such, runway markings and signage have also been updated.



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<b>RUNWAYS</b>	<b>Runway 9-27</b>	<b>Runway 15-33</b>
Runway Length (feet)	4,803	3,852
Runway Width (feet)	75	75
Displaced Threshold	None	None
Runway Pavement Surface Material	asphalt	asphalt
Runway Pavement Surface Treatment	N/A	N/A
Runway Pavement Markings	Non-Precision	Basic
Runway Lighting	MIRL	MIRL
Usable for Air Carrier Operations	No	No
Traffic Pattern	9 Right-27 Left	15 Right- 33 Left
<b>RUNWAY PAVEMENT STRENGTH (lbs)</b>		
Single Wheel Loading (SWL)	12,500	12,500
Dual Wheel Loading (DWL)	N/A	N/A
<b>TAXIWAYS</b>		
Taxiway Lighting	MITL on taxiways, A, B, and D positioned at each runway turnoff*	
Marking	Centerline markings on all taxiways	
<b>VISUAL APPROACH/LIGHTING AIDS</b>		
	PAPI-2 (both runways)	PAPI-2 (Runway 33)
	REILs (both runways)	REILs (both runways)
<b>STRAIGHT-IN INSTRUMENT APPROACHES</b>		
	None**	None
<b>WEATHER AND NAVIGATIONAL AIDS</b>		
AWOS-3, rotating beacon, lighted wind Indicator, segmented circle, and CTAF/UNICOM.		

\* Solar lighting also serves varying positions of each taxiway.

\*\* An LPV approach will soon serve Runway 27.

**KEY**

<b>LPV</b>	Localizer Performance with Vertical Guidance	<b>PAPI</b>	Precision Approach Path Indicator
<b>MIRL</b>	Medium Intensity Runway Lighting	<b>AWOS</b>	Automated Weather Observation System
<b>MITL</b>	Medium Intensity Taxiway Lighting	<b>CTAF</b>	Common Traffic Advisory Frequency
<b>REIL</b>	Runway End Identification Lighting	<b>UNICOM</b>	Universal Communication



**Runway 9-27:** Runway 9-27 is 4,803 feet long by 75 feet wide and is positioned in an east-west orientation. The asphalt runway is reported to be in good condition by official FAA publication and contains a pavement strength rating of 12,500 pounds single wheel loading (SWL), referring to the aircraft landing gear configuration that utilizes a single wheel on each strut of the main landing gear. Runway 9-27 contains non-precision instrument runway markings providing landing designation markings, threshold markings, aiming point markings, a runway centerline and runway edge markings. Runway 9-27 is designated as the primary runway.



**Runway 15-33:** Runway 15-33 is 3,852 feet long by 75 feet wide and is positioned in a northwest-southeast orientation. The runway is constructed of asphalt and is reported to be in good condition by official FAA publications. The runway contains a pavement strength rating of 12,500 SWL and has basic markings, providing landing designator markings, aiming point markings, and a runway centerline.

### Taxiways

The taxiway system at Boulder City Municipal Airport consists of parallel, connector, and entrance/exit taxiways as depicted on **Exhibit 1C**. Parallel taxiways are primarily designed to efficiently and quickly route aircraft between the runway and the originating/destination location.

Taxiway A serves as an entrance/exit taxiway (oriented north-south) serving Runway 9-27 and provides access to the transient apron and locally based aircraft tiedown and hangar storage areas. The taxiway also contains a holding position serving Runway 27. Hold aprons allow pilots to perform flight checks and conduct engine run-ups.

Taxiway B is a full length parallel taxiway with a northwest-southeast orientation serving Runway 15-33 and provides entrance/exit connectors at each end of the runway. Taxiway B also offers access to an apron serving multiple fixed base operators (FBOs) as well as Runway 9-27 via midpoint intersection.

Taxiway D serves as a full length quasi-parallel taxiway to Runway 9-27 providing access to Runway 9 via a connector taxiway. Taxiway D also intersects with Taxiway A, which provides access to Runway 27. Taxiway D intersects Runway 15-33 at midpoint and provides access to multiple FBOs along with the transient and locally based aircraft tiedown and hangar storage areas. The taxiway also contains a holding position serving Runway 9.

All parallel taxiways maintain a runway to taxiway centerline separation of at least 240 feet. In addition, each taxiway is 35 feet in width, with the exception of the southeastern-most portion of Taxiway B connecting to Runway 15-33, which is 50 feet in width as presented in **Table 1E**.

*All parallel taxiways maintain a runway to taxiway centerline separation of at least 240 feet.*

**TABLE 1E**  
**Taxiway Data**  
**Boulder City Municipal Airport**

Designated Taxiways	Length (feet)	Width (feet)
A	1,300	35
B	3,700	35-50
D	4,803	35

Source: Airport Records; Aerial Mapping.

### Final Approach and Takeoff Areas

The Boulder City Municipal Airport offers four final approach and takeoff areas (FATO), three of which are located on the south side of the aircraft apron area and approximately 50 feet north of the centerline along Taxiway D as represented in **Exhibit 1C**. Helipads 1 and 2 are separated by approximately 570 feet, and Helipads 2 and 3 are separated by approximately 530 feet. The fourth helipad is centrally located on the closed runway. Currently, the FATO areas associated with each helipad extend south, perpendicular with Taxiway D and Runway 9-27. Helipads 1-3 maintain a separation of 790 feet between the Runway 9-27 centerline, while helipad 4 maintains a separation of approximately 500 feet from the Runway 9-27 centerline.

### Pavement Markings

Pavement markings aid in the movement of aircraft along airport surfaces and identify closed or hazardous areas on the airport. As previously discussed, Runway 9-27 has non-precision markings which include the following:

- Threshold bars;
- Runway designation;
- Centerline;
- Aiming points, and;
- Runway edge markings.

Runway 15-33 contains basic markings which are required to include landing designation markings and runway centerline markings; however, Runway 15-33 also provides aiming point markings in addition to the required basic markings.

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 at Boulder City Municipal Airport include the following:

- Centerline;
- Leadoff lines on normally used exits;
- Dashed type edge markings along the portion of Taxiway D and Taxiway B which are contiguous to aircraft parking aprons on the east and south sides of the ramp.

Taxiway markings also include aircraft hold line positions located on the entrance/exit and connecting taxiways. The hold line positions function to keep aircraft from entering the runway environment without clearance. The location of hold lines is established by the design aircraft for a runway. The hold lines on entrance/exit taxiways associated with Runway 9-27 range from 230 to 275 feet from the runway centerline. For Runway 15-33, the hold lines are located approximately 200 feet from the runway centerline. It should be noted that the hold lines serving Runway 15-33 are currently deficient of the design standards. Design standards will be further discussed in Chapter Three.



It should be noted that the Taxiway B interface with Runway 33 and the Taxiway D interface with Runway 9 are less than a 90-degree angle. As such, the aircraft holding position locations are not fully parallel with the runway alignment. The same scenario applies to the hold lines associated with Taxiway B as it crosses Runway 9-27, and Taxiway D as it crosses Runway 15-33. FAA standards suggest that all runway hold line positions be aligned fully parallel with the runway centerline so that the pilot has full range of view in both directions.

Aircraft movement areas on various parking aprons are identified with centerline markings. Aircraft tiedown positions are identified on various apron surfaces as well.

Blast pads marked with yellow chevrons also serve each end of Runway 9-27 and Runway 15-33. The blast pad is a surface adjacent to the end of a runway provided to reduce the erosive effect of jet blast or propeller wash. The blast pad associated with Runway 9 is 300 feet long by 90 feet wide, while the blast pad serving Runway 27 is 300 feet long by 90 feet wide. Runway 15 is equipped with a 250-foot long by 95-foot wide blast pad, and Runway 33 is equipped with a 300-foot long by 95-foot wide blast pad.

## Airfield Lighting and Signage

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

*Airfield lighting and signage systems extend an airport's usefulness into periods of darkness and/or poor visibility.*

**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 Boulder City Municipal Airport is located on top of a tower which supports the beacon. The beacon is situated approximately 2,600 feet northeast of the intersection of both runways, located on the easternmost side of the hangar directly east of the airport administration building.

**Runway and Taxiway Lighting:** Runway and taxiway edge lighting utilize 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 runways and aircraft parking areas.

Runways 9-27 and 15-33 are equipped with medium intensity runway lights (MIRL). Each of these runway ends is also equipped with threshold lighting to identify the landing threshold. Threshold lighting consists of specially designed light fixtures that are red on one half of the lens and green on the other half of the lens. The green portion of the fixture is turned towards the approach surface and is intended to be seen from landing aircraft, while the red portion is visible to aircraft on the runway surface.

Taxiways associated with each runway are equipped with medium intensity taxiway lighting (MITL) at each runway turnoff. Each taxiway does contain some solar lighting; however, the lighting does not serve the entire length of any one taxiway. In addition, elevated runway guard lights are also positioned on each taxiway intersection that crosses a runway.

**Airfield Signage:** The airport has a runway/taxiway signage system that assists pilots in identifying their location on the airfield and directing them to their desired location. 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 Boulder City Municipal Airport includes runway and taxiway designations, holding positions, routing/directional, and runway distance remaining, runway end, and exits. It should be noted that the Airport does contain some lighted signage.

**Visual Glide Slope Approach Aids:** Visual approach aids consist of a series of lights that, when interpreted by pilots, give an indication of being above, below, or on the designated descent path to the runway. A two-light precision approach path indicator (PAPI-2) is installed on both ends of Runway 9-27

and a PAPI-2 serves the approach end of Runway 33. The PAPI-2s associated with Runway 9-27 are located on the left side of each respective runway end, which is standard. The PAPI-2 on Runway 33 is also located on the left side of the runway. A standard three-degree glideslope is provided by the PAPI-2s serving each respective runway. Gradient issues associated with Runway 15 currently preclude the feasibility for a PAPI to serve the runway.

**Runway End Identification Lights:** Runway end identification lights (REILs) provide rapid and positive identification of the approach end of a runway. The system consists of two synchronized flashing lights, located laterally on each side of the runway threshold, facing the approaching aircraft. A REIL system has been installed on each end of Runway 9-27 as well as the approach ends of Runways 15 and 33.

**Pilot-Controlled Lighting:** The airport's lighting system is connected to a pilot-controlled lighting (PCL) system. The PCL system allows pilots to activate the MIRL on Runways 9-27 and 15-33 with the use of the aircraft's radio transmitter. The PCL can be accessed on the common traffic advisory frequency (CTAF) 122.7 MHz.

### Weather and Communication Aids

Boulder City Municipal Airport is equipped with a lighted windcone and segmented circle which provides pilots with information about wind conditions and traffic pattern usage. These facilities are located approximately 1,000 feet northwest of the intersection of the runways. Additional supplemental windcones are spread out on the airfield, allowing wind conditions to be interpreted by pilots along the runway system.

An automated weather observation system III (AWOS-III) is located on the airport. The AWOS-III automatically records the following weather conditions:

- Wind speed, gusts, and direction
- Temperature
- Dew point
- Altimeter setting
- Density altitude
- Visibility
- Precipitation accumulation
- Cloud height

This information is transmitted at regular intervals on the airport's AWOS-III aeronautical advisory frequency (118.475 MHz) or via a local telephone number (702-293-1532), where a computer-generated voice will present airport weather information. This information can



also be accessed through the Airport website in the form of Meteorological Aerodrome Reports (METAR). AWOS-III broadcasts are updated on a minute-by-minute basis and provide arriving and departing pilots with the current weather conditions. The AWOS-III system is located on the airfield, approximately 1,100 feet northwest of the Runway 9-27/15-33 intersection.

Boulder City Municipal Airport utilizes a CTAF, which was mentioned 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 universal communications (UNICOM) frequency (122.7 MHz) is available on the same frequency, which a pilot can use to obtain information from airport businesses that monitor that frequency.

Although Boulder City Municipal Airport does not currently have an airport traffic control tower (ATCT) located on the airfield, a 2011 study conducted by Quadrex Aviation, LLC, in association with Kimley-Horn and Associates Inc., justifies the potential need for an ATCT given the current and forecast operational statistics. Future planning will consider the potential need for an ATCT at Boulder City Municipal Airport.

*Future planning will consider the potential need for an ATCT at Boulder City Municipal Airport.*

## **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 Boulder City Municipal Airport include a very high frequency omnidirectional range (VOR), which has been combined with a military tactical air navigational aid (TACAN) to form a VORTAC; the airport also utilizes a global positioning system (GPS).

The VOR, designated for civilian pilots, provides azimuth readings to pilots of properly equipped aircraft by transmitting a radio signal at every degree to provide 360 individual navigational courses. The VORTAC provides distance and direction information to both civilian and military pilots. The Boulder City VORTAC is located approximately 3 ½ nautical miles north of the airport.

GPS is another 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 to a specific ground-based navigational facility.

## LANDSIDE FACILITIES

At a commercial service airport, such as Boulder City Municipal Airport, landside facilities typically include a terminal building and/or administration buildings, fixed base operators (FBOs), specialized aviation service operators (SASOs), aircraft storage hangars, aircraft parking aprons, and various support facilities, such as fuel storage, automobile parking, and fencing/gates. The landside facilities at the airport are identified on **Exhibit 1E**.



### Administration Building

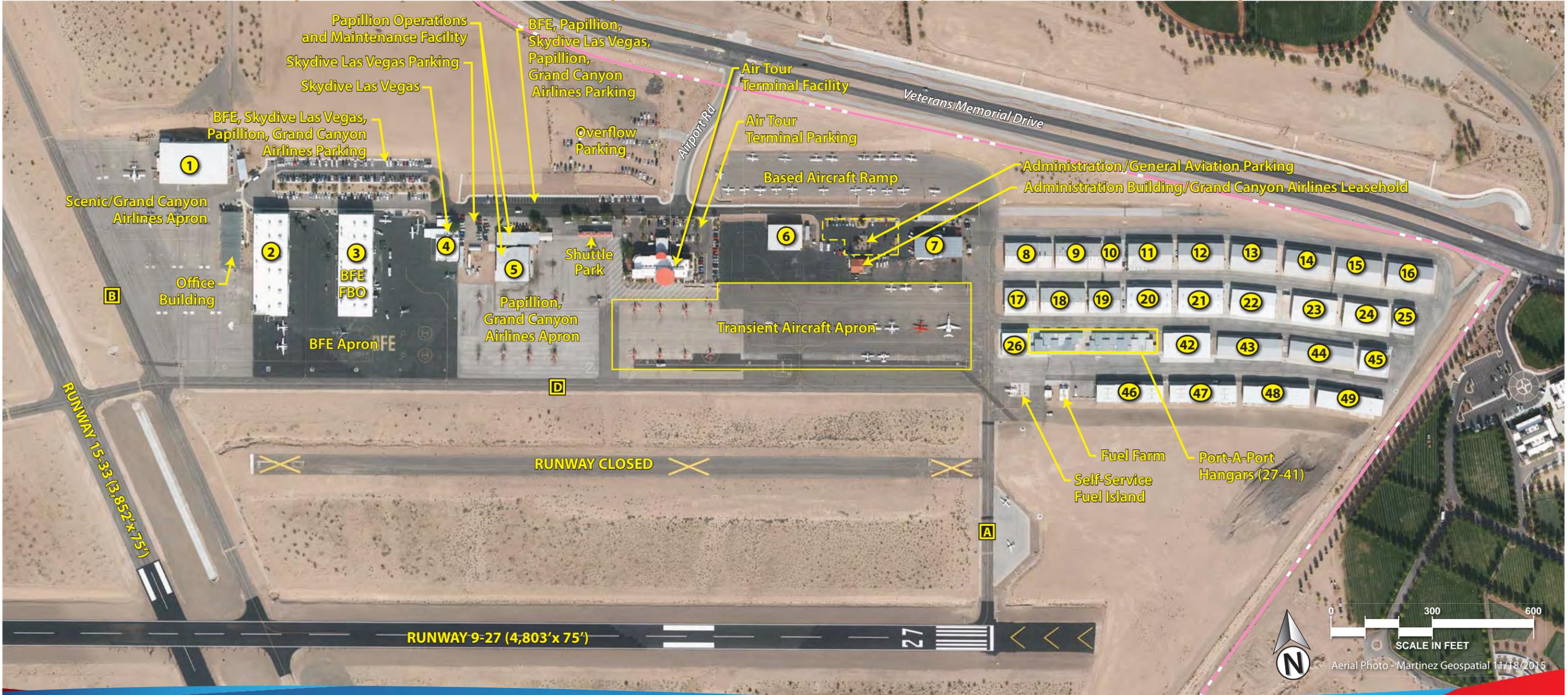
The two-story airport administration building was constructed in the 1980s and contains approximately 2,400 square feet of space. A portion of the administration building is utilized for airport administration and operations, while the other portion is occupied by Grand Canyon Airlines through a leasehold. The main entrance to the administration building is from inside the airport fence on the south side of the building. An additional entrance is provided curbside on the north side of the building.

### Air Tour Terminal Building

The air tour terminal building located on the airport is currently used and owned by Grand Canyon Airlines and Papillon Grand Canyon Helicopters. Both organizations are tour providers, offering guided air tours of the Las Vegas area as well as the Grand Canyon. The facility includes several features related to commercial passenger service activities, including the following:

- Ticketing for tour packages takes place on the east and west sides of the terminal facility.
- Across from the ticketing area are rental car and shuttle counters.
- A waiting area containing limited seating is available and centrally located to the ticketing counters.
- A gift shop and souvenir facility occupies the northwest side of the terminal building with access gained through the waiting area after passing through the main entrance.
- An outdoor observation/waiting patio is also provided on the west side of the air tour terminal building.
- Additional services are located to the right of the main entrance to the terminal and include vending machines, telephones, and public restrooms.

BUILDING NUMBER	BUILDING TYPE	BUILDING SIZE (SQ. FT.)	BUILDING NUMBER	BUILDING TYPE	BUILDING SIZE (SQ. FT.)	BUILDING NUMBER	BUILDING TYPE	BUILDING SIZE (SQ. FT.)	BUILDING NUMBER	BUILDING TYPE	BUILDING SIZE (SQ. FT.)	BUILDING NUMBER	BUILDING TYPE	BUILDING SIZE (SQ. FT.)
1	Conventional	25,200	11	Linear Box	10,125	21	Linear Box	10,125	31	Port-A-Port	880	41	Port-A-Port	880
2	Conventional	31,000	12	Linear Box	10,125	22	Linear Box	10,125	32	Port-A-Port	880	42	Linear Box	10,125
3	Conventional	31,000	13	Linear Box	10,125	23	Linear Box	10,125	33	Port-A-Port	880	43	Linear Box	10,000
4	Executive	4,200	14	Linear Box	10,125	24	Linear Box	10,125	34	Port-A-Port	880	44	Linear Box	10,000
5	Conventional	11,025	15	Linear Box	10,125	25	Executive	3,600	35	Port-A-Port	880	45	Executive	5,525
6	Executive	8,400	16	Linear Box	10,125	26	Executive	5,525	36	Port-A-Port	880	46	Linear Box	10,000
7	Executive	9,750	17	Linear Box	7,125	27	Port-A-Port	880	37	Port-A-Port	880	47	Linear Box	10,000
8	Linear Box	10,125	18	Linear Box	10,125	28	Port-A-Port	880	38	Port-A-Port	880	48	Linear Box	10,000
9	Linear Box	10,125	19	Linear Box	7,125	29	Port-A-Port	880	39	Port-A-Port	880	49	Linear Box	10,000
10	Linear Box	3,700	20	Linear Box	10,125	30	Port-A-Port	880	40	Port-A-Port	880			



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Passengers looking to board an aircraft are provided access to the single boarding gate through single doorways on the east and west sides of the building located adjacent to the main passenger waiting area. Arriving or returning passengers pass through the same exterior doors in order to enter the main terminal lobby. Administrative offices are located on the second level of the air tour terminal building and are designated for air tour service providers. These offices are separated into multiple work areas. Also located on the second level of the air tour terminal building is a dispatch facility that provides air traffic guidance to approaching and departing Papillon and Grand Canyon air tour operators.



The air tour terminal building is directly accessible from Airport Road, which is a two-lane paved roadway that provides access to the terminal area and associated vehicle parking lots. A two-way circulation pattern has been established adjacent to the north side of the terminal building to allow for passenger drop-off and vehicle circulation.

### Aircraft Hangar Facilities

Hangar facilities at Boulder City Municipal Airport are comprised of conventional hangars, executive hangars, T-hangars, box hangars, linear box hangars, and port-a-port hangars. Conventional hangars provide a large open space, free from roof support structures, and have the capability to store several aircraft simultaneously. Conventional hangars are often utilized by airport businesses, such as FBOs and large aircraft maintenance providers. Conventional hangars are typically 10,000 square feet or larger.

*Hangar facilities at Boulder City Municipal Airport are comprised of conventional hangars, executive hangars, T-hangars, box hangars, linear box hangars, and port-a-port hangars.*

Executive hangars provide the same type of aircraft storage as conventional hangars, but are typically smaller than 10,000 square feet. These hangars are normally utilized by individual owners to store several aircraft or by smaller airport businesses. This type of hangar is becoming more popular at general aviation airports and often is included in a larger contiguous facility that contains several separate hangar facilities.

T-hangars and linear box hangars provide for separate aircraft storage facilities within a larger hangar complex. These hangars typically provide space for only one aircraft and are used for private storage only. Box and port-a-port hangars typically provide storage for a single aircraft used for private storage, and consist of a stand-alone facility.

As shown on **Exhibit 1E**, there are 49 separate buildings, which encompass 140 private hangars at Boulder City Municipal Airport providing approximately 378,250 square feet of hangar, maintenance, and office space. Conventional hangar space at the airport totals approximately 98,225 square feet in four separate hangars. There are six separate executive hangar facilities totaling approximately 37,000 square feet. Finally, 24 Linear Box/T-hangars and 15 port-a-port hangar facilities are on the airport comprising approximately 243,025 square feet.

### Aircraft Parking Aprons

There are several designated aircraft parking apron areas at Boulder City Municipal Airport, as depicted on **Exhibit 1E**. The air tour terminal parking apron is located adjacent to the south side of the terminal building. This area is comprised of space for commercial aircraft to park, deplane, and board passengers and encompasses approximately 32,400 square yards. This also includes space for parking and circulation of airline support equipment. There are currently 20 helicopter parking positions and seven positions for fixed-wing aircraft. The air tour terminal parking apron is constructed of asphalt.

The east aircraft parking apron extends east of the air tour terminal area adjacent to the north side of Taxiway D and consists of approximately 11,100 square yards of pavement comprised of asphalt. Within this area, there are 29 marked fixed-wing aircraft tiedown positions and one marked helicopter parking space which are used by transient aircraft for parking. Additional parking for general aviation aircraft is provided on the north side of the airport administration building and can be accessed via Taxiway A. The GA apron encompasses approximately 10,000 square yards and 29 marked aircraft tiedown positions.

The west and far west aircraft parking aprons are constructed of asphalt. The west apron serves the BFE FBO and encompasses approximately 11,600 square yards. This apron contains 22 marked fixed-wing aircraft parking spaces and eight marked helicopter parking spaces. The far west apron contains 14 marked parking spaces for larger aircraft and encompasses approximately 14,500 square yards.

All totaled, there are approximately 79,600 square yards of aircraft parking apron offered at the airport. Within these areas, approximately 103 marked tiedown positions are offered for general aviation aircraft.



## Aviation Services

Those businesses that choose to locate on airport property or adjacent to the airport provide a significant impact not only to the airport, but also to the region. Encouraging businesses to locate in the vicinity of an airport is a good practice for a number of reasons. First, the business will benefit from being near a commerce and transportation hub. Second, the community will benefit because the airport will develop a buffer of industry and manufacturing that will restrict incompatible land uses, such as residential housing, from locating too close to the airport. Third, business development on and around airports can generate a direct revenue stream to the airport. Some airports have done this successfully, leading to airport self-sufficiency.

*Those businesses that choose to locate on airport property or adjacent to the airport provide a significant impact not only to the airport, but also to the region. Encouraging businesses to locate in the vicinity of an airport is a good practice for a number of reasons.*

A wide variety of aviation services are available at Boulder City Municipal Airport. This includes commercial service, aircraft fueling, aircraft parking, hangar space/leasing, flight instruction, and aircraft maintenance. The commercial service tour operators located on the airport include the following, as aforementioned:

- 5 Star Grand Canyon Helicopter Tours
- Grand Canyon Airlines
- Papillon Grand Canyon Helicopters
- Serenity Helicopters

There is also a full range of specialty aviation businesses located on the airport that provide aviation services including aircraft maintenance, avionics, rental cars, hangar space/leasing, aircraft parts, flight instruction and training, skydiving, and other services. These businesses include:

- Sky Dive Las Vegas
- BFE Flight Services
- Boulder City Aviation Services
- Black Mountain Avionics
- PS Aviation

In addition, a gift shop is located in the air tour terminal building that caters to commercial passenger service as well as local customers. Boulder City provides airport management and oversees the day-to-day operations at the airport



### Vehicle Parking

Boulder City Municipal Airport has dedicated parking areas for vehicles adjacent to the north, east, and west sides of the air tour terminal building that are accessible via Airport Road extending from the north side of the airport. Vehicle parking in the immediate vicinity of the air tour terminal building includes public, employee, handicapped-accessible, and taxi/shuttle spaces.

A paved parking area is located directly north of the Boulder City Municipal Airport Administration Building. This parking area contains 35 marked parking spaces. Located directly to the east of the administration building is Building 1197, a large aircraft hangar, which provides an additional 12 paved and marked private parking spaces.

Directly to the north of the air tour terminal building, approximately 23 marked vehicle parking positions are provided. Farther to the east, an additional 20 vehicle parking spaces are available in an unpaved area across from the Aviation Drive loop in the terminal area. Additional unpaved vehicle parking is available on the north side of the air tour terminal building and adjacent to the north side of Airport Road, which includes an estimated 230 spaces.

Additional paved vehicle parking spaces are provided farther west and directly north of the Papillon Operations facility and include 11 positions. Farther west of this area is another paved parking lot that provides 25 vehicle positions that accommodates the Papillon Operations facility, Sky Dive Las Vegas, and other airport tenants. An unpaved parking area is also provided directly north of Airport Road adjacent to the Papillon Operations facility. The unpaved parking area contains an estimated 53 unmarked parking spaces.

At the westernmost point of Airport Road are additional paved and marked vehicle parking positions situated to the north of the BFE FBO facilities. Approximately 131 vehicle positions are located in this area, with two positions being designated for Enterprise Rent-A-Car. The area also contains two motorcycle parking areas capable of accommodating approximately three motorcycles each.

Vehicle parking at the airport is under the control of Boulder City. Airport parking passes can be obtained at the Airport Administration Building. Airport parking passes can be purchased on an annual, quarterly, or monthly basis.

Other unmarked parking areas on the airport are located along the north side of Airport Road that runs adjacent to the air tour terminal facility and FBO facilities. Additional unmarked parking is located east

of the designated parachute landing zone. Unmarked and unpaved parking is designated strictly for airport overflow parking. Boulder City Ordinance mandates that all primary off-street parking must be paved.

### **Fuel Facilities**

There is currently one fuel farm located on the airport that stores aviation fuel. While the fuel farm is operated by the BFE FBO, it is owned by Boulder City. The fuel farm is located near the entrance to the GA hangars, accessible from Taxiway A. It consists of two aboveground storage tanks providing for 40,000 gallons of Jet A fuel storage and two underground fuel storage tanks providing 12,000 gallons of 100LL fuel storage and 12,000 gallons of Jet A fuel storage.

Fueling trucks are also in use by Papillon Grand Canyon Helicopters, BFE FBO, and Grand Canyon Airlines. Full service fueling operations are available from BFE FBO, as well as self-service fueling from the fueling island located west of Taxiway A, near the entrance to the GA hangars.

### **Aircraft Rescue and Firefighting**

Only *Title 14 Code of Federal Regulations (CFR) Part 139* certificated airports are required to provide aircraft rescue and firefighting (ARFF) services. Boulder City Municipal Airport is not Part 139 certificated, and as such, is not required to support on-site ARFF services. However, the need for on-site ARFF services will be further examined as airport tenants and service providers have recently expressed interest in the subject. Firefighting and emergency services are currently provided by the Boulder City Fire Department, located approximately two miles to the northeast.

*The need for on-site ARFF services will be further examined as airport tenants and service providers have recently expressed interest in the subject.*

### **Snow and Ice Control**

Snow and ice removal is not a necessary function for Boulder City Municipal Airport as significant accumulation is rare. Average annual snowfall totals are approximately 0.9 inches in the Boulder City area.

## Fencing / Gates

Boulder City Municipal Airport's perimeter is fenced with six-foot tall chain link fencing with three-strand barbed wire across the top. The fencing does not always follow the legal property boundary due to the layout of physical features and infrastructure development.

A combination of automatic and manual gates is situated around the airfield in order to prevent inadvertent entry. All vehicle gates which enter onto the movement area are controlled-access and locked at all times.



## Maintenance Facilities and Equipment

The airport does not currently have a building dedicated to maintenance or storage. Future planning will consider the need for a dedicated airport maintenance facility. Although the airport does not currently have a facility to house equipment, the airport does own equipment dedicated to maintenance and operation of the airport. The airport currently owns the following equipment:

- One 2011 Chevy Colorado
- One 2012 Ford Explorer
- One 2015 Nissan Leaf
- One golf cart
- Two lighted "X's" (to indicate closed runway or taxiway)
- One Buffalo Blower
- One foreign object debris (FOD) Boss
- Two portable generators

## 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 for both airside and landside components. **Table 1F** presents the utilities and providers serving Boulder City Municipal Airport.

**TABLE 1F**  
**Utility Services**  
**Boulder City Municipal Airport**

Utility	Service Provider
Electric	Boulder City Municipal Electrical Distribution System
Gas	New Mexico Gas Company
Water (Untreated)	U.S. Bureau of Reclamation (SUBR)
Water (Potable)	Southern Nevada Water System (SNWS)
Sewer	Boulder City Waste Water Treatment

Source: Boulder City Master Plan (2009).

## VICINITY AIRSPACE

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

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

**Class B Airspace:** Class B airspace has been designated around some of the country’s busiest commercial service airports, such as McCarran 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 busy commercial service airports. This airspace is the most restrictive controlled airspace encountered by pilots operating under visual flight rules (VFR). Boulder City Municipal Airport is located under the Class B airspace designated for McCarran International Airport which begins at 7,000 feet MSL above Boulder City Municipal Airport and extends to 10,000 feet MSL.

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. Moreover, a pilot must have at least a private pilot’s certificate or be a student pilot who has met the requirements of FAR Part 61.95, which

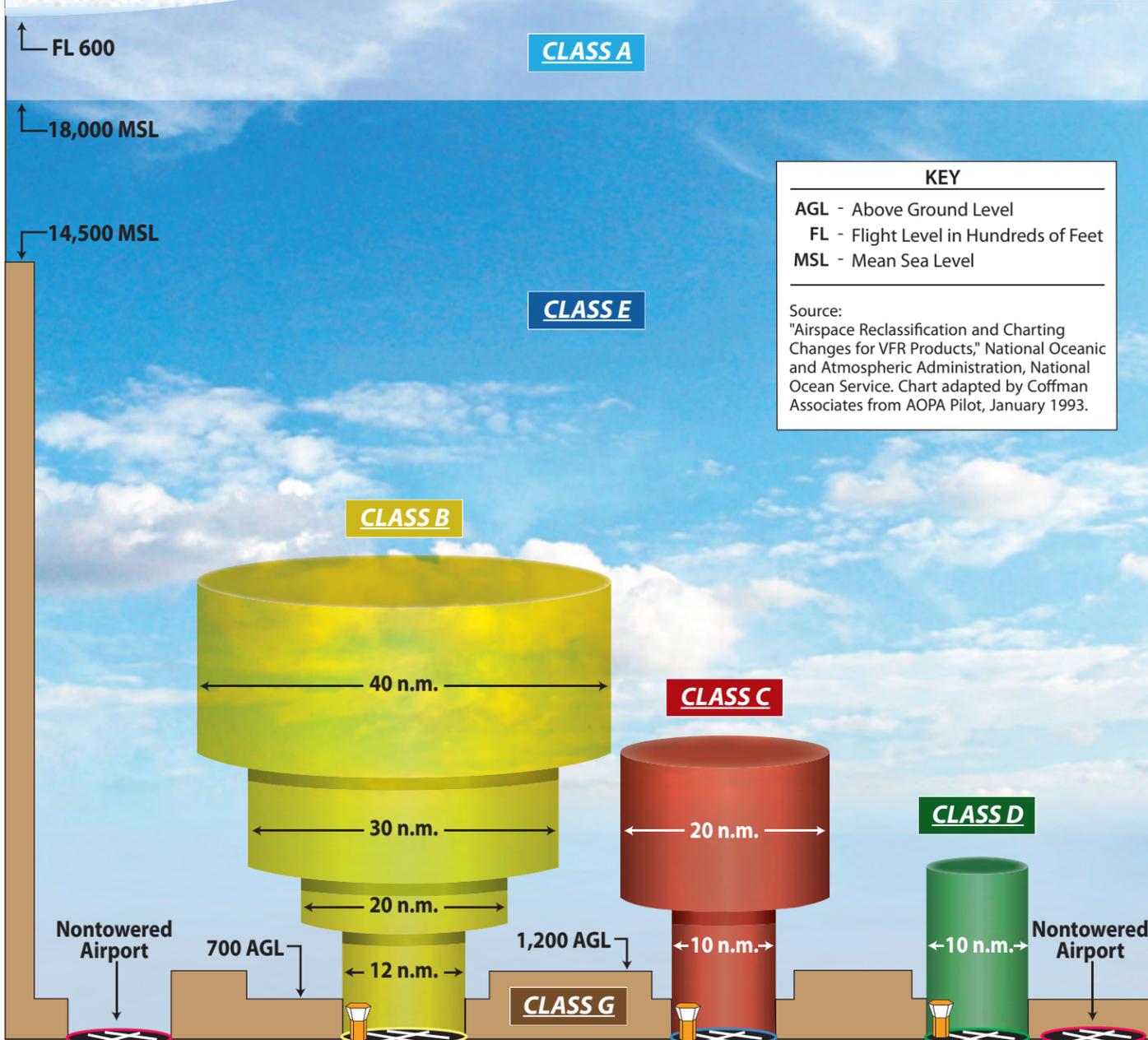
requires special ground and flight training for Class B airspace. Helicopters do not need special navigation equipment or a transponder if they operate at or below 1,000 feet and have made prior arrangements in the form of a Letter of Agreement with the FAA controlling agency. Aircraft are also required to have and utilize a Mode C transponder within a 30-nautical-mile range of the center of Class B airspace. A Mode C transponder allows the ATCT to track the altitude of the aircraft.

**Class C Airspace:** The FAA has established Class C airspace at 120 airports around the country as a means of regulating air traffic in these areas. Class C airspace is designed to regulate the flow of uncontrolled traffic above, around, and below the arrival and departure airspace required for high-performance, passenger-carrying aircraft at some commercial service airports. In order to fly inside Class C airspace, the aircraft must have a two-way radio, an encoding transponder, and have established communication with ATC. Aircraft may fly below the floor of Class C airspace or above the Class C airspace ceiling without establishing communication with ATC. Currently, the nearest Class C Airspace is approximately 175 nautical miles to the southwest of Boulder City Municipal Airport at the Los Angeles/Ontario International Airport.

**Class D Airspace:** Class D airspace is controlled airspace surrounding airports with an ATCT. The Class D airspace typically constitutes a cylinder with a horizontal radius of five nautical miles from the airport, extending from the surface up to a designated vertical limit, typically set at approximately 2,500 feet above the airport elevation. The nearest Class D airspace surrounds North Las Vegas Airport, approximately 23 nautical miles to the northwest, and Creech Air Force Base approximately 55 nautical miles to the northwest of Boulder City Municipal Airport.

**Class E Airspace:** Class E airspace consists of controlled airspace designed to contain IFR operations near an airport and while aircraft are transitioning between the airport and enroute environments. Unless otherwise specified, Class E airspace terminates at the base of the overlying airspace. Only aircraft operating under IFR are required to be in contact with air traffic control when operating in Class E airspace. While aircraft conducting visual flights in Class E airspace are not required to be in radio communications with air traffic control facilities, visual flight can only be conducted if minimum visibility and cloud ceilings exist. Class E airspace helps to buffer the Class D airspace at the airport in order to protect approaches to the various runways, generally having a floor of 700 feet above ground level (AGL). The Boulder City Municipal Airport is currently located in Class E Airspace.

**Class G Airspace:** Airspace not designated as Class A, B, C, D, or E is considered uncontrolled, or Class G, airspace. ATC does not have the authority or responsibility to exercise control over air traffic within this airspace. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet AGL). The airspace immediately surrounding Boulder City Municipal Airport is classified as Class G.

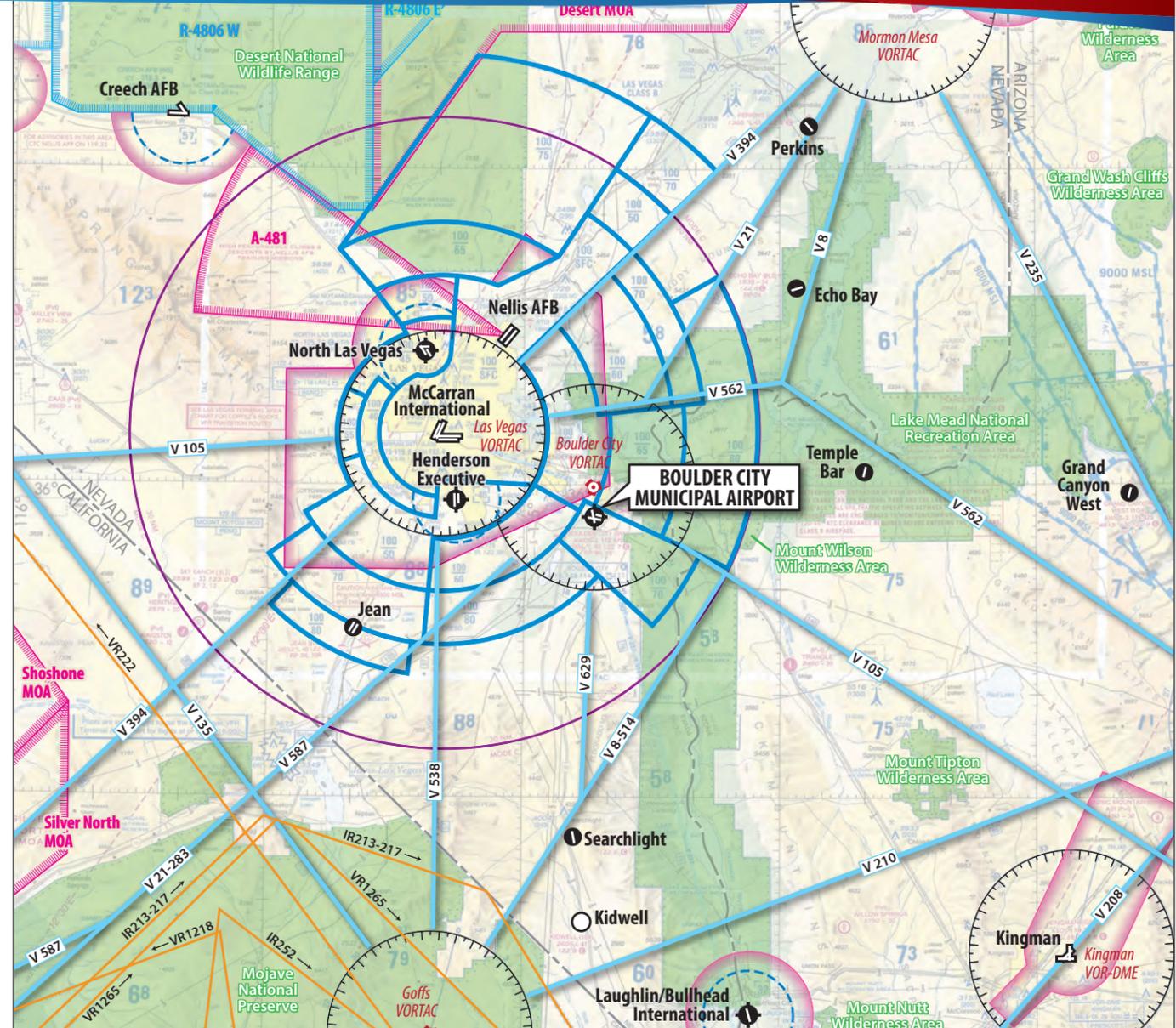


**KEY**  
 AGL - Above Ground Level  
 FL - Flight Level in Hundreds of Feet  
 MSL - Mean Sea Level

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.

**DEFINITION OF AIRSPACE CLASSIFICATIONS**

- 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.



**LEGEND**

- Airport with other than hard-surfaced runways
- Airport with hard-surfaced runways 1,500' to 8,069' in length
- Airports with hard-surfaced runways greater than 8,069' or some multiple runways less than 8,069'
- Class B Airspace
- Class C Airspace - Mode C
- Class D Airspace
- Class E Airspace with floor 700 ft. above surface
- VORTAC
- Compass Rose
- Victor Airways
- Military Training Routes
- Wilderness Area
- Prohibited, Restricted, Warning, and Alert Areas
- Alert Area and MOA - Military Operations Area

**Source:**  
 Las Vegas Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration, March 5, 2015  
 Phoenix Sectional Chart, US Department of Commerce, National Oceanic and Atmospheric Administration, April 30, 2015

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**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. The designation of special use airspace identifies for other users the areas where military activity occurs, provides for segregation of that activity from other fliers, and allows charting to keep airspace users informed. These areas are depicted on **Exhibit 1F**.

*The designation of special use airspace identifies for other users the areas where military activity occurs, provides for segregation of that activity from other fliers, and allows charting to keep airspace users informed.*

**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 nautical miles wide.

As previously discussed, the Boulder City VORTAC is located approximately 3 ½ nautical miles north of Boulder City Municipal Airport. The following Victor Airways lead to and from the Boulder City and Las Vegas VORTAC facilities in the vicinity of the airport:

- V208
- V210
- V8-514
- V629
- V538
- V587
- V21-283
- V135
- V394
- V105
- V21
- V8
- V562
- V235

**Military Training Routes:** Military Training Routes (MTRs) are designated military flight paths that allow flight in excess of 250 knots at low altitude, typically below 10,000 feet MSL. MTRs can be designated for either VFR or IFR flight at altitudes below 1,500 feet or above 1,500 feet. Non-participating pilots are not restricted from utilizing MTRs; however, extreme caution and vigilance is recommended due to the nature of the participant aircraft using the MTRs. The FAA recommends contacting the nearest Flight Service Station to obtain information regarding the activity status of the MTR. MTRs within the vicinity of Boulder City Municipal Airport are located southwest of the airport and include VR222, VR1265, VR1218, IR213-217, and IR252.

**Military Operations Areas:** Military Operating Areas (MOAs) are designated areas of airspace established outside of Class A airspace to separate or segregate certain military activities IFR traffic and to identify for VFR traffic where these activities are conducted. While the FAA does not prohibit civilian VFR traffic from transiting an active MOA, it is strongly discouraged.

MOAs in the vicinity of Boulder City Municipal Airport include the A-481 MOA located approximately 25 nautical miles to the northwest of the airport as well as the Desert MOA located approximately 30 nautical miles north-northwest of the airport. The Shoshone and Silver North MOAs are located approximately 65 nautical miles southwest of the airport.

**Restricted Airspace:** Restricted areas contain airspace in which the flight of aircraft, while not wholly prohibitive, is subject to restrictions. Activities within these areas must be confined because of their nature, and limitations to aircraft operations may be imposed on those aircraft that are not a part of these activities. Restricted airspace is off-limits for public use unless granted permission from the controlling agency. The restricted areas in the vicinity of the airport are used by the military.

*The ARTCC facility having jurisdiction over the restricted airspace needs to authorize clearances to aircraft that cannot avoid the restricted area, unless the aircraft is on a previously approved altitude reservation mission or is part of the activity within the restricted area.*

The ARTCC facility having jurisdiction over the restricted airspace needs to authorize clearances to aircraft that cannot avoid the restricted area, unless the aircraft is on a previously approved altitude reservation mission or is part of the activity within the restricted area. If the restricted area is not active, the ARTCC facility will allow aircraft to transition through the airspace without issuing special clearances. Two restricted areas are located within the vicinity of Boulder City Municipal Airport. **Table 1G** presents these restricted areas and their pertinent information as it relates to time of designation, designated altitudes, controlling agency, and using agency.

**Table 1G**  
**Restricted Airspace**  
**Boulder City Municipal Airport**

Airspace Name	Time of Designation (Local)*	Designated Altitude	Controlling Agency	Using Agency
R-4806W	Continuous	Unlimited	FAA, Los Angeles ARTCC	USAF Warfare Center, Nellis AFB
R-4806E	5:00 a.m. - 8:00 p.m. Monday - Saturday	100 feet AGL – Unlimited	FAA, Los Angeles ARTCC	U.S. Air Force, commander, Tactical Fighter Weapon Center, Nellis AFB

\*Other times by NOTAM at least 24 hours in advance

Source: FAA Order JO 7400.8U, *Special Use Airspace* (January 2012).

## Temporary Flight Restrictions

Temporary flight restrictions (TFRs) are used to secure specific parcels of airspace for a specific period of time. TFRs are utilized for a variety of occasions and their use has become more prevalent since the terrorist attacks of September 11, 2001. A TFR is issued as a Notice to Airman (NOTAM) and it is ultimately the pilot's responsibility to be knowledgeable of the TFRs in their area of operation. A TFR may be established for the following reasons:

- Protect persons and property in the air or on the surface from an existing or imminent hazard.
- Provide a safe environment for the operation of disaster relief aircraft.
- Prevent an unsafe congestion of sightseeing aircraft above an incident or event, which may generate a high degree of public interest.
- Protect declared national disasters for humanitarian reasons in the State of Hawaii.
- Protect the President, Vice President, or other public figures.
- Provide a safe environment for space agency operations.

The Las Vegas area experiences TFRs throughout the year, which may affect the operations taking place at Boulder City Municipal Airport.

## National Park Service, Recreation, and Wilderness Areas

Nine wilderness areas exist in proximity to Boulder City Municipal Airport. Aircraft are requested to maintain a minimum altitude of 2,000 feet above the surface of designated Wilderness Areas, which can include National Parks Recreation Areas and Breeding Grounds. FAA Advisory Circular (AC) 91-36C defines the "surface" as the highest terrain within 2,000 feet laterally of the route of flight or the uppermost rim of a canyon or valley. The airport is located in proximity to the Desert National Wildlife Range, Lake Mead National Recreation Area, Grand Wash Cliffs Wilderness Area, Paiute Wilderness Area, Mount Wilson Wilderness Area, Mount Tipton Wilderness Area, Mount Nutt Wilderness Area, the Mojave National Preserve, and the Grand Canyon National Park.

## AIRSPACE CONTROL

As previously discussed, Boulder City Municipal Airport does not currently have an ATCT; therefore, no formal terminal air traffic control services are available for aircraft landing or departing the airport. Aircraft operating in the area are not required to file any type of flight plan or to contact any air traffic control facility unless they are entering airspace where contact is mandatory. The CTAF is used by pilots to obtain airport information and advise other aircraft of their position in the traffic pattern and their intentions. In addition, Papillon Grand Canyon Helicopters utilizes a dispatch facility on the second level



of the air tour terminal facility in an effort to better coordinate approaching and departing aircraft with air tour operations.

Boulder City Municipal Airport is located within the jurisdiction of the Los Angeles Air Route Traffic Control Center (ARTCC). The Reno Flight Service Station (FSS) provides additional weather data and other pertinent information to pilots on the ground and en route.

### **INSTRUMENT APPROACH PROCEDURES**

Instrument approach procedures are a series of predetermined maneuvers established by the FAA and using electronic navigational aids that assist pilots in locating and landing at an airport, especially during instrument flight conditions.

Currently, there are no published instrument approach procedures at BVU; however, there are four published and approved standard terminal arrivals (STARs). STARs are ATC IFR routes created for application to arriving IFR aircraft en route to specific airports. STARs serve as a form of communication between pilots and ATC. When a flight crew accepts ATC clearance for a STAR, they have communicated with the controller the specific route they will be following, and in some cases they also specify the airspeed and altitude, depending upon the type of clearance. The use of STARs provides a common method for departing the en route airspace structure and navigating to a specific destination. In short, a STAR is a preplanned IFR ATC arrival procedure published for the use of pilots in order to simplify clearance delivery procedures.

Published STARs associated with Boulder City Municipal Airport are presented in **Exhibit 1G**.

Although STARs are typically used by ATC to provide a seamless transition from the en route airspace structure to an instrument approach for a specific airport, STARs are capable of serving multiple airports as they typically end at a specified fix or navigational aid. If the airport contains published and approved instrument approach procedures, the approach will generally begin where the STAR ends. Otherwise, aircraft utilizing the STAR can continue to the desired destination after departing the STAR.

Along with published STARs, Boulder City Municipal Airport also contains preferred arrival routes. Given the large amount of air tour operations taking place at the airport, the airport has generated a set of preferred arrival routes in an effort to establish an organized method for aircraft entering the traffic pattern.



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As a result of the amount of fixed-wing and helicopter traffic, the airport has provided preferred arrival routes for both fixed-wing and helicopter arrivals. Preferred arrivals for Boulder City Municipal Airport are presented in **Exhibit 1H**. Preferred fixed-wing arrivals include the Powerline and Wilson's Ridge Arrivals. Preferred helicopter arrivals are based primarily on weather conditions at the time of arrival. These preferred arrivals include the following:

*Given the large amount of air tour operations taking place at the airport, the airport has generated a set of preferred arrival routes in an effort to establish an organized method for aircraft entering the traffic pattern.*

- Arrival from the northeast
- Arrival from the northwest for north or calm winds
- Arrival from the northwest for south winds
- Arrival from the south

## DEPARTURE PROCEDURES

Departure procedures are preplanned instrument procedures which provide obstruction clearance from the terminal area to the appropriate en route structure. These procedures can either provide obstacle clearance protection information to pilots through obstacle departure procedures (ODPs) or increase airspace efficiency and reduce communications and departure delays through standard instrument departures (SIDs). Currently, Boulder City Municipal Airport does not contain any departure procedures.

Although the airport does not have published FAA approved departure procedures, the airport does have preferred departure procedures in order to allow for efficient and noise conscious operation of air tour service providers, as well as flight instruction and GA traffic. The Boulder City Municipal Airport has one preferred departure route for fixed-wing traffic, which is presented in **Exhibit 1H** from the previous section.

Given the amount of helicopter air tour operations occurring at Boulder City Municipal Airport, numerous preferred helicopter departure procedures have been established by the airport. These preferred procedures are also presented in **Exhibit 1H**. Preferred helicopter departure procedures include the following:

- South or calm wind
- East or west wind
- North wind
- Powerline departure
- Railroad pass departure

## LOCAL OPERATING PROCEDURES

Boulder City Municipal Airport is situated at 2,203 feet MSL. The traffic pattern at the airport is maintained to provide the safest and most efficient use of the airspace surrounding the airport. While aircraft can be expected to operate over most areas of the region, the density of aircraft operations are higher near the airport. This is the result of aircraft following the established traffic patterns for the airport. A

*While aircraft can be expected to operate over most areas of the region, the density of aircraft operations are higher near the airport.*

traffic pattern is the directional traffic flow that is prescribed for aircraft landing or taking off from an airport. Essentially, the traffic pattern defines which side of the runway aircraft will operate. The traffic patterns for Runways 9-27 and 15-33 are published as standard left-hand patterns.

The traffic pattern altitude for light, non-turbine general aviation aircraft is 1,000 feet AGL. For larger general aviation and fixed-wing turbine aircraft, the pattern altitude is 1,500 feet AGL. The recommended helicopter traffic pattern altitude is 500 feet AGL.

## NOISE ABATEMENT RULES AND PROCEDURES

In an effort to reduce noise impacts in areas adjacent to Boulder City Municipal Airport, pilots are encouraged to adhere to a voluntary noise abatement program entitled “Fly Quiet.” The voluntary “Fly Quiet” program was initiated in an effort to respect the community surrounding the Boulder City Municipal Airport. The courtesy no-fly zone as well as the preferred arrival and departure routes for helicopter and fixed-wing aircraft are depicted on **Exhibit 1H**.

*The voluntary “Fly Quiet” program was initiated in an effort to respect the community surrounding the Boulder City Municipal Airport.*

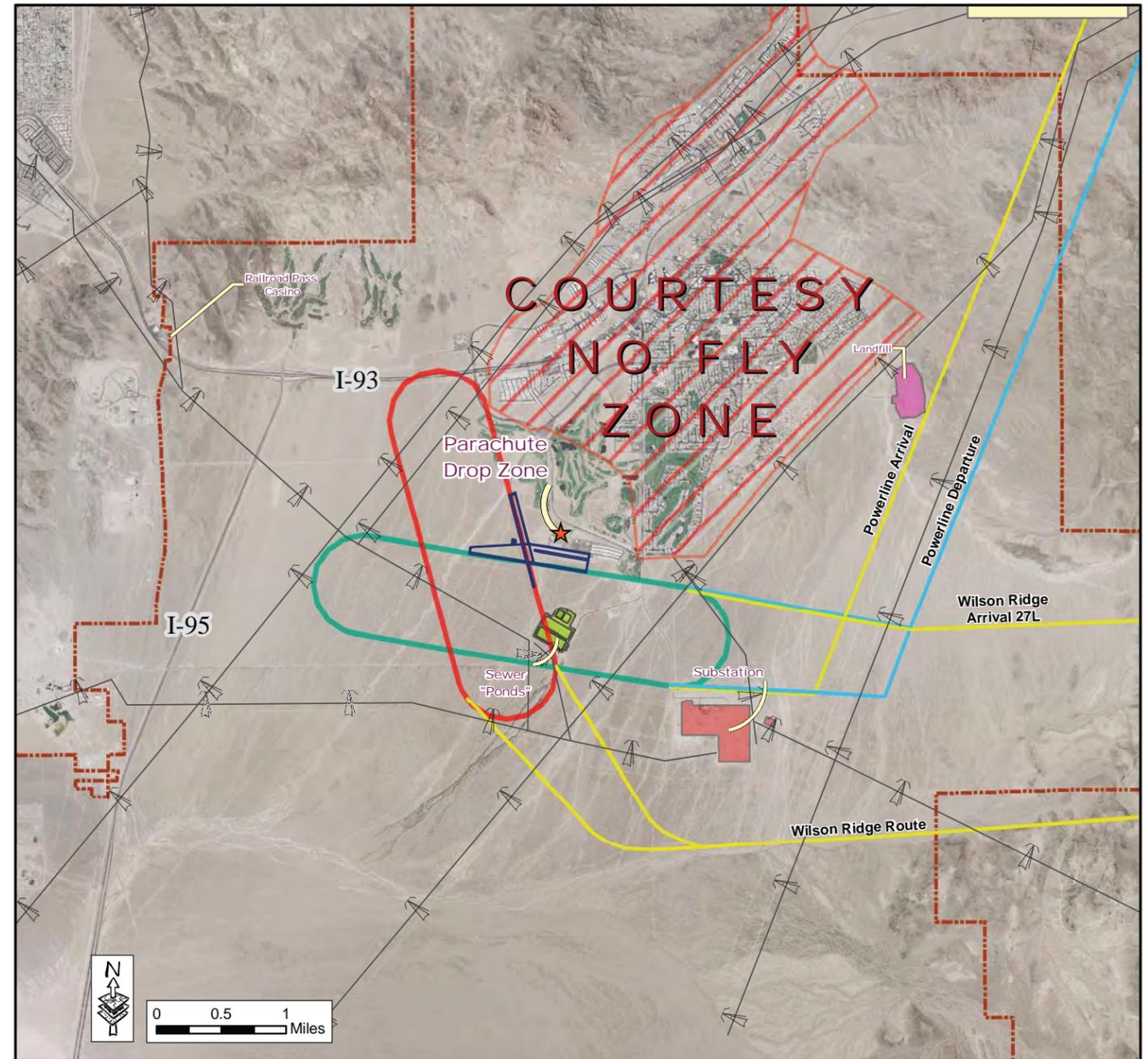
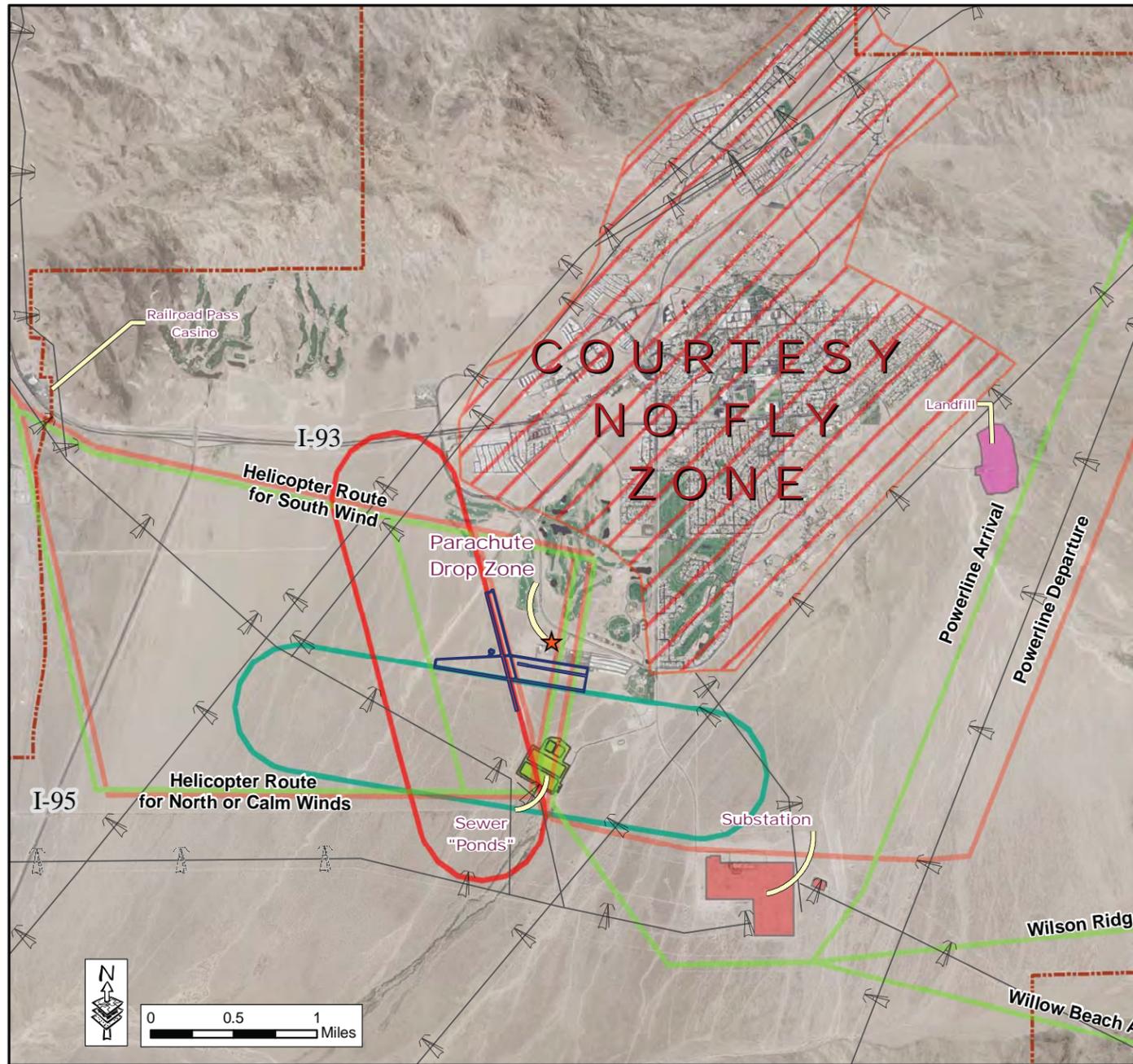
## REGIONAL AIRPORTS

A review of public-use airports within the vicinity of Boulder City Municipal Airport has been made to identify and distinguish the type of air service provided in the area surrounding the airport. Information pertaining to each airport was obtained from FAA Form 5010-1, *Airport Master Record*. **Exhibit 1J** provides information on public-use airports within 50 nautical miles of Boulder City Municipal Airport.

There are 12 public-use airports within a 50-nautical mile radius, as presented on the exhibit. The nearest airports to Boulder City Municipal Airport that provide commercial airline services are McCarran International Airport, located approximately 16 nautical miles to the northwest, and Laughlin/Bullhead

**Boulder City Municipal Airport Helicopter Arrival/Departure Patterns**

**Boulder City Municipal Airport Fixed Wing Arrival/Departure Patterns**



**LEGEND**

- Transmission Lines
- WAPA Substation
- Sanitary Landfill
- Wastewater Treatment plant

- ▭ Boulder City Limits
- ▭ Runway Pattern for 15/33
- ▭ Runway Pattern for 9R/27L

**Helicopter Patterns Pattern**

- Arrival
- Departure

**Fixed Wing Patterns Pattern**

- Arrival
- Departure

**Notes:**

Map Prepared by:  
Brok Armantrout  
Director, Community Development Department  
City of Boulder City, Nevada

Date: March 18, 2010  
Revision: 1.20

Aerial Photography: Fall 2009  
Photography Source: (Clark County)

The map shows both north-wind and south-wind approaches into the airport.

Also, note that the map marks a recommended courtesy "no-fly" zone over the city. It is recognized that pilots are entitled to fly over the city if they so choose. The City is asking, as a courtesy, if they would consider not flying over the city.

Map originally prepared in April 2007. Revised in April 2009 to show current aerial photography and adjusted arrival/departure paths for all aircraft types.

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**HENDERSON EXECUTIVE AIRPORT (HND)**



Airport NPIAS Classification: ..... Reliever  
 FAA Asset Study Classification: .... National  
 Location from BVU: ..... 13 nm W  
 Elevation: ..... 2492  
 Weather Reporting: ..... AWOS-3PT  
 ATCT: ..... Yes  
 Annual Operations: ..... 71,175  
 Based Aircraft: ..... 260  
 Enplaned Passengers: ..... 22,372

RUNWAYS	17R-35L	17L-35R
Length	6,501'	5,001'
Width	100'	75'
Pavement Strength		
SWL	30,000	30,000
DWL	60,000	30,000
Lighting	MIRL	MIRL
Marking	Basic	Basic
Approach Aids	PAPI-4 REIL	PAPI-4 REIL
Instrument Approach Procedures	RNAV GPS- 35L	

Services Provided: Aircraft fuel (100LL/Jet A), bulk oxygen, aircraft tiedowns, air taxi and charter operations.

**MCCARRAN INTERNATIONAL AIRPORT (LAS)**



Airport NPIAS Classification: ..... Primary  
 FAA Asset Study Classification: ... Large Hub  
 Location from BVU: ..... 16.2 nm WNW  
 Elevation: ..... 2,181.4  
 Weather Reporting: ..... ASOS  
 ATCT: ..... Yes  
 Annual Operations: ..... 521,950  
 Based Aircraft: ..... 126  
 Enplaned Passengers: ..... 19,959,651

RUNWAYS	7L-25R	7R-25L	1R-19L	1L-19R
Length	14,512'	10,525'	9,771'	8,988'
Width	150	150	150	150
Pavement Strength				
SWL	120,000	120,000	120,000	120,000
DWL	250,000	250,000	250,000	250,000
Lighting	HIRL	HIRL	MIRL	MIRL
Marking	Precision	Precision	Non-precision	Precision
Approach Aids	PAPI-4, MALS-25R REIL-7R	PAPI-4 MALS-25L REIL-19R	PAPI-4 REIL	PAPI-4 MALS-1L
Instrument Approach Procedures	ILS/DME-25R	ILS/DME-25L		ILS/DME-1L

Services Provided: Aircraft fuel (100LL/Jet A), aircraft hangars and tiedowns, bottled and bulk oxygen, major airframe and powerplant maintenance, air taxi, charter, and commercial air service.

**NORTH LAS VEGAS AIRPORT (VGT)**



Airport NPIAS Classification: ..... Reliever  
 FAA Asset Study Classification: ..... National  
 Location from BVU: ..... 22.6 nm NW  
 Elevation: ..... 2205  
 Weather Reporting: ..... ASOS  
 ATCT: ..... Yes  
 Annual Operations: ..... 133,225  
 Based Aircraft: ..... 489  
 Enplaned Passengers: ..... 48,271

RUNWAYS	7 25	12R-30L	12L-30R
Length	5,005'	5,001'	4,203'
Width	75	75	75
Pavement Strength			
SWL	30,000	30,000	30,000
DWL	NA	NA	NA
Lighting	MIRL	MIRL	MIRL
Marking	Basic	Non-precision	Non-precision
Approach Aids	PAPI-4 REIL	PAPI-4 REIL	PAPI-4 REIL
Instrument Approach Procedures	GPS-12R	ILS/LOC-12L	

Services Provided: Aircraft fuel (100LL/Jet A), aircraft tiedowns, bulk oxygen, major airframe and powerplant maintenance, air taxi, charter, and commercial air service.

**JEAN AIRPORT (0L7)**



Airport NPIAS Classification: ..... GA  
 FAA Asset Study Classification: ..... Local  
 Location from BVU: ..... 25.2 nm WSW  
 Elevation: ..... 2,832 feet  
 Weather Reporting: ..... None  
 ATCT: ..... No  
 Annual Operations: ..... 20,075  
 Based Aircraft: ..... 21  
 Enplaned Passengers: ..... 1,290

RUNWAYS	2L-20R	2R-20L
Length	4,600	3,700
Width	75	60
Pavement Strength		
SWL	12,500	12,500
DWL		
Lighting	MIRL	None
Marking	Basic	Basic
Approach Aids	None	None
Instrument Approach Procedures	None	

Services Provided: Aircraft fuel (100LL/Jet A), aircraft tiedowns.

**TEMPLE BAR AIRPORT (U30)**



Airport NPIAS Classification: ..... NA  
 FAA Asset Study Classification: ..... NA  
 Location from BVU: ..... 25.9 nm E  
 Elevation: ..... 1,549 feet  
 Weather Reporting: ..... None  
 ATCT: ..... No  
 Annual Operations: ..... 948  
 Based Aircraft: ..... None  
 Enplaned Passengers : ..... NA

RUNWAYS	18-36
Length	3,500'
Width	50'
Pavement Strength	
SWL	10,000
DWL	
Lighting	None
Marking	Basic
Approach Aids	None
Instrument Approach Procedures	None

Services Provided: Aircraft tiedowns and air taxi.

**ECHO BAY AIRPORT (0L9)**



Airport NPIAS Classification: ..... NA  
 FAA Asset Study Classification: ..... NA  
 Location from BVU: ..... 29.1 nm NE  
 Elevation: ..... 1,535 feet  
 Weather Reporting: ..... None  
 ATCT: ..... No  
 Annual Operations: ..... 504  
 Based Aircraft: ..... 1  
 Enplaned Passengers: ..... NA

RUNWAYS	6-24
Length	3,400
Width	50
Pavement Strength	
SWL	12,500
DWL	NA
Lighting	None
Marking	Basic
Approach Aids	None
Instrument Approach Procedures	None

Services Provided: Aircraft tiedowns.

**KEY**

- ASOS - Automated Surface Observation System
- ATCT - Airport Traffic Control Tower
- AWOS - Automated Weather Observation System
- DWL - Dual Wheel Loading
- DTWL - Dual Tandem Wheel Loading
- HIRL - High Intensity Runway Lighting
- ILS - Instrument Landing System
- LIRL - Low Intensity Runway Lights
- LOC - Localizer
- MALSR- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
- MIRL - Medium Intensity Runway Lighting
- NPIAS - National Plan of Integrated Airport Systems
- PAPI - Precision Approach Path Indicator
- PSIL - Pulsating/Steady Burning Visual Approach Slope Indicator
- REIL - Runway End Identifier Lights
- RNAV - Area Navigation (GPS variant)
- SWL - Single Wheel Loading
- VASI - Visual Approach Slope Indicator
- VOR - VHF Omni-Directional Range

**SEARCHLIGHT AIRPORT (1L3)**



Airport NPIAS Classification ..... NA  
 FAA Asset Study Classification ..... NA  
 Location from BVU ..... 30.3 nm S  
 Elevation ..... 3,413 feet  
 Weather Reporting ..... None  
 ATCT ..... No  
 Annual Operations ..... NA  
 Based Aircraft ..... NA  
 Enplaned Passengers ..... NA

RUNWAYS	16-34
Length	5,040
Width	70
Pavement Strength	
SWL	
DWL	
Lighting	None
Marking	Basic
Approach Aids	None
Instrument Approach Procedures	None

Services Provided: Aircraft tiedowns.

**SKY RANCH AIRPORT (3L2)**



Airport NPIAS Classification ..... NA  
 FAA Asset Study Classification ..... NA  
 Location from BVU ..... 38.3 nm WSW  
 Elevation ..... 2,599 feet  
 Weather Reporting ..... None  
 ATCT ..... No  
 Annual Operations ..... 2,964  
 Based Aircraft ..... 75  
 Enplaned Passengers ..... NA

RUNWAYS	3-21	12-30
Length	3,340	3,300
Width	45	105
Pavement Strength		
SWL		
DWL		
Lighting	Non-standard	None
Marking	Basic	None
Approach Aids	None	None
Instrument Approach Procedures	None	None

Services Provided: Aircraft hangars and tiedowns.

**KIDWELL AIRPORT (1L4)**



Airport NPIAS Classification ..... NA  
 FAA Asset Study Classification ..... NA  
 Location from BVU ..... 38.5 nm S  
 Elevation ..... 2,605 feet  
 Weather Reporting ..... None  
 ATCT ..... No  
 Annual Operations ..... 3,484  
 Based Aircraft ..... 17  
 Enplaned Passengers ..... NA

RUNWAYS	15-33
Length	4,140
Width	65
Pavement Strength	
SWL	NA
DWL	NA
Lighting	Non-standard
Marking	None
Approach Aids	None
Instrument Approach Procedures	None

Services Provided: Aircraft tiedowns.

**PEARCE FERRY AIRPORT (L25)**



Airport NPIAS Classification ..... NA  
 FAA Asset Study Classification ..... NA  
 Location from BVU ..... 40.5 nm ENE  
 Elevation ..... 2,941 feet  
 Weather Reporting ..... None  
 ATCT ..... No  
 Annual Operations ..... 300  
 Based Aircraft ..... None  
 Enplaned Passengers ..... NA

RUNWAYS	1-19
Length	2,900
Width	110
Pavement Strength	
SWL	NA
DWL	NA
Lighting	None
Marking	None
Approach Aids	None
Instrument Approach Procedures	None

Services Provided: Aircraft tiedowns and air taxi.

**PERKINS FIELD AIRPORT (U08)**



Airport NPIAS Classification ..... GA  
 FAA Asset Study Classification ..... Basic  
 Location from BVU ..... 42.4 nm NNE  
 Elevation ..... 1,366 feet  
 Weather Reporting ..... None  
 ATCT ..... No  
 Annual Operations ..... 5,200  
 Based Aircraft ..... 12  
 Enplaned Passengers ..... NA

RUNWAYS	13-31
Length	4,811
Width	75
Pavement Strength	
SWL	30,000
DWL	NA
Lighting	MIRL
Marking	Basic
Approach Aids	None
Instrument Approach Procedures	None

Services Provided: Aircraft fuel (100LL) and aircraft tiedowns.

**LAUGHLIN/BULLHEAD INTERNATIONAL AIRPORT (IFP)**



Airport NPIAS Classification ..... Primary  
 FAA Asset Study Classification ..... Non-Hub  
 Location from BVU ..... 49.7 nm SSE  
 Elevation ..... 700 feet  
 Weather Reporting ..... AWOS-3PT  
 ATCT ..... Yes  
 Annual Operations ..... 13,505  
 Based Aircraft ..... 39  
 Enplaned Passengers ..... 110,799

RUNWAYS	16-34
Length	7,500
Width	150
Pavement Strength	
SWL	75,000
DWL	200,000
Lighting	MIRL
Marking	Non-precision
Approach Aids	PAPI-4, REIL
Instrument Approach Procedures	RNAV (GPS)-16/34, VOR/DME-34

Services Provided: Aircraft fuel (100L/Jet A), aircraft tiedowns, bulk oxygen, air taxi, charter, and commercial operations.

- |     |   |                                       |   |   |  |
|-----|---|---------------------------------------|---|---|--|
| KEY | ASOS - Automated Surface Observation System | DTWL - Dual Tandem Wheel Loading      | LOC - Localizer   | NPIAS - National Plan of Integrated Airport Systems             | RNAV - Area Navigation (GPS variant)   |
|     | ATCT - Airport Traffic Control Tower        | HIRL - High Intensity Runway Lighting | MALSR- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights | PAPI - Precision Approach Path Indicator                        | SWL - Single Wheel Loading             |
|     | AWOS - Automated Weather Observation System | ILS - Instrument Landing System       | MIRL - Medium Intensity Runway Lighting   | PSIL - Pulsating/Steady Burning Visual Approach Slope Indicator | VASI - Visual Approach Slope Indicator |
|     | DWL - Dual Wheel Loading                    | LIRL - Low Intensity Runway Lights    |   | REIL - Runway End Identifier Lights                             | VOR - VHF Omni-Directional Range       |

International Airport, located 49 nautical miles to the southeast. These two facilities also offer services to general aviation aircraft.

Other general aviation airports located in proximity to Boulder City Municipal Airport include Henderson Executive Airport, North Las Vegas Airport, Jean Airport, Temple Bar Airport, Echo Bay Airport, Searchlight Airport, Sky Ranch Airport, Kidwell Airport, Pearce Ferry Airport, and Perkins Field Airport. Of these airports, North Las Vegas and Henderson Executive Airport offer the most comparable services to general aviation aircraft when compared to Boulder City Municipal Airport.

Even with the existence of several aviation facilities in the regional area, Boulder City Municipal Airport is positioned well due to the full range of services it has to offer at the airport as well as in the community. The vicinity airports each have unique qualities that may serve a specific segment of aviation. These factors must be considered carefully in determining the service area for Boulder City Municipal Airport, which will be discussed in the next chapter.

## **AREA LAND USE AND ZONING**

The land use surrounding Boulder City Municipal Airport can have a significant impact on airport operations and growth. The following section identifies baseline information related to land use and zoning in the vicinity of the airport. By understanding the land use issues surrounding the airport, more appropriate recommendations can be made for the future of the airport.

## **FEDERAL LEGISLATION AND REGULATIONS**

There are numerous federal laws and regulations related to airport land use compatibility. Airports that accept federal development grants are required to make every reasonable effort to comply with these laws and regulations. The following is a summary of the federal laws and regulations related to land use compatibility and zoning surrounding airports.

### ***Airport and Airway Improvement Act of 1982 - United States Code (USC), Title 49***

Upon acceptance of federal funds, this Act obligates the airport owners to operate and maintain the airport and comply with specific assurances, including maintenance of compatible land uses around airports. The implementation of this Act is handled through stipulations outlined in the grant documents signed by airport owners when they accept federal funds for a project.

### **Objects Affecting Navigable Airspace – Title 14 CFR Part 77**

This federal regulation establishes standards for determining obstructions in navigable airspace. It sets forth requirements for construction and alteration of structures (i.e., buildings, towers, etc.). It also provides for studies of obstructions to determine their effect on the safe and efficient use of airspace, as well as providing for public hearings regarding these obstructions, along with provisions for the creation of antenna farm areas. It also establishes methods of identifying surfaces that must be free from penetration by obstructions, including buildings, cranes, cell towers, etc., in the vicinity of an airport. This regulation is predominately concerned with airspace-related issues. Implementation and enforcement of the elements contained in this regulation are a cooperative effort between the FAA and the individual state aviation agencies or the airports themselves. The imaginary surfaces defined in Title 14 CFR Part 77 include the primary surface, transitional surface, approach surface, horizontal surface, and the conical surface. **Exhibit 1K** depicts a model example of the application of the Part 77 surfaces.

### **Airport Noise Compatibility Planning – Title 14 CFR Part 150**

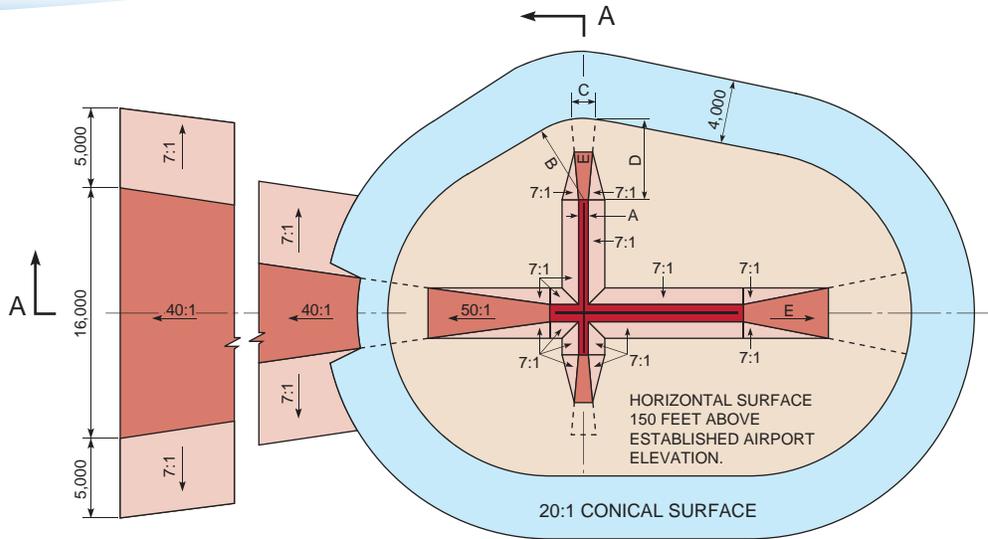
This federal regulation provides guidance for controlling planning for aviation noise compatibility on and around airports. These procedures and standards are used by the airport to prepare noise exposure maps and noise compatibility programs. The Title 14 CFR Part 150 process enables communities to plan for compatible land use around airports to minimize the impact from incompatible land uses on the airport. The noise compatibility planning process is the only “regulatory” avenue available to local airport operators for addressing airport noise issues.

### **Airport Land Use Compatibility Planning – FAA Advisory Circular (AC) 150/5060-6**

This document guides the development of a compatibility plan to ensure the environs surrounding an airport are not developed in a manner that could pose a risk to the airport’s operations. This document specifically looks at land use and noise issues.

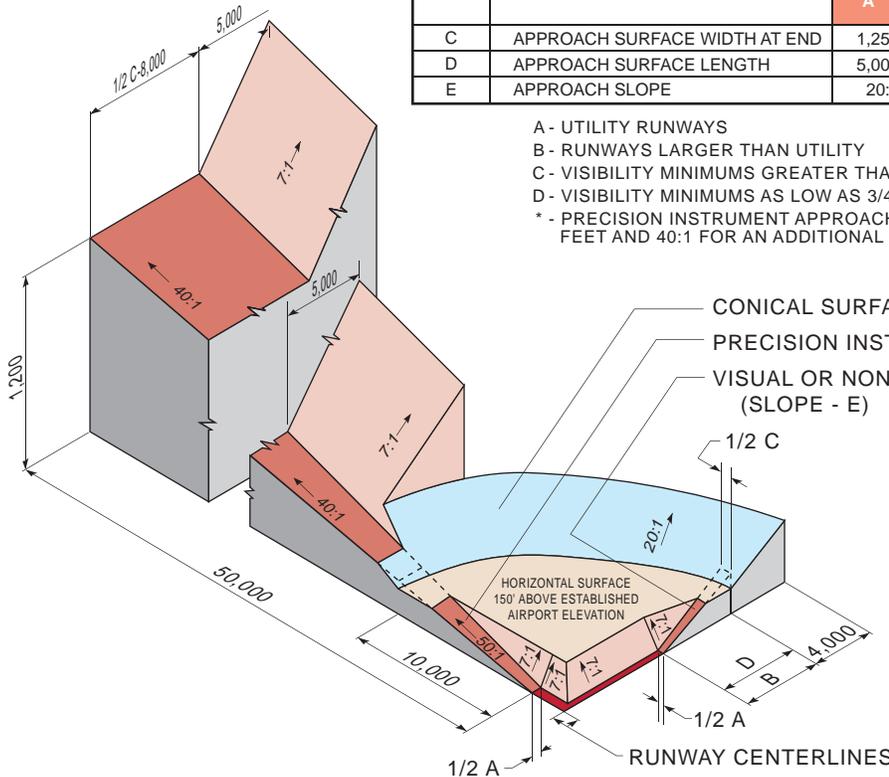
### **Airport Master Plans – FAA Advisory Circular (AC) 150/5070-6B**

This document guides the development of airport master plans. The guiding principle of the airport planning process is to develop a safe and efficient airport through the use of acceptable standards. While there are many steps in the planning process, none of these steps should be treated in a piecemeal manner. The airside and landside issues must be equally evaluated to create a plan that provides for compatible airport and community development where possible.



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B C D		
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B C D		
		C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

- A - UTILITY RUNWAYS
- B - RUNWAYS LARGER THAN UTILITY
- C - VISIBILITY MINIMUMS GREATER THAN 3/4 MILE
- D - VISIBILITY MINIMUMS AS LOW AS 3/4 MILE
- \* - PRECISION INSTRUMENT APPROACH SLOPE IS 50:1 FOR INNER 10,000 FEET AND 40:1 FOR AN ADDITIONAL 40,000 FEET



**ISOMETRIC VIEW OF SECTION A-A**

SOURCE: 14 CFR Part 77, Section 77.25, Civil Airport Imaginary Surfaces.

### **A Model Zoning Ordinance to Limit Height of Objects Around Airports –FAA Advisory Circular (AC) 150/5190-4A**

This advisory circular concerns itself with developing zoning ordinances to control the height of objects. It is based upon the surfaces described in Subpart C of Title 14 CFR Part 77, *Objects Affecting Navigable Airspace*. This document provides sample language and model ordinances for use by local airports.

### **Airport Design - Advisory Circular (AC) 150/5300-13A**

This document provides the basic standards and recommendations for airport design. Topics include various runway and taxiway safety areas, the runway protection zones, threshold siting surfaces, runway length, and facility separation standards.

### **Grant Assurances**

Pursuant to the provisions of Title 49, U.S.C., subtitle VII, as amended, assurances are required to be submitted as part of a project application by sponsors requesting funds. Upon acceptance of the grant offer by the sponsor, these assurances are incorporated in, and become part of, the grant agreement. There are 39 grant assurances, several of which address airport planning. The following are the primary land use compatibility grant assurances:

- Grant Assurance 21 requires, in part, that the sponsor:

“...take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft.”

- Grant Assurance 20 relates to an airport sponsor’s obligation for hazard removal and mitigation to address potential obstructions to the airspace around the airport. Grant Assurance 20 states that the airport sponsor will:

“...take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards.”

## LAND USE AND ZONING

Under ideal conditions, the development immediately surrounding an airport would be controlled and limited to compatible land uses. Compatible land uses would include light and heavy industrial development and some commercial development. Land use zoning is the most common land use control. Boulder City and Clark County have in place a zoning plan for areas adjacent to Boulder City Municipal Airport.

*Under ideal conditions, the development immediately surrounding an airport would be controlled and limited to compatible land uses.*

**Exhibit 1L** depicts the current zoning for Boulder City. Additional zoning outside the city limits is under the jurisdiction of the National Park Service and the Bureau of Land Management. As indicated on the exhibit, the area immediately north-northeast of the airport is largely zoned Parks and Recreation, with some parcels to the northeast being zoned Single-Family Residential. The Veterans Memorial Cemetery and Wastewater Treatment Facility located east and southeast of the airport respectively, are contained in an area zoned Public/Quasi-Public. The majority of property adjacent to the south and west sides of the airport are zoned as vacant land, with a small area to the north zoned as vacant as well.

Currently, most of the land north and northeast of the airport is developed as Residential and Commercial/Office/Employment. To the east of the airport is the Lake Mead Recreational Area, located outside of Boulder City limits. South and southwest of the airport land outside of the Boulder City limits is owned by the Western Area Power Authority and the Bureau of Land Management. West and northwest of the airport are areas under the jurisdiction of the City of Henderson, the Bureau of Land Management, as well as Private Land, all located outside the city limits of Boulder City.

Currently, most of the land north and northeast of the airport is developed as Residential and Commercial/Office/Employment. To the east of the airport is the Lake Mead Recreational Area, located outside of Boulder City limits. South and southwest of the airport land outside of the Boulder City limits is owned by the Western Area Power Authority and the Bureau of Land Management. West and northwest of the airport are areas under the jurisdiction of the City of Henderson, the Bureau of Land Management, as well as Private Land, all located outside the city limits of Boulder City.

Boulder City's future land use map is shown on **Exhibit 1M**. The airport is shown being zoned as Boulder City Municipal Airport. Land between the airport and State Highway 93 is designated within the Airport Sub-Area Boundary. This land is primarily composed of Parks and Recreation and Airport Area Commercial land uses. Also contained within this area are some Low and Medium Density Residential, as well as Mixed Use and Community Commercial land uses. The land directly to the east and southeast of the airport is zoned Public and Quasi-Public. Land to the south, west, and northwest of the airport is zoned as Open Lands.

It should be noted that the *Boulder City Master Plan* (2003), updated in 2009, has five implementing policies related to Public Facilities that include the following:

- Policy PF-1: Provision of Adequate Public Facilities and Services
- Policy PF-2: Definition of Adequate Urban Facilities and Services Standards
- Policy PF-3: Sustainable Funding of Public Facilities and Services
- Policy PF-4: Coordinate with Airport Master Plan
- Policy PF-5: Coordinate with Clark County School District

In addition, the Clark County Comprehensive Plan has four policies in place with regard to Airport Environs. These policies include the following:

- Policy 1: Aircraft noise, accident potential, and hazard areas will be considered and effectively planned for in Clark County.
- Policy 2: Clark County will cooperate with the United States Air Force and the Department of Aviation to evaluate land use proposals on and near Air Force Bases and airports to reduce or eliminate development incompatibilities.
- Policy 3: Clark County will support local, state, and federal programs promoting land use compatibility for airports within southern Nevada.
- Policy 4: Clark County will encourage airport owner/operators to acquire land that may conflict with the current or planned operation of that particular airport.

## **SOCIOECONOMIC CHARACTERISTICS**

Socioeconomic characteristics are collected and examined to derive an understanding of the dynamics of growth within the vicinity of Boulder City Municipal Airport. This information is essential in determining aviation demand level requirements, as most general aviation demand can be directly related to the socioeconomic condition of the area. Statistical analysis of population, employment, and income trends can 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. For this study, socioeconomic data was gathered from various sources, including the Clark County Comprehensive Planning Department, United States Census Bureau, and Woods & Poole Complete Economic and Demographic Data. It should be noted that only historical figures are presented in this section. Future socioeconomic projections will be outlined in Chapter Two.

## **POPULATION**

Population is one of the most important socioeconomic factors to consider when planning for future needs of an airport. Trends in population provide an indication of the potential of the region to sustain growth in aviation activity. Historical population data for Boulder City is presented in **Table 1H**. Additional population data for Clark County, the State of Nevada, and the United States is also included.

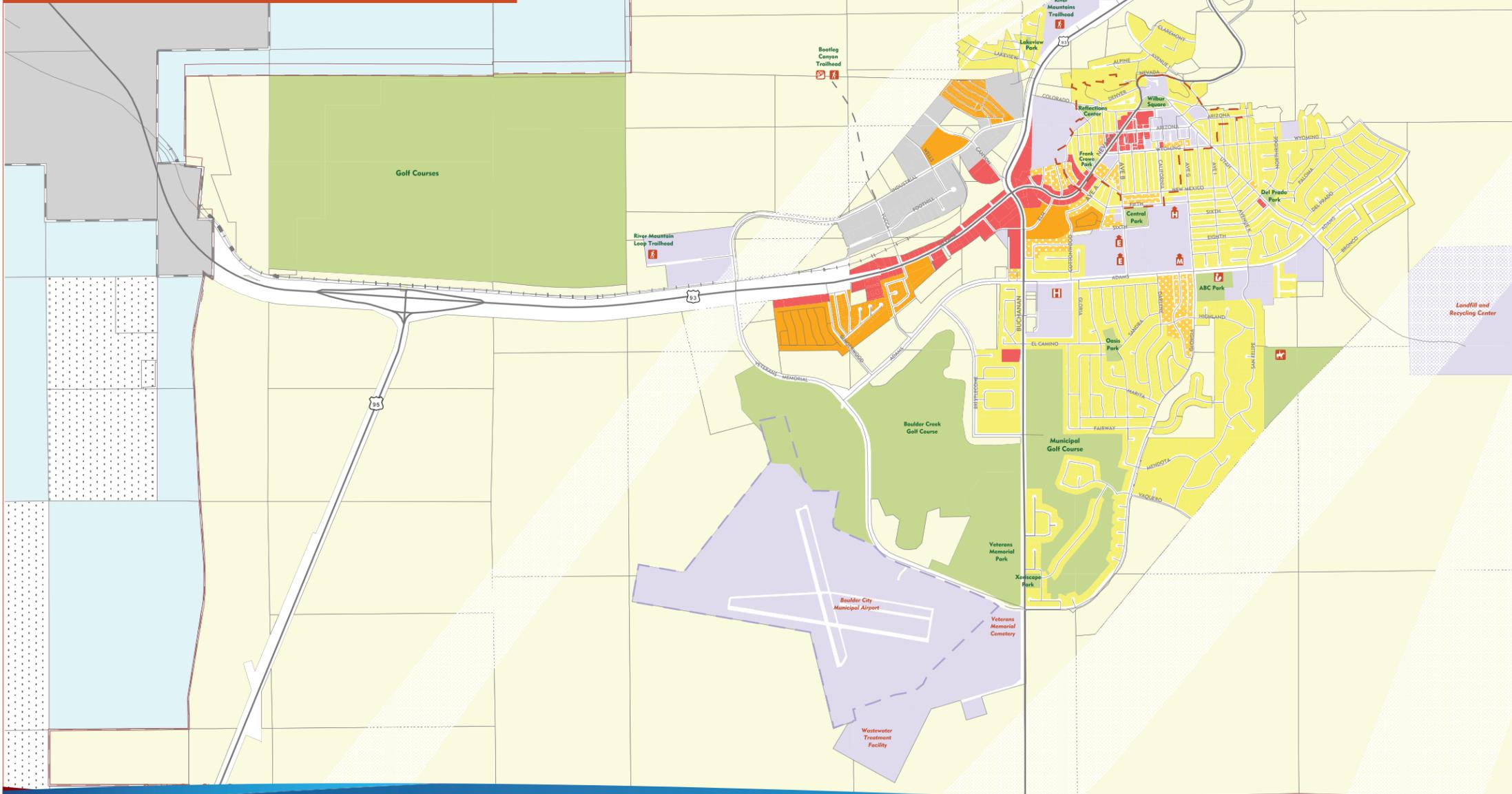
As shown in the table, all reporting entities have experienced positive growth in population since 2000. During this time, the population of Boulder City has increased at a compound annual growth rate (CAGR) of 0.41 percent. This translates to the addition of approximately 886 new residents. Clark County and the State of Nevada experienced slightly higher CAGRs of 2.98 percent and 2.54 percent, respectively, during the same time period.



**DOWNTOWN CORE**



**ELDORADO VALLEY AND CONTEXT**



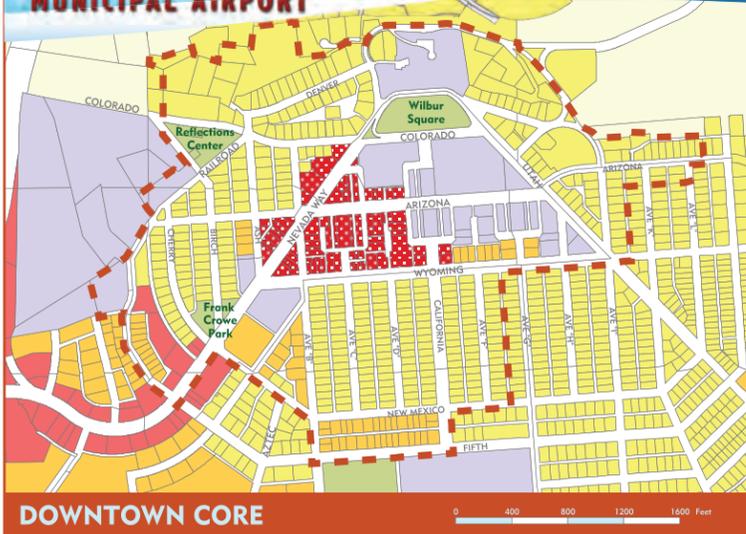
**LEGEND**

<p><b>Residential</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: yellow; border: 1px solid black; margin-right: 5px;"></span> Single-Family Residential</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: orange; border: 1px solid black; margin-right: 5px;"></span> Multi-family Residential</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightorange; border: 1px solid black; margin-right: 5px;"></span> Mobile Home Residential</li> </ul> <p><b>Commercial/Office/Employment</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: red; border: 1px solid black; margin-right: 5px;"></span> Commercial</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: grey; border: 1px solid black; margin-right: 5px;"></span> Industrial</li> </ul> <p><b>Parks, Recreation, and Vacant Lands</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: green; border: 1px solid black; margin-right: 5px;"></span> Parks and Recreation</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightgreen; border: 1px solid black; margin-right: 5px;"></span> Vacant</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightyellow; border: 1px solid black; margin-right: 5px;"></span> Conservation Easement (Tortoise Preserve)</li> </ul> <p><b>Federal Lands (outside city limits)</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightblue; border: 1px solid black; margin-right: 5px;"></span> National Park Service</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightgrey; border: 1px solid black; margin-right: 5px;"></span> Bureau of Land Management</li> </ul>	<p><b>Other</b></p> <ul style="list-style-type: none"> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightpurple; border: 1px solid black; margin-right: 5px;"></span> Public/Quasi-Public</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px dashed black; margin-right: 5px;"></span> Private Land (outside city limits)</li> <li><span style="display: inline-block; width: 15px; height: 10px; background-color: lightgrey; border: 1px solid black; margin-right: 5px;"></span> Western Area Power Authority</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Power Line Easements*</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> City of Henderson</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Airport Boundary</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Federal Historic District Boundary</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Boulder City Limits</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Horse Corrals</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Hospital</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Library</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Hiking/Biking Trailhead</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> High School</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Middle School</li> <li><span style="display: inline-block; width: 15px; height: 10px; border: 1px solid black; margin-right: 5px;"></span> Elementary School</li> </ul>
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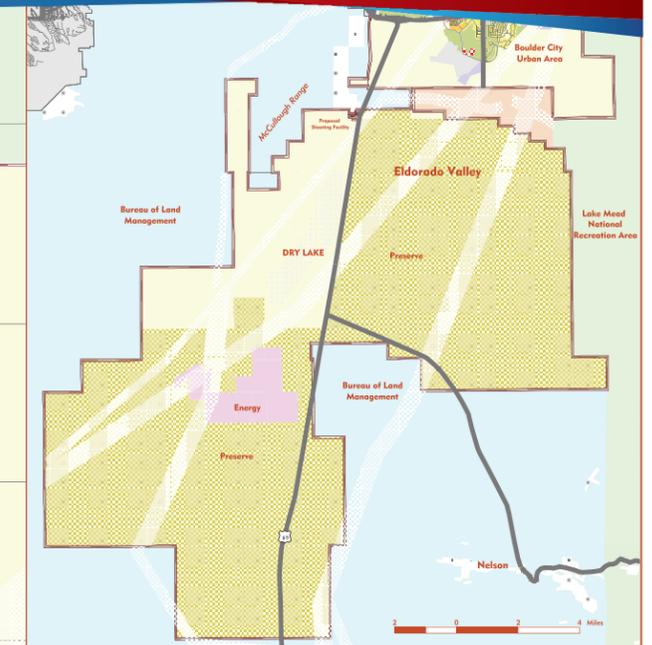
Data Sources: City of Boulder City, Clark County, Bureau of Land Management, City of Henderson, Clarion Associates  
 \*Note: Power Line Easements are shown for illustrative purposes only.



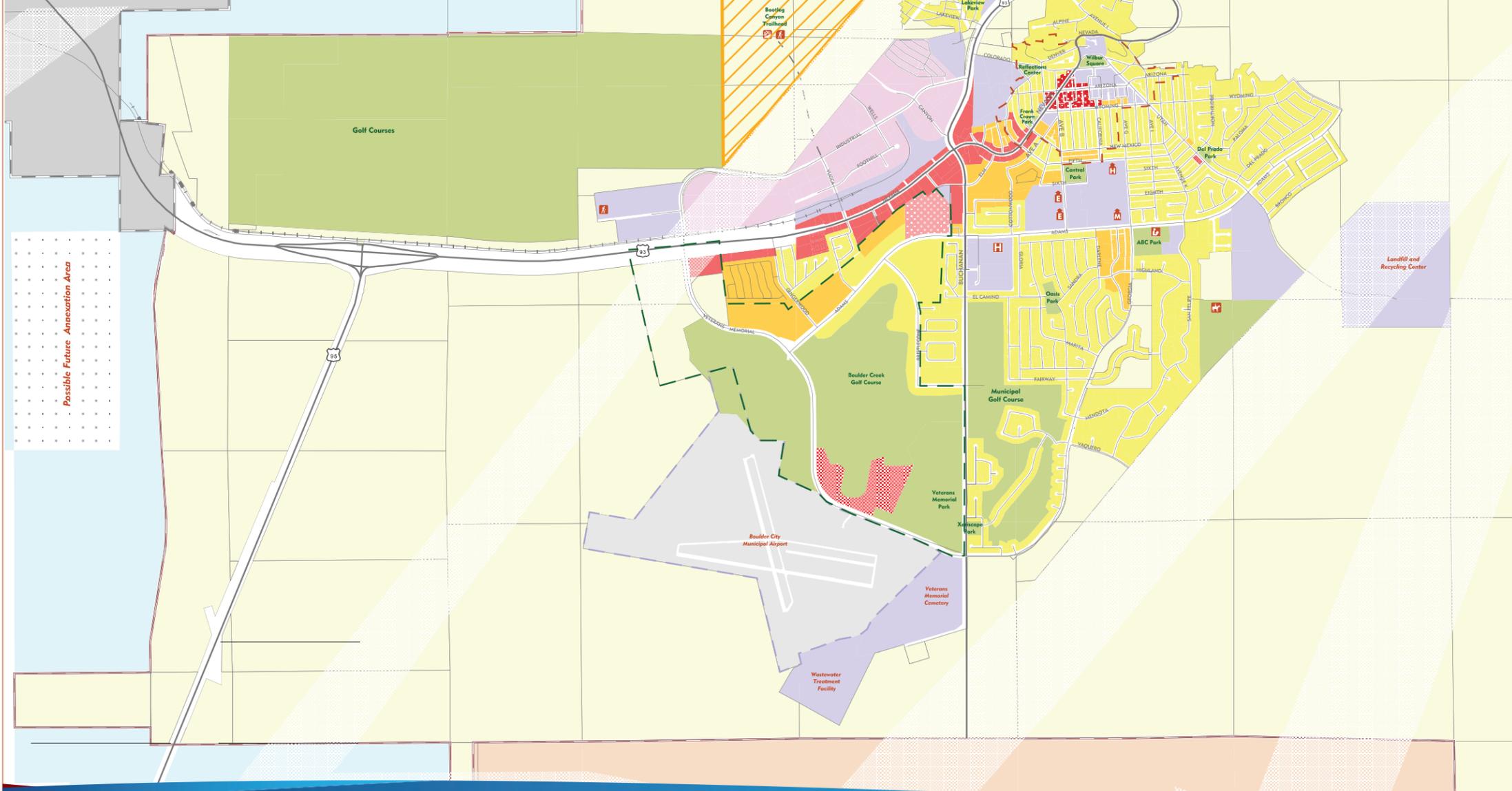
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**DOWNTOWN CORE**



**ELDORADO VALLEY AND CONTEXT**



**LEGEND**

<b>Residential</b>	<b>Other</b>
Low Density Residential	Public/Quasi-Public
Medium Density Residential	Boulder City Municipal Airport
<b>Commercial/Office/Employment</b>	Bootleg Canyon Special Planning Area**
Central Business District	Private Land
Community Commercial	Western Area Power Authority
Mixed Use-Commercial/Office	Power Line Easements*
Airport Area Commercial	City of Henderson
Manufacturing	Airport Subarea Boundary**
<b>Parks, Recreation, and Open Lands</b>	Federal Historic District Boundary
Parks and Recreation	Boulder City Limits
Open Lands	Horse Corrals
Open Lands (Multi-Species Conservation Easement)	Hospital
<b>Federal Lands</b>	Library
National Park Service	Hiking/Biking Trailhead
Bureau of Land Management	High School
	Middle School
	Elementary School

Data Sources: City of Boulder City, Clark County, Bureau of Land Management, City of Henderson, Clarion Associates  
 \*Note: Power Line Easements are shown for illustrative purposes only.  
 \*\*Please refer Chapter 15 of the Master Plan for additional detail and policies.

0 0.25 0.5 0.75 Miles

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**TABLE 1H**  
**Historical Population Statistics**

	2000	2005	2010	2014	Compound Annual Growth Rate
Boulder City	14,966	15,177	15,023	15,852	0.41%
Clark County	1,393,909	1,729,522	1,953,106	2,102,238	2.98%
State of Nevada	1,998,257	2,414,807	2,700,551	2,839,099	2.54%
United States	282,124,631	296,410,404	308,745,538	318,857,056	0.88%

Source: U.S. Census Bureau; Clark County Comprehensive Planning Department; Southern Nevada Regional Planning Coalition—Southern Nevada Consensus Population Estimate.

As a point of comparison, the United States population grew at an CAGR of 0.88 percent. These positive growth trends have been attributed to the availability of affordable quality homes, excellent educational institutions, and enjoyable recreational amenities.

*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 region’s employment base can be valuable in determining the overall well-being of the general area. In most cases, the area’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 1J** provides historical employment characteristics from 2000 to 2014 in three analysis categories, including Clark County, the State of Nevada, and the United States.

**TABLE 1J**  
**Historical Employment Statistics**

	2000	2005	2010	2014	Compound Annual Growth Rate
Clark County	852,405	1,084,733	1,057,617	1,145,269	1.97%
State of Nevada	1,253,211	1,539,023	1,483,276	1,591,256	1.63%
United States	165,370,900	172,557,300	173,044,700	185,151,800	0.82%

Source: Woods & Poole Complete Economic Demographic Data (2015)

Total employment in the region has grown, on average, at a rate greater than one percent annually since 2000. Between 2005 and 2010, Clark County and the State of Nevada experienced negative growth. This can be attributed to the economic recession that the United States experienced during that timeframe. Since 2010, the region has been experiencing positive trends in employment similar to the pre-2005 timeframe.

Although the recent downturn in the economy has affected the employment base, the greater area continues to sustain an economy that provides a variety of employment options serving multiple industries.

Locally, Boulder City and the greater Las Vegas area is a center of commerce for the region. Located in close proximity to Lake Mead, the Hoover Dam, and the West Rim of the Grand Canyon, Boulder City is a hub for tourism and recreation. The nearby Las Vegas community provides extensive retail shopping, medical facilities, industry, government, casinos, opera, art, and much more. The major employers in Clark County are presented in **Table 1K**. Understanding the types of employment opportunities will aid in identifying demand for aviation services in the area.

**TABLE 1K**  
**Major Employers**  
**Clark County**

Employer	Description	Employees
MGM Resorts International	Recreation	55,000
Caesars Entertainment Corporation	Recreation	26,034
Station Casinos	Recreation	13,000
Wynn Resorts	Recreation	11,923
Boyd Gaming Corporation	Recreation	9,200
Las Vegas Sands Corporation	Recreation	8,870
Walmart Stores	Retail	6,550
Cosmopolitan of Las Vegas	Recreation	5,600
The Valley Health System	Health Services	5,352
Kroger Company	Retail	4,600
Supervalu	Retail	4,080
St. Rose Dominican Hospitals	Health services	3,293
Sears Holding Corporation	Retail	3,000
Target Corporation	Retail	2,700
Southwest Airlines	Air Carrier	2,631
United Health Care	Health Services	2,550
Las Vegas Hotel (Las Vegas Hilton)	Recreation	2,500
Home Depot	Retail	2,200
Lowe's	Retail	2,150
NV Energy	Energy	1,700
Safeway	Retail	1,400

Source: Clark County Department of Economic Development.

**PER CAPITA PERSONAL INCOME**

**Table 1L** presents the per capita personal income (PCPI) for Clark County since 2000. The PCPI for the State of Nevada and United States is also provided for this time period. PCPI is determined by dividing the total income by population. In order for PCPI to grow, income growth must outpace population growth significantly. As shown in the table, the region experienced a negative trend in PCPI from 2005 to 2010. The downward trend during this time period is attributed to the economic down-cycle that occurred in the United States during this time. Similar to employment trends, the PCPI decreased during the recession, but has returned to positive growth in recent years.

**TABLE 1L**  
**Historical Per Capita Personal Income (adjusted to 2009 dollars)**

	2000	2005	2010	2014	Compound Annual Growth Rate
Clark County	36,384	40,714	34,920	35,535	-0.17%
State of Nevada	37,541	41,820	36,061	37,181	-0.07%
United States	36,794	38,899	39,492	42,365	1.01%

Source: Woods & Poole Complete Economic Demographic Data (2015)

## **STRENGTHS, WEAKNESSES, OPPORTUNITIES, AND THREATS (SWOT) ANALYSIS**

An analysis of strengths, weaknesses, opportunities, and threats (SWOT) is a strategic planning tool used to identify the strengths, weaknesses, opportunities, and threats associated with a particular subject. For the purposes of this study, a SWOT analysis was conducted in order to identify these traits as they pertain to the Boulder City Municipal Airport. The following SWOT analysis expresses the opinions of the stakeholders currently associated with the airport.

*The following SWOT analysis expresses the opinions of the stakeholders currently associated with the airport.*

### **STRENGTHS**

- The airport is located in close proximity to the City of Las Vegas as well as many national landmarks such as the Grand Canyon, Lake Mead, and the Hoover Dam.
- Although located near the City of Las Vegas, the airport and the City of Boulder City maintain the appeal and feel of a small town.
- The airport is classified as Class G, but located under the Class B (controlled) airspace of McCarran International Airport (LAS).
- Land use surrounding the airport allows for little conflict.
- The utility rates are low.
- The services and facilities offered at the airport are exceptional.
- Prevailing weather conditions generally allow for VFR flight.
- The FAA allows tour operators to fly when TFRs are scheduled in Las Vegas.
- The airport is not governed by Clark County or Clark County Aviation so permitting is streamlined.
- Boulder City has been selected, along with four other Nevada test sites, to house a test bed drone port in an effort to begin the implementation of unmanned aerial vehicles into the national air transportation system. However, unmanned aerial vehicles (UAVs) are currently not allowed at the Airport.

## WEAKNESSES

- The current mix of air traffic poses challenges in maintaining aircraft separation both in the air and on the ground. This constitutes the need for an ATCT.
- The airport has experienced significant growth and is reaching its ramp space capacity.
- Boulder City residents are not always receptive to change and the airport experiences a lack of funding.
- The airport experiences "mavericks" or pilots new to the airport due to TFRs and leisure activities. This poses a weakness as unfamiliar pilots must quickly adapt to a unique airport environment without the guidance of an ATCT.
- The current runway length is not sufficient to accommodate larger general aviation aircraft and business jets.
- The current runway configuration promotes better wind coverage on the crosswind runway as opposed to the primary runway.
- A driving lane (or access road) for emergency vehicle access is needed.
- The airport does not contain an ARFF facility.
- The current placement of helipads poses risks.
- Pedestrian traffic associated with air tour operators must mix with active ground traffic.

## OPPORTUNITIES

- The State of Nevada has targeted the aviation industry to influence aviation growth and get aviation related businesses to move into the state, especially maintenance and repair facilities.
- Radar tracking or flight following is provided by McCarran International Airport.
- The proposed interstate (I-11) may bring business, especially to the vacant land surrounding the airport.
- There is land available surrounding the airport; however, it must be evaluated to ensure the right mix of uses.
- Improve safety of the airport.
- A proposal for a localizer performance with vertical guidance (LPV) instrument approach on Runway 27 is currently in process.
- Opportunities exist for a flight school.

## THREATS

- Given the current mix of traffic, number of operations, and the existing airfield configuration, there is increased potential for accidents.
- There are powerline obstructions to the south and east of the airport in association with the substation.
- There is one ingress and egress for helicopter operators.
- Existing infrastructure is in need of utilities, drainage, etc.

## ENVIRONMENTAL INVENTORY

The purpose of the following environmental inventory is to identify potential environmental sensitivities that should be considered when planning future improvements at Boulder City Municipal Airport.

Research was done for each of the 14 environmental impact categories described within the FAA's Order 1050.1F *Environmental Impacts: Policies and Procedures*. It was determined that the following resources are not present within the airport environs or cannot be inventoried because they are evaluated during project implementation:

### Not Present

- Coastal Resources (Coastal Barriers and Coastal Zones) – the airport is inland and not subject to any coastal restrictions.
- Wild and Scenic Rivers – The closest Wild and Scenic River is the Kern River, located 183 miles west of the airport.

### Not Inventoried

- Visual Effects (including light emissions)
- Natural Resources and Energy Supply
- Noise and Compatible Land Use

Land Use, which was discussed previously in this chapter, is also identified as an environmental impact category within FAA Order 1050.1F.

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

## AIR QUALITY

Air quality in a given location is described by the concentrations of various pollutants in the atmosphere. The significance of a pollution concentration is determined by comparing it to the state and federal air quality standards. In 1971, the U.S. Environmental Protection Agency (EPA) established standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O<sub>3</sub>), Carbon Monoxide (CO), Sulfur Dioxide (SO<sub>2</sub>), Nitrogen Oxide (NO<sub>x</sub>), Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>), and Lead (Pb).

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

## BIOLOGICAL RESOURCES

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

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

According to the USFWS, there are three threatened or endangered species listed for the vicinity of the airport: Southwestern Willow Flycatcher (endangered, bird); Yellow-billed Cuckoo (threatened, bird) and Desert Tortoise (threatened, reptile). The Southwestern Willow Flycatcher and Yellow-billed Cuckoo are species typically found in dense riparian habitats along streams, rivers, and other wetlands where cottonwood, willow, boxelder, saltcedar, are present. This habitat is not present within the Boulder City Municipal Airport property. A Critical Habitat area for the Desert Tortoise is located approximately one and a half miles south of the airport and extends more than 100 miles to south.

In addition to the ESA, the *Migratory Bird Treaty Act* (MBTA) is also applicable at Boulder City Municipal Airport as much of the study area constitutes habitat for birds protected under the MBTA. The IPaC report for the airport lists 22 bird species that may be affected by projects at the airport.

Birds protected under the MBTA may nest, winter, or migrate throughout the area, including those protected by the ESA. Under the requirements of the MBTA, all project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. Migratory birds known to occur in the study area are listed in **Table 1M**.

A review of the National Hydrography Dataset, published by the United States Geological Survey, was conducted to determine the presence of perennial streams, rivers, sand and gravel pits, lakes and reservoirs within the study area. There are several intermittent washes located within the vicinity of the airport which flow south to Quail Wash. Based on a review of aerial photography, some areas of airport pavement cross these washes.

**TABLE 1M**  
**Birds Protected Under the *Migratory Bird Treaty Act***  
**Clark County, Nevada**

Bald Eagle	Le Conte's Thrasher
Bell's Vireo	Loggerhead Shrike
Bendire's Thrasher	Long-billed Curlew
Black-chinned Sparrow	Lucy's Warbler
Brewer's Sparrow	Peregrine Falcon
Burrowing Owl	Prairie Falcon
Cactus Wren	Sage Thrasher
Costa's Hummingbird	Short-eared Owl
Flammulated Owl	Sonoran Yellow Warbler
Gray Vireo	Swainson's Hawk
Green-tailed Towhee	Western Grebe

**HISTORICAL, ARCHITECTURAL, ARCHEOLOGICAL, 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.

Based on a review of the National Register of Historic Places, there are three National Register of Historic Places properties within three miles of the airport: Boulder City Historic District (2 miles northeast); Boulder Dam Hotel (3 miles northeast); and Old Boulder City Hospital (3 miles northeast).

**DEPARTMENT OF TRANSPORTATION ACT, SECTION 4(f)**

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

The following list summarizes the nearest properties of each type that may be protected under Section 4(f) of the DOT Act:

- Wilderness Area – Black Canyon Wilderness (4 miles east)
- Historic Site Listed on the National Register – As previously discussed, there are three National Register of Historic Places properties within three miles of the airport: Boulder City Historic District (2 miles northeast); Boulder Dam Hotel (3 miles northeast); and Old Boulder City Hospital (3 miles northeast)
- Locally Owned Public Park – The closest publically owned park is Veterans Memorial Park located immediately north of the airport.
- Wildlife Refuge – Desert National Wildlife Refuge (27 miles north)
- Recreation Area – Lake Mead National Recreation Area (4 miles east)
- National Marine Sanctuary – None within 50 miles of the airport.

## **FARMLANDS**

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

Information obtained from the Natural Resource Conservation Service's (NRCS) Web Soil Survey indicates that none of the airport or surrounding area is classified as Prime Farmland.<sup>1</sup>

## **HAZARDOUS MATERIALS, SOLID WASTE, AND POLLUTION PREVENTION**

Federal, state, and local laws regulate hazardous materials use, storage, transport, and disposal. These laws may extend to past and future landowners of properties containing these materials. In addition, disrupting sites containing hazardous materials or contaminants may cause significant impacts to soil, surface water, groundwater, air quality, and the organisms using these resources. According to *EJSCREEN*, there are no Superfund or Brownfield sites within five miles of the airport.

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<sup>1</sup> NRCS Web Soil Survey, <http://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>, accessed January 2016

## SOCIOECONOMICS, ENVIRONMENTAL JUSTICE, AND CHILDREN'S ENVIRONMENTAL HEALTH AND SAFETY RISKS

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

## WATER RESOURCES

*Wetlands.* The U.S. Army Corps of Engineers regulates the discharge of dredged and/or fill material into waters of the United States, including adjacent wetlands, under Section 404 of the *Clean Water Act*. Wetlands are defined in Executive Order 11990, *Protection of Wetlands*, as "those areas that are inundated by surface or groundwater with a frequency sufficient to support and under normal circumstances does or would support a prevalence of vegetation or aquatic life that requires saturated or seasonably saturated soil conditions for growth and reproduction." Wetlands can include swamps, marshes, bogs, sloughs, potholes, wet meadows, river overflows, mud flats, natural ponds, estuarine areas, tidal overflows, and shallow lakes and ponds with emergent vegetation. Wetlands exhibit three characteristics: the soil is inundated or saturated to the surface at some time during the growing season (hydrology), has a population of plants able to tolerate various degrees of flooding or frequent saturation (hydrophytes), and soils that are saturated enough to develop anaerobic conditions during the growing season (hydric).

According to the USFWS, which manages the National Wetlands Inventory<sup>2</sup> on behalf of all federal agencies, there are no wetlands present at the airport. Additionally, a review of information from the NRCS Web Soil Survey indicates soils present at the airport have less than one percent hydric components.<sup>2</sup>

*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. Based on a review of Federal Emergency Management Agency (FEMA) maps dated September 27, 2002, no portion of a 100-year floodplain is located on airport property.

*Surface Waters.* The *Clean Water Act* provides the authority to establish water quality standards, control discharges, develop waste treatment management plans and practices, prevent or minimize the loss of wetlands, and regulate other issues concerning water quality. Water quality concerns related to airport

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<sup>2</sup> <http://www.fws.gov/wetlands/Data/Mapper.html>, accessed January 2016

development most often relate to the potential for surface runoff and soil erosion, as well as the storage and handling of fuel, petroleum products, solvents, etc. Additionally, Congress has mandated (under the *Clean Water Act*) the National Pollutant Discharge Elimination System (NPDES). This program addresses non-agricultural storm water discharges. Through the use of NPDES permits, certain procedures are required to prevent contamination of water bodies from storm water runoff.

Examples of direct impacts to surface waters include any in-water work resulting from expansion of an existing FAA facility adjacent to surface waters, or a withdrawal of water from a surface water for construction or operations.

According to *EJSCREEN*, there are no *Clean Water Act* Section 303d impaired streams or water bodies within five miles of the airport.

*Groundwater.* Groundwater is subsurface water that occupies the space between sand, clay, and rock formations. The term aquifer is used to describe the geologic layers that store or transmit groundwater, such as to wells, springs, and other water sources. Examples of direct impacts to groundwater could include withdrawal of groundwater for operational purposes, or reduction of infiltration or recharge area due to new impervious surfaces.

Based on information available from the Groundwater Atlas of the United States, the airport is underlain by basin and range basin-fill aquifers.<sup>3</sup> This type of aquifer is “formed of volcanic and carbonate rocks and unconsolidated to consolidated basin-fill deposits. The basin-fill deposits form the most productive aquifers and are generally in individual alluvial basins that are drained internally and are separated by low mountains.”

## SUMMARY

This chapter has presented comprehensive data related to the airport, the community, and surrounding area. This information provides the foundation upon which the remaining elements of the Master Plan can be accomplished and is important to forecast future aviation activity and facility needs.

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<sup>3</sup> [http://pubs.usgs.gov/ha/ha730/ch\\_b/B-text2.html](http://pubs.usgs.gov/ha/ha730/ch_b/B-text2.html), Ground Water Atlas of the United States, accessed January 2016.

## DOCUMENT SOURCES

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 or photographs which were referenced for information. On-site inventory and interviews with airport staff and tenants contributed to the inventory effort.

*Airport/Facility Directory, Southwest*, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, June 2015.

*Las Vegas Aeronautical Chart*, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, October 2015.

*National Plan of Integrated Airport Systems (NPIAS)*, U.S. Department of Transportation, Federal Aviation Administration, 2015-2019.

*U.S. Terminal Procedures, Southwest*, U.S. Department of Transportation, Federal Aviation Administration, National Aeronautical Charting Office, November 2015.

*Nevada Airport System Plan Update 2009*. Prepared by Aires Consultants Ltd.

Woods & Poole Economics, *The Complete Economic and Demographic Data Source, 2015*.

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

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

Bureau of Economic Analysis, U.S. Department of Commerce  
<http://www.bea.gov>

City of Boulder City  
<http://www.bcnv.org/>

Clark County  
<http://www.clarkcountynv.gov/>

FAA Terminal Area Forecast (January 2015)  
<https://aspm.faa.gov/main/taf.asp>

FAA 5010 Data:

<http://www.airnav.com>

<http://www.gcr1.com/5010Web>

Nevada Department of Transportation – Aviation Planning Division

[https://www.nevadadot.com/About\\_NDOT/NDOT\\_Divisions/Planning/Aviation/Aviation.aspx](https://www.nevadadot.com/About_NDOT/NDOT_Divisions/Planning/Aviation/Aviation.aspx)

United States Department of Transportation – Bureau of Transportation Statistics

[http://www.transtats.bts.gov/Data\\_Elements.aspx?Data=1](http://www.transtats.bts.gov/Data_Elements.aspx?Data=1)



**BOULDER CITY**  
**MUNICIPAL AIRPORT**

**CHAPTER TWO**

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Forecasts

# BOULDER CITY MUNICIPAL AIRPORT



## CHAPTER TWO FORECASTS

An important component required to properly outline future airport facility planning is a detailed analysis of the aviation demands expected over the specified planning period. In airport master planning, this involves projecting potential aviation activity for a 20-year timeframe. For Boulder City Municipal Airport, aviation demand forecasting will consider commercial passenger service projections, general aviation forecasts for based aircraft, and aircraft operational activity projections by aggregate annualized totals and by specific categories. These will serve as the basis for facility planning and needs of the airport through the year 2035.

The objective of forecasting is to predict the magnitude of change expected over the next two decades. Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts serve as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

*The objective of forecasting is to predict the magnitude of change expected over the next two decades.*



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

Only two components of a Master Plan are approved by the FAA: the aviation demand forecasts and the Airport Layout Plan (ALP). The ALP will be updated based on the analysis and findings of this study and will be presented later in this report.

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

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

The forecast process for an Airport Master Plan consists of a series of basic steps that vary in complexity depending upon the issues to be addressed and the type of airport being studied. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results. FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, outlines seven standard steps involved in the forecast process, including:

- 1) **Identify Aviation Activity Measures:** The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
- 2) **Review Previous Airport Forecasts:** May include the FAA *Terminal Area Forecast*, state or regional system plans, and previous master plans.
- 3) **Gather Data:** Determine what data is required to prepare the forecasts, identify data sources, and collect historical and forecast data.
- 4) **Select Forecast Methods:** There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.
- 5) **Apply Forecast Methods and Evaluate Results:** Prepare the actual forecasts and evaluate for reasonableness.

- 6) **Summarize and Document Results:** Provide supporting text and tables as necessary.
- 7) **Compare Forecast Results with FAA's TAF:** Follow guidance in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems*. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for Boulder City Municipal Airport was produced following these basic guidelines. Existing forecasts are examined and compared against current and historic activity. The historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for the airport that will permit airport management to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

*It is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.*

## **NATIONAL AVIATION TRENDS AND FORECASTS**

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, general aviation, and FAA workload measures. The forecasts are prepared to meet budget and planning needs 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 2015-2035*, published in March 2015. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

*Air carriers fine-tuned their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel efficient aircraft.*

Since its deregulation in 1978, the U.S. commercial air carrier industry has been characterized by boom-to-bust cycles. The volatility that was associated with these cycles was thought by many to be a structural feature of an industry that was capital intensive but

cash poor. However, the Great Recession of 2007-2009 marked a fundamental change in the operations and finances of U.S. airlines. Air carriers fine-tuned their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft.

To increase operating revenues, carriers initiated new services that customers were willing to purchase and started charging separately for services that were historically bundled in the price of a ticket. The industry experienced an unprecedented period of consolidation with four major mergers in five years. These changes along with capacity discipline exhibited by carriers have resulted in a fifth consecutive year of profitability for the industry in 2014. Looking ahead, there is optimism that the industry has been transformed from that of a boom-to-bust cycle to one of sustainable profits.

## U.S. ECONOMIC OUTLOOK

According to the FAA forecast report, as the economy recovers from the most serious economic downturn and slow recovery since the Great Depression, aviation will continue to grow over the long run. Fundamentally, demand for aviation is driven by economic activity. As economic growth picks up, so will growth in aviation activity. The FAA forecast calls for passenger growth over the next 20 years to average 2.0 percent annually. The steep decline in the price of oil in 2014 and into 2015 is a catalyst for a short lived uptick in passenger growth; however, growth is anticipated to be somewhat muted, primarily due to the uncertainty that surrounds the U.S. and global economies.

U.S. economic performance in 2014 continued to be mixed, with modest growth in real gross domestic product (GDP) and real incomes, a slowly falling unemployment rate, and oil prices and consumer inflation remaining in check. The economy grew at an average annual rate of 2.6 percent in fiscal year (FY) 2014 after expanding 1.8 percent in FY 2013. GDP growth was strong in the second half of 2014 after shrinking in the second quarter primarily due to adverse weather conditions spurred on by the polar vortex. There were favorable signs in 2014 as the housing market continued to improve, the stock market entered record territory, and the labor market saw steady improvement with almost 2.8 million new jobs created during the year, the best figure since 1999. The unemployment rate fell steadily throughout 2014 from 7.2 percent to 5.6 percent by December.

*The long-term stability of U.S. economic growth depends on sustained growth in the workforce and capital stock, along with improved productivity and competitiveness.*

In the medium term, (the three-year period between 2016 and 2019), U.S. economic growth is projected to average 2.6 percent per year, with rates ranging between 2.4 and 2.7 percent. Income growth picks up during the same period, averaging 3.2 percent per year. For the balance of the forecast period, annual average growth of U.S. real GDP and real income is projected to slow to around 2.4 and 2.5 percent, respectively. The long-term stability of U.S. economic growth depends on sustained growth in the workforce and capital stock, along with improved productivity and competitiveness.

## U.S. TRAVEL DEMAND

By year end of federal FY 2014, the U.S. commercial aviation industry consisted of 16 scheduled mainline air carriers that used large passenger jets (over 90 seats) and 70 regional carriers that used smaller piston, turboprop, and regional jet aircraft (up to 90 seats) to provide connecting passengers to the larger carriers. Mainline and regional carriers offer domestic and international passenger service between the U.S. and foreign destinations, although regional carrier international service is confined to the border markets in Canada, Mexico, and the Caribbean. Twenty-six all-cargo carriers were providing domestic and/or international air cargo service at the end of 2014.

According to the FAA, shaping today's commercial air carrier industry are three distinct trends: (1) continuing industry consolidation and restructuring; (2) continued capacity discipline in response to external shocks; and (3) the proliferation of ancillary revenues.

The restructuring and consolidation of the U.S. airline industry that began in the aftermath of the terror attacks of September 11, 2001 continued in 2014. During 2014, Southwest continued to integrate the former AirTran network into its operations, while American and U.S. Airways moved ahead with combining their networks and reservation systems. Consequently, when compared to 2007, 5.7 percent fewer domestic available seat miles (ASMs) were flown and 2.9 percent fewer passengers were carried domestically in 2014. This has had clear implications with both the average size of aircraft and load factors increasing.

One of the most striking outcomes of industry restructuring has been the unprecedented period of capacity discipline (achieving higher passenger loads through scheduled flight and fleet mix consolidation primarily), especially in domestic markets. Between 1978 and 2000, ASMs in domestic markets increased at an average annual rate of four percent per year, recording only two years of decline. Even though domestic ASMs shrank by 6.9 percent in FY 2002, following the events of September 11, 2001, growth resumed and by FY 2007, domestic ASMs were 3.6 percent above the FY 2000 level. However, since FY 2007, ASMs in the U.S. domestic market have decreased by 5.7 percent, as the industry responded first to the sharp rise in oil prices (up 155 percent between 2004 and 2008) and then the Great Recession that followed (2007-2009).

*As a result of capacity reduction and the introduction of ancillary revenue sources, U.S. passenger carriers posted net profits for the fifth consecutive year in 2014.*

The 5.7 percent reduction in domestic capacity since 2007 has not been shared equally between the mainline carriers and their regional counterparts. To better match demand to capacity, the mainline carriers contracted out "thin" routes to their regional

counterparts because they could provide lift at a lower cost, or simply removed the capacity altogether. In 2014, the mainline carrier group provided 6.3 percent less capacity than it did in 2007 (and carried 3.6

percent fewer passengers). Capacity flown by the regional group has shrunk by 1.9 percent over the same five-year period (with passengers carried decreasing by 0.7 percent).

The most recent trend to take hold is that of ancillary revenues. Carriers generate ancillary revenues by selling products and services beyond that of an airplane ticket to customers. This includes the un-bundling of services previously included in the ticket price, such as checked bags and on-board meals, and by adding new services, such as boarding priority. As a result of capacity reduction and the introduction of ancillary revenue sources, U.S. passenger carriers posted net profits for the fifth consecutive year in 2014.

### FAA COMMERCIAL AIR CARRIER FORECASTS

Although the recession has been officially over for several years, in 2014, carriers continued to deal with economic uncertainties as business travel budgets remained strained, unemployment was still high relatively high compared to pre-recession years, and uncertainty surrounding federal fiscal policy remained. In such an uncertain but slowly improving economic environment, industry capacity growth was somewhat restrained (up 2.2 percent in 2014), after only a 0.8 percent increase in 2013. Given the minimal increase in seats available to the traveling public, carriers were still able to raise airfares despite the slow growth in demand. Higher airfares and ancillary revenue, coupled with flat to falling fuel prices, resulted in U.S. carriers being profitable in 2014.

According to the FAA, system capacity is projected to increase modestly (up 2.4 percent) in 2015. In the domestic market, mainline carrier capacity expanded only slightly (1.8 percent) in 2014, but is projected to grow at a more robust rate (2.6 percent) in 2015, while capacity for the regional carriers is projected to post its first increase since FY 2011 (up 4.0 percent). In the international sector, capacity is forecast to increase slowly in the Atlantic and Pacific markets and increase modestly in the Latin market, resulting in an overall international capacity increase of 1.6 percent in 2015.

Passenger demand growth is in line with capacity growth in 2015, with system revenue passenger miles (RPMs) forecast to grow 2.6 percent. Supported by a growing U.S. and world economy, year over year RPM growth is forecast to be 2.5 percent on average over the period from 2015-2035. Over the same time period, system capacity growth averages 2.5 percent per year.

*System passengers are projected to increase an average of 1.9 percent a year, with mainline carriers growing at 2.0 percent a year, slightly higher than their regional counterparts (up 1.6 percent).*

System passengers are projected to increase an average of 1.9 percent a year, with mainline carriers growing at 2.0 percent a year, slightly higher than their regional counterparts (up 1.6 percent). By 2035,

U.S. commercial air carriers are projected to fly 1.71 trillion ASMs and transport 1.14 billion enplaned passengers – a total of 1.44 trillion passenger miles.

Planes will remain crowded, with load factors projected to grow moderately during the early years of the forecast period, then tapering during the mid to latter years to 84.2 percent in 2035 (up 0.6 points compared to the beginning of the forecast period in 2015).

The FAA forecasts indicate that enplanements are forecast to grow (up 2.6 percent) in 2015, following a 2.1 percent increase in 2014. Over the forecast period, domestic enplanements are projected to grow at an average annual rate of 1.7 percent, with mainline and regional carriers growing at the same rate. **Exhibit 2A** presents the annual historical and forecast enplanement totals for both large air carriers and commuter airlines in the U.S. as forecast by the FAA.

### FAA COMMERCIAL AIRCRAFT FLEET FORECASTS

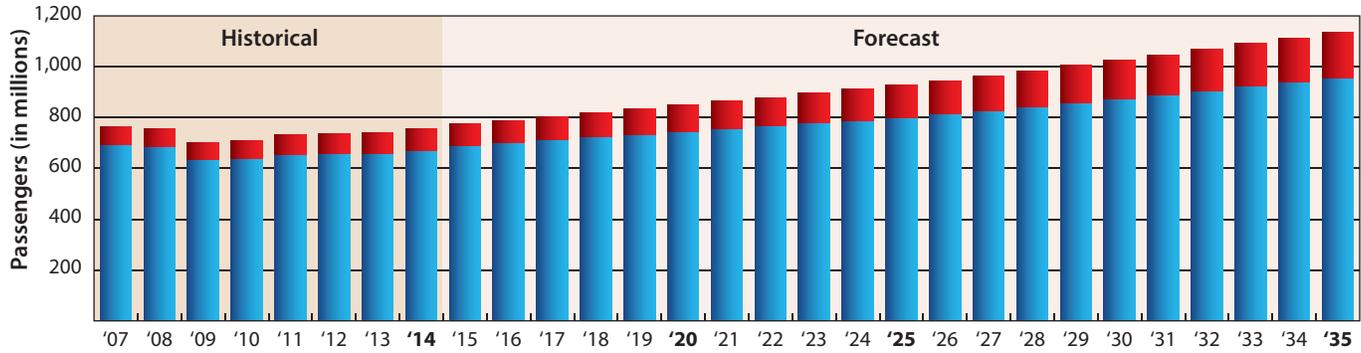
The commercial passenger carrier fleet is undergoing transformation. The mainline carriers are retiring older, less fuel-efficient aircraft (e.g., 737-300/400/500, 757/767, and MD-80) and replacing them with more technologically advanced A319/320 and 737-700/800/900 aircraft. The regional carriers are growing their fleet of 70-90 seat regional jet aircraft and reducing their fleet of 50-seat jet aircraft. The total number of aircraft in the U.S. commercial fleet (including regional carriers) is estimated at 6,727 for 2014, a decrease of 86 aircraft from 2013. This total includes 3,774 mainline air carrier passenger aircraft (over 90 seats), 740 mainline air cargo aircraft, and 2,213 regional carrier aircraft (jets, turboprops, and pistons).

The number of passenger jets in the mainline fleet is estimated to have increased by 41 in 2014. After 2014, the mainline aircraft fleet was projected to add approximately 64 aircraft annually, totaling 5,112 aircraft in 2035. The mainline narrow-body fleet (including the Embraer 190s) was projected to grow by 42 aircraft annually from 2015-2035. The wide-body fleet (including the Boeing 787 and Airbus A-350) was projected to grow by 24 aircraft annually over the same period. Mainline passenger jet aircraft are forecast to increase 1.5 percent annually through 2034.

The regional passenger aircraft fleet is estimated to have decreased by 86 aircraft in 2014, as decreases in 50-seat and smaller regional jets and turboprops outpace production of new larger regional jets. After 2014, the regional carrier fleet (turboprops and jets) is expected to decrease by 0.2 percent per year over the remaining years of the forecast period, totaling 2,141 aircraft in 2035. The number of regional jets (90 seats or

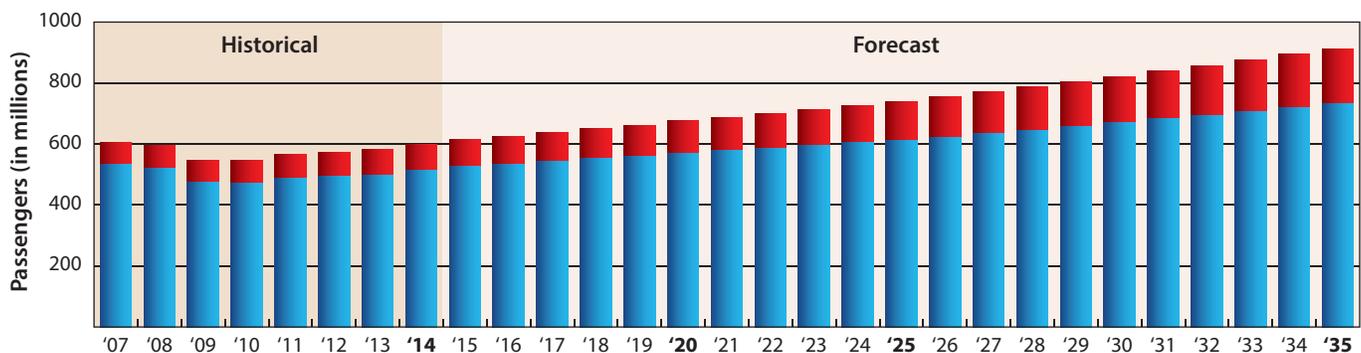
*All of the growth in regional jets over the forecast period occurs in the larger, 70- to 90-seat aircraft category. During the forecast period, all regional jets of 50 or less seats are projected to be retired from the fleet.*

**U.S. AIR CARRIER PASSENGER ENPLANEMENTS<sup>1</sup>**



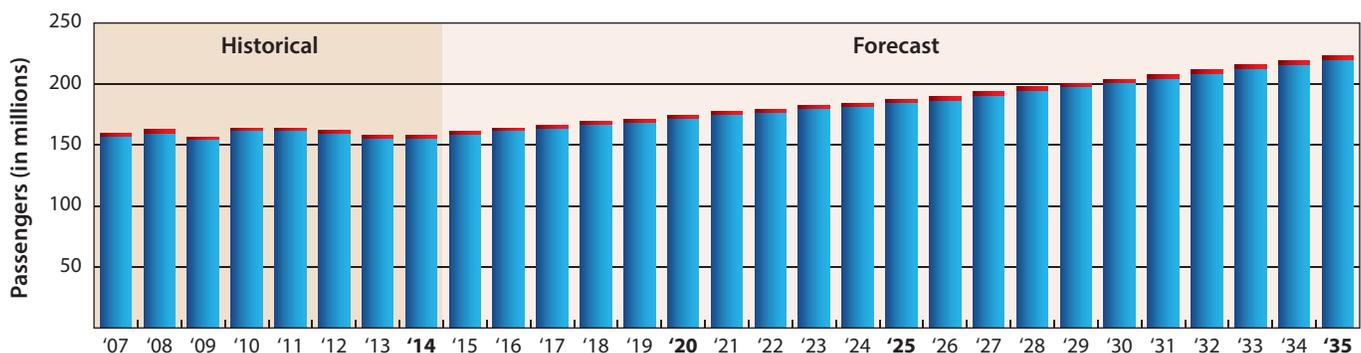
SOURCE	2014	2020	2025	2035	AAGR 2014-2035
Domestic Revenue Enplanements	668.4	742.0	796.6	951.0	1.69%
International Revenue Enplanements	88.0	109.1	130.8	185.5	3.61%
TOTAL	756.3	851.1	927.4	1,136.5	1.96%

**U.S. MAINLINE AIR CARRIER PASSENGER ENPLANEMENTS**



SOURCE	2014	2020	2025	2035	AAGR 2014-2035
Domestic Revenue Enplanements	513.2	570.5	612.7	731.7	1.70%
International Revenue Enplanements	85.1	105.9	127.4	181.4	3.67%
TOTAL	598.3	676.4	740.2	913.1	2.03%

**U.S. REGIONAL AIR CARRIER PASSENGER ENPLANEMENTS**



SOURCE	2014	2020	2025	2035	AAGR 2014-2035
Domestic Revenue Enplanements	155.2	171.5	183.9	219.3	1.66%
International Revenue Enplanements	2.9	3.2	3.4	4.0	1.54%
TOTAL	158.1	174.6	187.3	223.3	1.66%

<sup>1</sup>Sum of U.S. Mainline and Regional Air Carrier Enplanements  
Note: All figures measured in millions

Source: FAA Aerospace Forecast - Fiscal Years 2015-2035

fewer) is projected to grow from 1,642 in 2014 to 1,953 in 2034, an average annual increase of 0.8 percent. All of the growth in regional jets over the forecast period occurs in the larger, 70- to 90-seat aircraft category. During the forecast period, all regional jets of 50 or less seats are projected to be retired from the fleet.

Large cargo jet aircraft are forecast to grow from an estimate of 740 in 2014 to a total 1,182 aircraft in 2035. The narrow-body, cargo jet fleet is projected to increase by two aircraft per year over the 20-year forecast period as older 757s and 737s are converted to cargo service. The wide-body, cargo jet fleet is projected to increase by 14 aircraft annually. **Exhibit 2B** presents the FAA commercial aircraft fleet forecast through 2035.

### FAA GENERAL AVIATION FORECASTS

The FAA forecasts the fleet mix and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts “active aircraft,” not total aircraft. An active aircraft is one that is flown at least one hour during the year. From 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

*Overall, business aviation is projected to outpace personal/recreational use.*

After growing rapidly for most of the decade, the demand for business jet aircraft slowed over the past few years, as the industry was hard hit by the 2008-2009 economic recession. Nonetheless, the FAA forecast calls for growth through the long-term, driven by higher corporate profits and continued

concerns about safety, security, and flight delays. Overall, business aviation is projected to outpace personal/recreational use.

In 2014, the FAA estimated there were 139,890 piston-powered aircraft in the national fleet. The total number of piston-powered aircraft in the fleet is forecast to decline by 0.5 percent from 2014-2035, resulting in 125,935 by 2035. This includes -0.6 percent annually for single engine pistons and -0.4 percent for multi-engine pistons.

Total turbine aircraft are forecast to return to growth in 2014 and have an annual growth rate of 2.4 percent through 2035. The FAA estimates there were 28,085 turbine-powered aircraft in the national fleet in 2014, and there will be 45,905 by 2035. This includes annual growth rates of 1.5 percent for turboprops, 2.8 percent for business jets, and 2.8 percent for turbine helicopters.

While comprising a much smaller portion of the general aviation fleet, experimental aircraft, typically identified as home-built aircraft, are projected to grow annually by 1.4 percent through 2035. The FAA estimates there were 24,480 experimental aircraft in 2014, and these are projected to grow to 33,040 by 2035. Sport aircraft are forecast to grow 4.3 percent annually through the long term, growing from

2,200 in 2014 to 5,360 by 2035. **Exhibit 2C** presents the historical and forecast U.S. active general aviation aircraft.

The FAA also forecasts total operations based upon activity at control towers across the United States. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. General aviation operations, both local and itinerant, declined significantly as a result of the 2008-2009 recession and subsequent slow recovery. Through 2035, total general aviation operations are forecast to grow 0.4 percent annually. Air taxi/commuter operations are forecast to decline by 3.6 percent through 2024, and then increase slightly through the remainder of the forecast period. Overall, air taxi/commuter operations are forecast to decline by 1.2 percent annually from 2014 through 2035.

**GENERAL AVIATION AIRCRAFT SHIPMENTS AND REVENUE**

As previously discussed, the 2008-2009 economic recession has had a negative impact on general aviation aircraft production, and the industry has been slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. According to the General Aviation Manufacturers Association (GAMA), there is optimism that aircraft manufacturing will stabilize and return to growth, which has been evidenced since 2011. **Table 2A** presents historical data related to general aviation aircraft shipments.

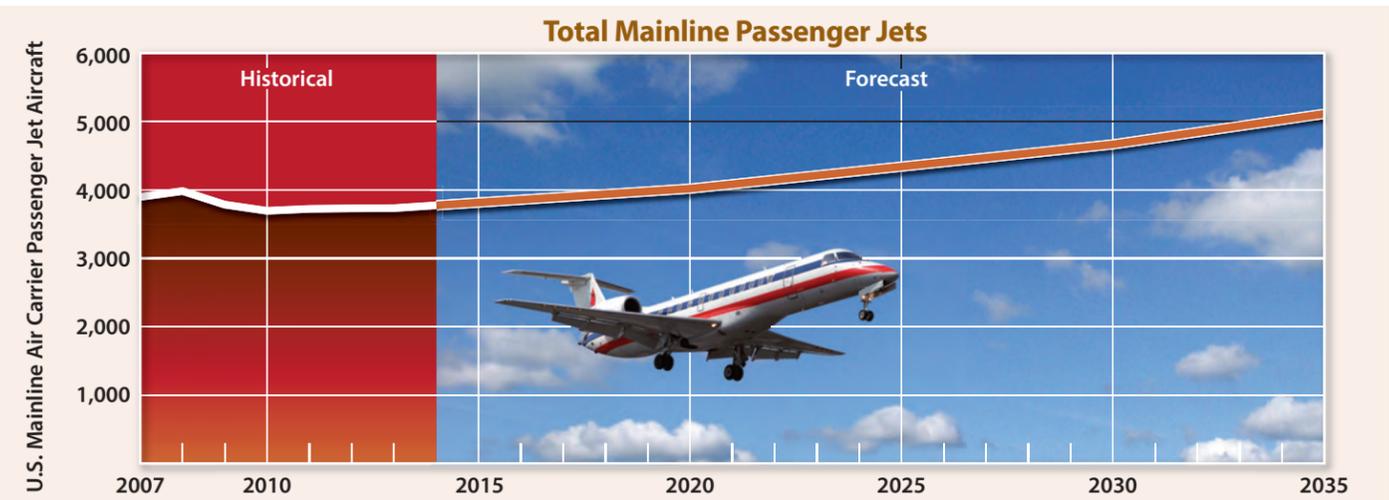
**TABLE 2A**  
**Annual General Aviation Airplane Shipments**  
**Manufactured Worldwide and Factory Net Billings**

Year	Total	SEP	MEP	TP	J	Net Billings (\$millions)
1994	1,132	544	77	233	278	3,749
1995	1,251	605	61	285	300	4,294
1996	1,437	731	70	320	316	4,936
1997	1,840	1043	80	279	438	7,170
1998	2,457	1508	98	336	515	8,604
1999	2,808	1689	112	340	667	11,560
2000	3,147	1,877	103	415	752	13,496
2001	2,998	1,645	147	422	784	13,868
2002	2,677	1,591	130	280	676	11,778
2003	2,686	1,825	71	272	518	9,998
2004	2,963	1,999	52	321	591	11,918
2005	3,590	2,326	139	375	750	15,156
2006	4,053	2,513	242	412	886	18,815
2007	4,276	2,417	258	465	1,136	21,837
2008	3,970	1,943	176	538	1,313	24,772
2009	2,279	893	70	446	870	19,474
2010	2,020	781	108	368	763	19,715
2011	2,120	761	137	526	696	19,097
2012	2,133	790	91	580	672	18,873
2013	2,345	900	122	645	678	23,450
2014	2,445	986	143	603	722	24,499

SEP - Single Engine Piston; MEP - Multi-Engine Piston; TP - Turboprop; J - Turbofan/Turbojet  
Source: General Aviation Manufacturers Association 2014 Statistical Databook.

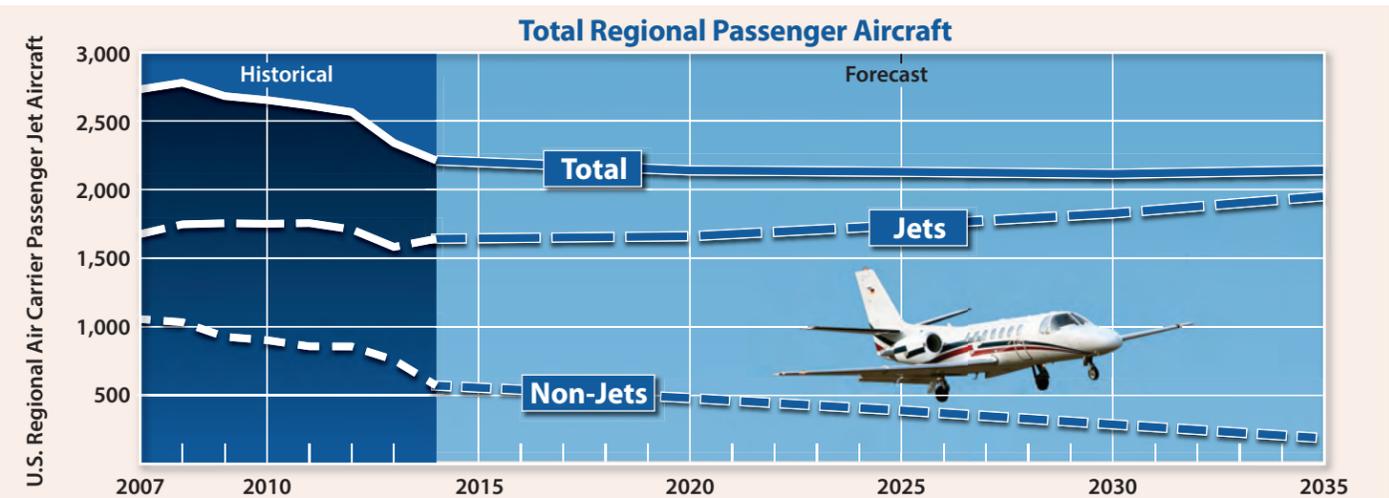
**U.S. MAINLINE AIR CARRIER PASSENGER JET AIRCRAFT**

	2014	2020	2025	2035	AAGR 2014-2035
<b>Large Narrow Body</b>					
2 Engine	3,155	3,291	3,512	4,016	1.16%
3/4 Engine	5	5	0	0	0.00%
<b>Large Wide Body</b>					
2 Engine	481	594	731	983	3.46%
3/4 Wide Body	40	31	0	0	0.00%
<b>Total Large Jets</b>	<b>3,681</b>	<b>3,921</b>	<b>4,243</b>	<b>4,999</b>	<b>1.47%</b>
<b>Total Regional Jets</b>	<b>93</b>	<b>97</b>	<b>97</b>	<b>113</b>	<b>0.93%</b>
<b>Total Mainline Passenger Jets</b>	<b>3,774</b>	<b>4,018</b>	<b>4,340</b>	<b>5,112</b>	<b>1.46%</b>



**U.S. REGIONAL AIR CARRIER PASSENGER JET AIRCRAFT**

	2014	2020	2025	2035	AAGR 2014-2035
<b>Less than 30 Seats</b>					
Turboprop	483	388	293	79	-8.26%
<b>31-40 Seats</b>					
Turboprop	37	30	22	6	-8.30%
<b>Over 40 Seats</b>					
Turboprop	51	62	75	103	3.40%
Jet	1,642	1,660	1,740	1,953	0.83%
<b>Non-Jet Total</b>	<b>571</b>	<b>480</b>	<b>390</b>	<b>188</b>	<b>-5.15%</b>
<b>Jet Total</b>	<b>1,642</b>	<b>1,660</b>	<b>1,740</b>	<b>1,953</b>	<b>0.83%</b>
<b>Total Regional Passenger Aircraft</b>	<b>2,213</b>	<b>2,140</b>	<b>2,130</b>	<b>2,141</b>	<b>-0.16%</b>



**U.S. ALL CARGO JET AIRCRAFT**

	2014	2020	2025	2035	AAGR 2014-2035
<b>Large Narrow Body</b>					
2 Engine	191	213	243	306	2.27%
3/4 Engine	15	13	0	0	0.00%
<b>Large Wide Body</b>					
2 Engine	296	356	439	628	3.65%
3/4 Engine	238	239	219	248	0.20%
<b>Total All Cargo Jets</b>	<b>740</b>	<b>821</b>	<b>901</b>	<b>1,182</b>	<b>2.26%</b>

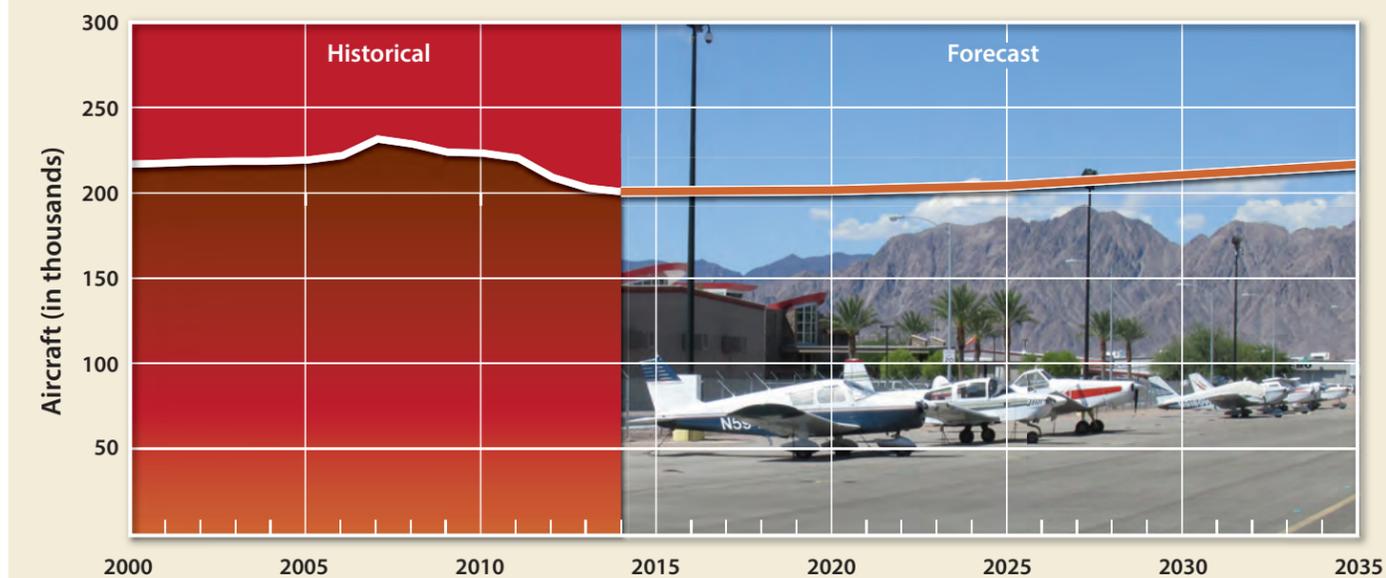


Source: FAA Aerospace Forecast - Fiscal Years 2015-2035

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**U.S. ACTIVE GENERAL AVIATION AIRCRAFT**

	2014	2020	2025	2035	AAGR 2014-2035
<b>Fixed Wing</b>					
<b>Piston</b>					
Single Engine	123,440	117,770	113,905	108,810	-0.60%
Multi-Engine	13,215	12,920	12,545	12,135	-0.41%
<b>Turbine</b>					
Turboprop	9,485	9,315	9,855	12,970	1.50%
Turbojet	11,750	13,115	15,000	20,815	2.76%
<b>Rotorcraft</b>					
Piston	3,235	3,785	4,165	4,990	2.09%
Turbine	6,850	8,410	9,595	12,120	2.75%
<b>Experimental</b>					
	24,480	26,795	28,875	33,040	1.44%
<b>Sport Aircraft</b>					
	2,200	3,170	3,970	5,360	4.33%
<b>Other</b>					
	4,205	4,130	4,060	4,020	-0.21%
<b>Total Pistons</b>	<b>139,890</b>	<b>134,475</b>	<b>130,615</b>	<b>125,935</b>	<b>-0.50%</b>
<b>Total Turbines</b>	<b>28,085</b>	<b>30,840</b>	<b>34,450</b>	<b>45,905</b>	<b>2.37%</b>
<b>Total Fleet</b>	<b>198,860</b>	<b>199,410</b>	<b>201,970</b>	<b>214,260</b>	<b>0.36%</b>

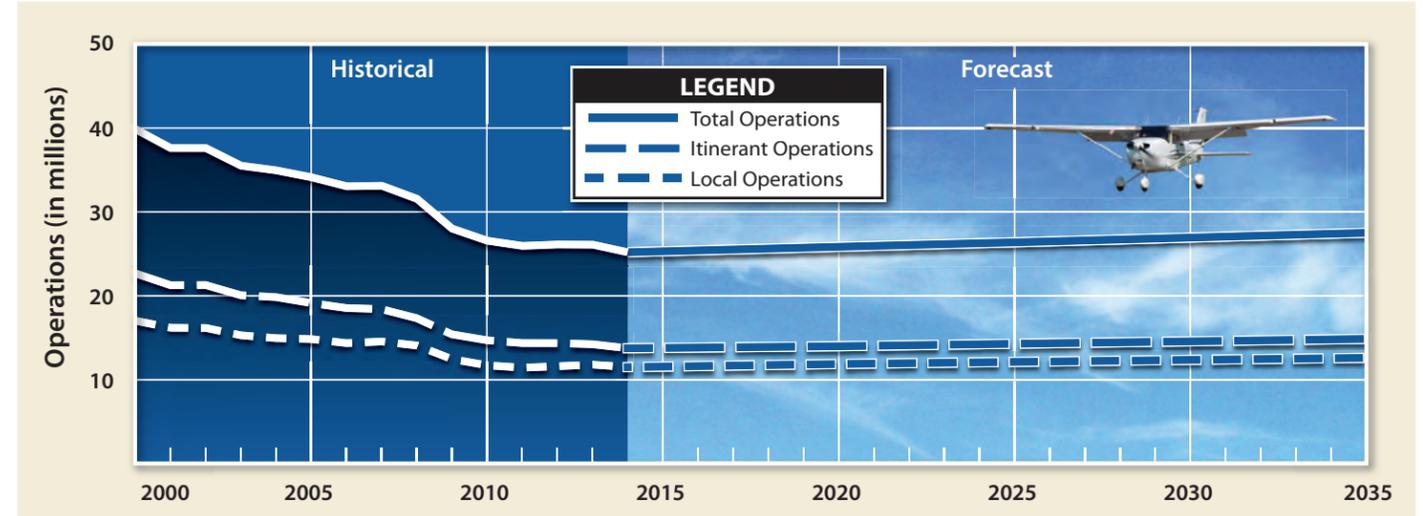


Notes: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.

Source: FAA Aerospace Forecast - Fiscal Years 2015-2035

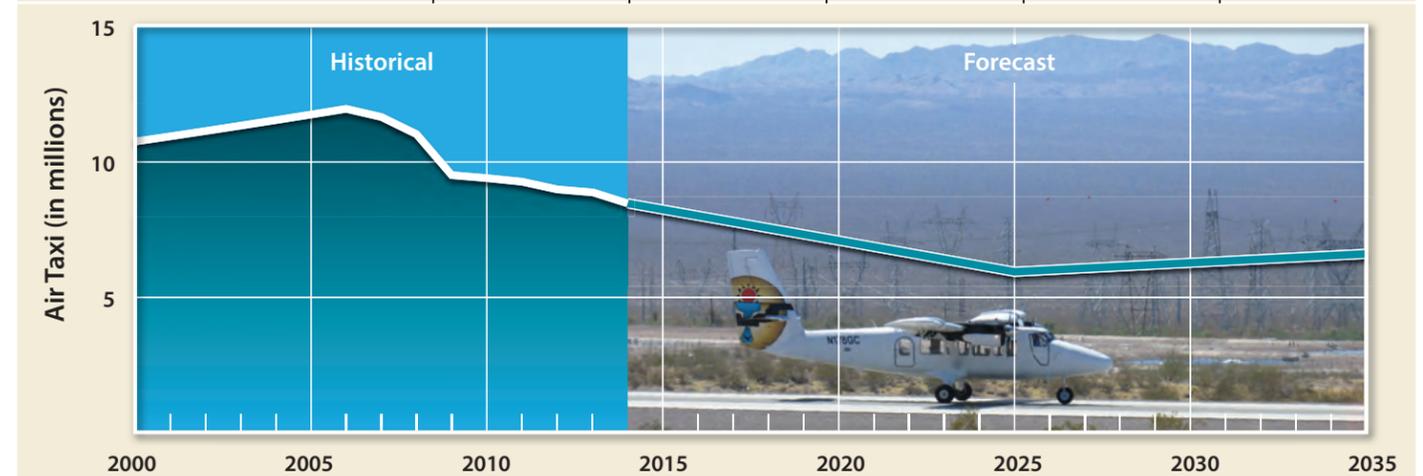
**U.S. GENERAL AVIATION OPERATIONS**

	2014	2020	2025	2035	AAGR 2014-2035
<b>Itinerant</b>					
	13,977,500	14,209,500	14,499,400	15,118,400	0.37%
<b>Local</b>					
	11,674,100	12,048,000	12,298,900	12,834,800	0.45%
<b>Total GA Operations</b>	<b>25,651,600</b>	<b>26,257,500</b>	<b>26,798,200</b>	<b>27,953,200</b>	<b>0.41%</b>



**U.S. GENERAL AVIATION AIR TAXI**

	2014	2020	2025	2035	AAGR 2014-2035
<b>Air Taxi/Commuter Operations</b>					
Itinerant	8,439,300	7,075,700	5,918,500	6,580,200	-1.18%



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Worldwide shipments of general aviation airplanes increased for the fourth year in a row in 2014. A total of 2,445 units were delivered around the globe, as compared to 2,345 units in 2013. Worldwide general aviation billings were also higher than the previous year.

**Business Jets:** General aviation manufacturers delivered 722 business jets in 2014, as compared to 678 units in 2013. Similar to 2013, demand was stronger in 2014 for large-cabin business jets than it was for medium and light business jets.

**Turboprops:** In 2014, 603 turboprop airplanes were delivered to customers around the world, a slight decline from the 645 delivered in 2013. Overall, the turboprop market has experienced significant gains since 2010.

**Pistons:** Piston deliveries increased from 1,022 units during 2013 to 1,129 in 2014. The piston segment continued to fare best for unit deliveries among the three segments by which GAMA tracks the airplane manufacturing industry. This is due in part by deliveries to flight schools in emerging markets. Most industry observers believe that the general aviation market, particularly the business aviation market, is in a position for sustained growth. Industry net orders are back to positive and most leading indicators continue to improve. The large jet category of the market is expected to expand faster than the other categories.

*Most industry observers believe that the general aviation market, particularly the business aviation market, is in a position for sustained growth.*

## **AIRPORT SERVICE AREA**

The initial step in determining the aviation demand for an airport is to define its generalized service area for various segments of aviation the airport can accommodate. The service area is determined primarily by evaluating the location of competing airports, their capabilities, their services, and their relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of the airport as well as the specific areas of aviation demand the airport is intended to serve. For Boulder City Municipal Airport, the primary roles are to accommodate commercial service, largely in the form of air tourism, as well as general aviation demand in the region.

The service area for an airport is a geographic region from which an airport can be expected to attract the largest share of its activity. The definition of the service area can then be used to identify other factors, such as socioeconomic and demographic trends, which influence aviation demand at the airport. Moreover, aviation demand will be impacted by the proximity of competing airports, the surface transportation network, and the strength of commercial and/or general aviation facilities and services provided by the airport and competing airports.

As in any business enterprise, the more attractive the facility is in terms of service 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 its service area. If facilities and services are adequate and/or competitive, some level of aviation activity might be attracted to the airport from more distant locales.

## COMMERCIAL SERVICE

As of November 2015, Boulder City Municipal Airport was one of only four airports in the state designated as a commercial service airport. BVU is unique in that the majority of its commercial service operations are focused on air tourism via helicopter and fixed wing aircraft. As such, the Airport does not conform to the typical commercial passenger service airport which offer national or regional passenger airlines with market-to-market transportation services.

In 2014, approximately 91 percent of the scheduled commercial air service passengers boarding in the state of Nevada did so at McCarran International Airport (LAS), which is located approximately 16 nautical miles northwest of Boulder City Municipal Airport. As a large hub airport, McCarran International offers direct passenger service to over 145 destinations around the world. It is served by over 30 airlines including the "big four" major airlines (American, Delta, Southwest, and United). LAS is one of the busiest airports in the country serving local residents and businesses as do most airports; however, LAS also facilitates the movement of millions of annual visitors to Las Vegas. BVU is different in that it is not served by traditional carriers, but air tour operators instead.

The attraction of Las Vegas, Nevada as the "entertainment capital of the world" brings many travelers from distant places with desires to indulge in all that is offered by the region. Gaming is a strong attractant, but so are other local places of interest, such as the nearby Hoover Dam, Lake Mead, and the Grand Canyon. These areas can be visited by automobile, but also via the air. Air tour operators have established a strong business model in offering air platform sight-seeing services to the greater Las Vegas market. Some operate directly out of LAS; however, the largest regional operation is based at BVU. As such, BVU operates as a commercial service sub-market to LAS and not as a competing market. More directly stated, LAS will always serve to facilitate national and international passenger service transport, while BVU will facilitate the majority of the Grand Canyon sight-seeing operations in the region.

## GENERAL AVIATION

General aviation is the term used to describe a diverse range of aviation activities which includes all segments of the aviation industry, with the exception of commercial air carriers and military. General aviation is the largest component of the national aviation system and includes common activities such as pilot training, recreational flying, agricultural applications, medical support, and other business and

corporate uses. General aviation aircraft can range from small glider and single engine aircraft to large turboprop and jet powered aircraft. In fact, some larger commercial airline aircraft models such as the Boeing 737, known as the Boeing Business Jet (BBJ), have been converted to private general aviation uses. Moreover, many retired military aircraft are now in service with general aviation functions.

Typically, the general aviation service area for regionalized airports can range from a minimum of 30 miles, extending outward to approximately 50 miles in regionalized settings. The proximity and level of general aviation services are largely the defining factors when describing the general aviation service area. A description of airports within an approximate 50-nautical mile radius of Boulder City Municipal Airport was discussed in Chapter One. As noted in the analysis, there are 12 public-use airports within a 50-mile proximity of BVU.

The Airport's location in the west-central portion of Clark County adjacent to Boulder City and in close proximity to the City of Las Vegas makes it an important facility serving the needs of general aviation in the county. Existing airport facilities including two runways, with its primary runway providing 4,803 feet of length, high quality aviation service providers, and abundant hangar space, situates BVU as a highly functional and competitive general aviation option in the region.

When discussing the general aviation service area, another primary demand segment that needs to be addressed is an airport's ability to attract based aircraft. As long as reasonably priced hangars and aviation services are offered, most aircraft owners and operators will choose to base at an airport nearer their home or business. As a result, the general aviation service area will tend to be more compact than a commercial service area. The corporate aviation component of the service area can extend a bit farther, depending on the level of service and availability of necessary services at competing airports.

A generalized 30-mile service area radius, as generally assumed by the FAA, extends into two nearby counties, which includes primarily Clark County and a portion of Mohave County in Arizona. **Exhibit 2D** depicts the location of registered aircraft in the 30-mile radius for 1995, 2005, and 2015. As depicted, the majority of registered aircraft in the radius are concentrated in and around regional population centers. In fact, most are located very close to an existing airport.

All significant population centers in Clark County are served by local general aviation airports. While some airports may have more limited facilities and offer fewer services, they are much closer to the local aircraft owners and airport users. Proximity to an airport is typically the most important aviation demand factor for general aviation activity. Most general aviation operators will elect to operate at a closer airport unless facilities or services cannot be provided. For example, limited runway length and a lack of facilities could prohibit some users from operating at Temple Bar Airport, so they could choose Boulder City Municipal Airport instead. Another example could include an aircraft operator choosing a more distant airport location for more preferable rate and fee structures.

For planning purposes, the primary general aviation service area for Boulder City Municipal Airport will be Clark County. Airports serving the population centers in the nearby area will effectively limit the service area. Furthermore, North Las Vegas Airport, located approximately 23 nautical miles north-west of Boulder City, will limit general aviation demand coming from the north. Likewise, Henderson Executive Airport could limit demand coming from the west. **Exhibit 2D** presents the competing general aviation airports in proximity to BVU.

*For planning purposes, the primary general aviation service area for Boulder City Municipal Airport will be Clark County.*

## SOCIOECONOMIC TRENDS

The socioeconomic conditions for the area provide an important baseline for preparing aviation demand forecasts. Local socioeconomic variables such as population, employment, and income are indicators for understanding the dynamics of the county and, in particular, the trends in aviation growth. Socioeconomic data for Clark County and the State of Nevada is presented in **Table 2B**. The data was obtained from the U.S. Census Bureau, Clark County Comprehensive Planning Department, and Woods & Poole Complete Economic and Demographic Data Set (CEDDS) prepared in 2015.

**TABLE 2B**  
Socioeconomic Projections

	HISTORICAL				PROJECTIONS			
	2000	2010	2014	CAGR (2000-2014)	2020	2025	2035	CAGR (2014-2035)
<b>Clark County</b>								
Population	1,393,909	1,953,106	2,102,238	2.98%	2,289,000	2,455,000	2,715,000	1.14%
Employment	852,405	1,057,617	1,145,269	2.13%	1,290,349	1,414,674	1,660,690	1.70%
PCPI	36,384	34,920	35,535	-0.07%	39,132	42,307	47,971	1.37%
<b>State of Nevada</b>								
Population	1,998,257	2,700,551	2,839,099	2.54%	3,106,066	3,355,295	3,889,685	1.51%
Employment	1,253,211	1,483,276	1,591,256	1.72%	1,780,658	1,941,425	2,255,632	1.59%
PCPI	37,541	36,061	37,181	-0.07%	40,806	43,998	49,637	1.31%

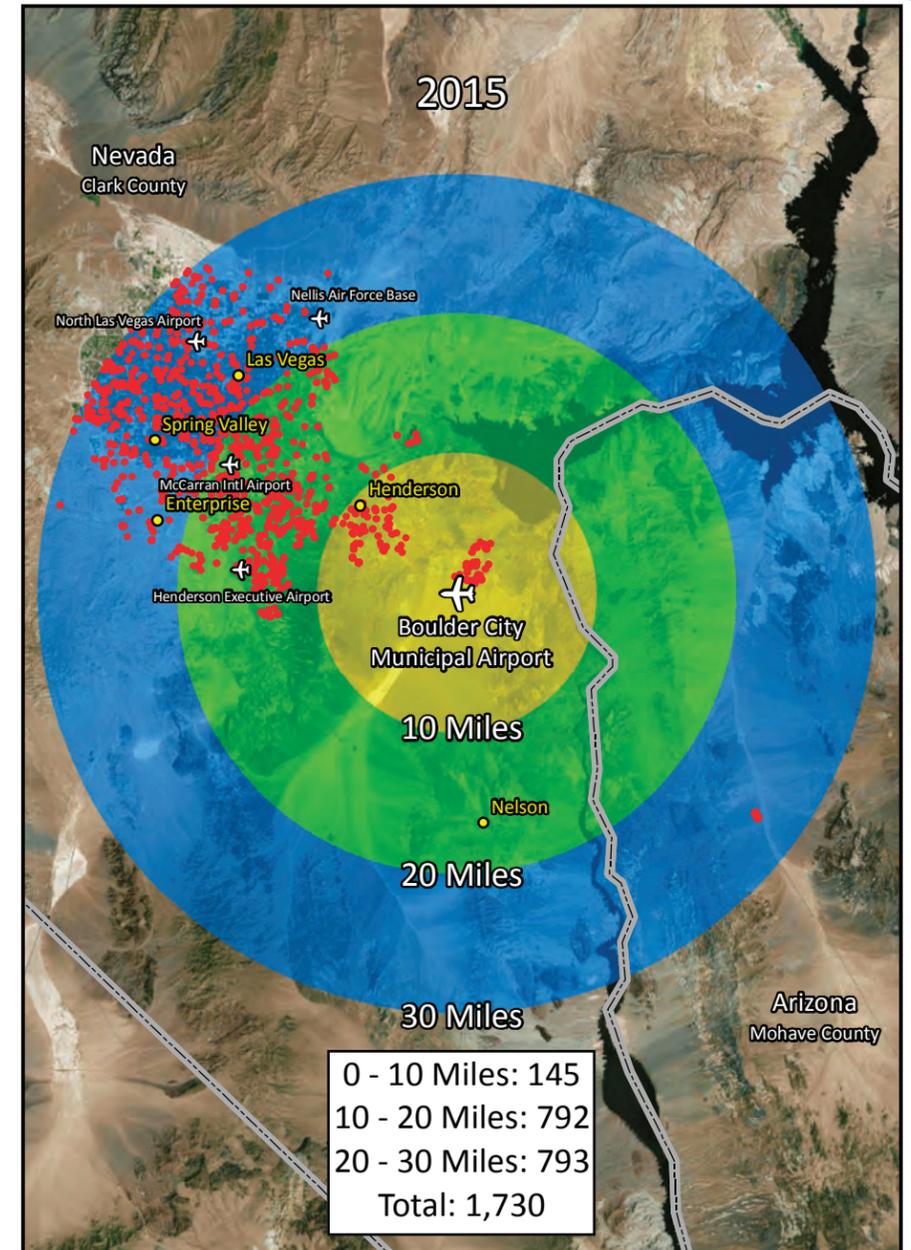
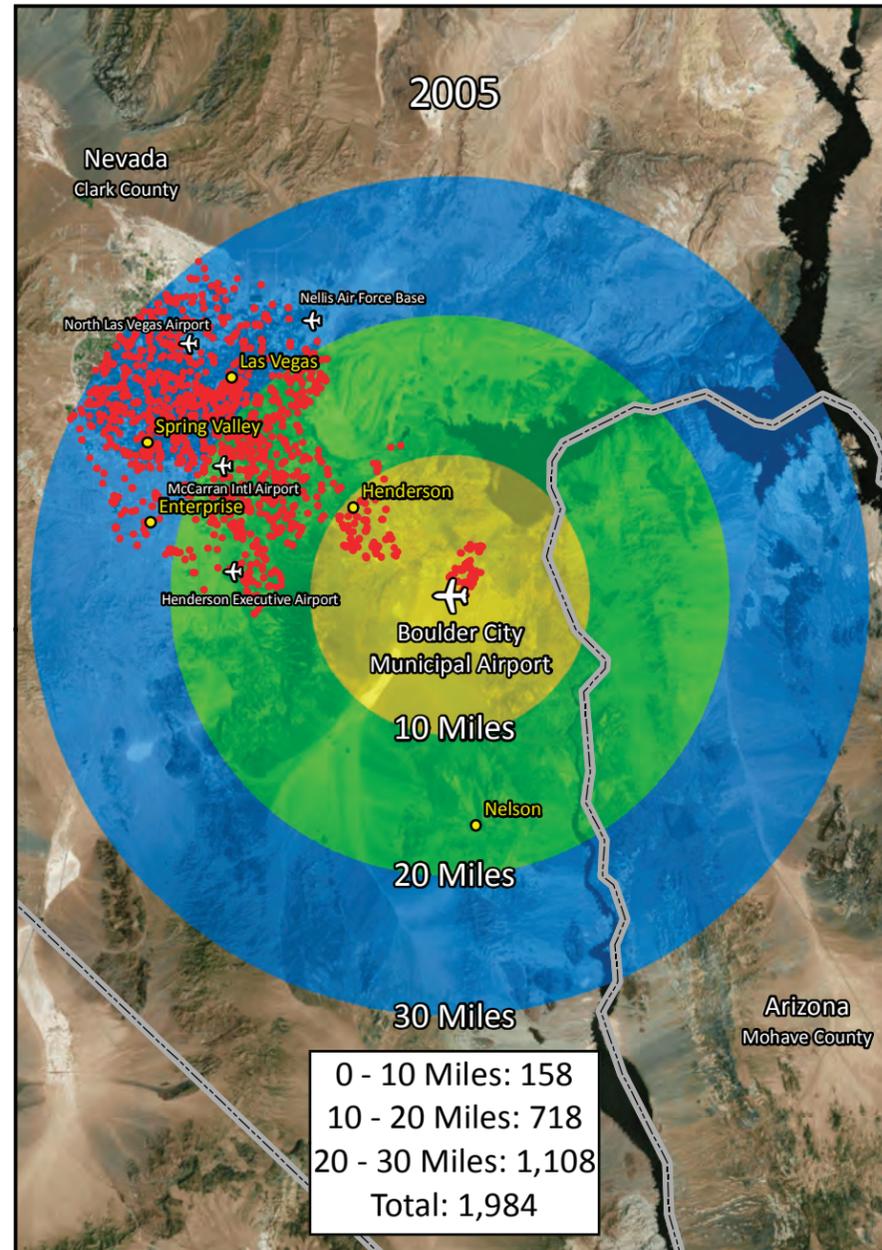
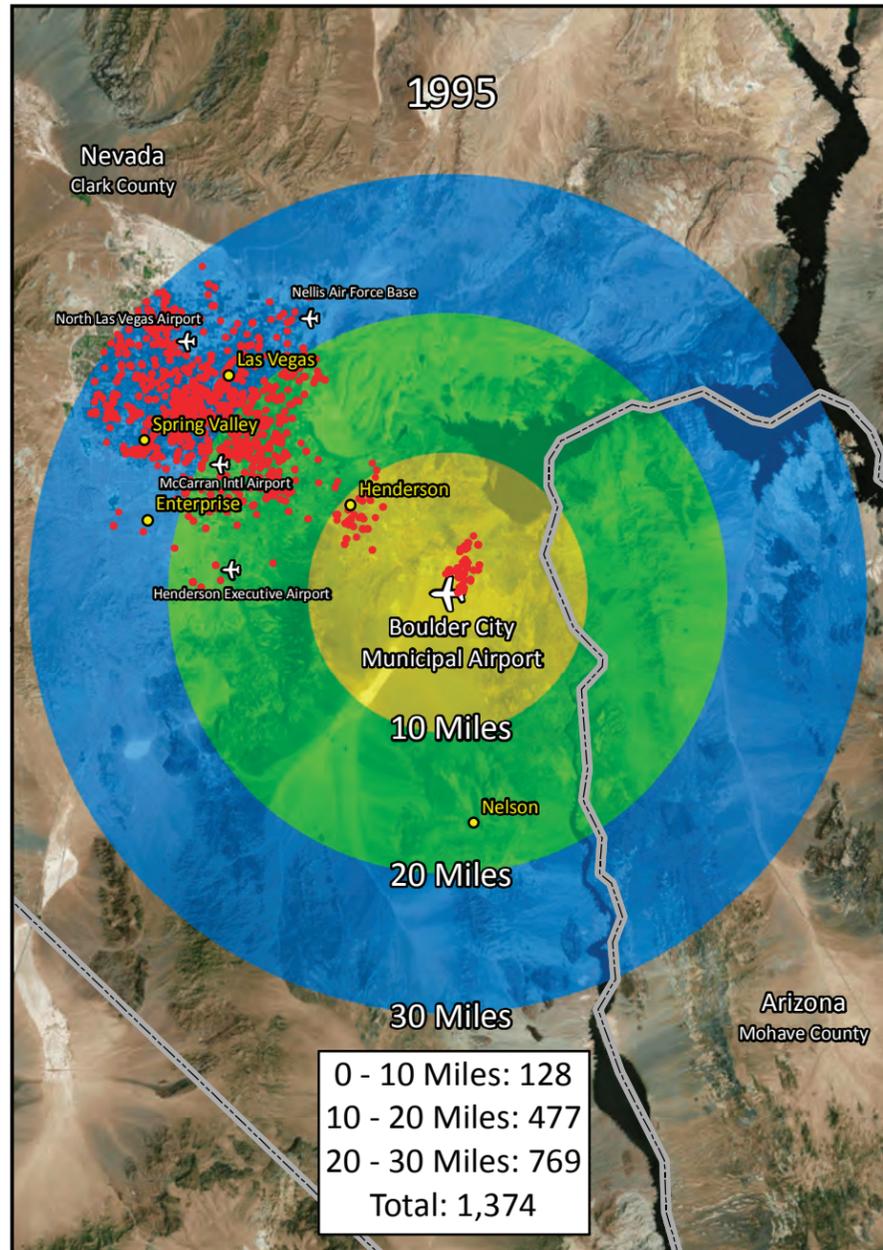
CAGR - Compound Annual Growth Rate

PCPI - Per Capita Personal Income (adjusted to 2009 dollars)

Source: Population - U.S. Census Bureau, Clark County Comprehensive Planning Department, and University of Las Vegas Center for Business and Economic Research; Employment and PCPI - Woods & Poole Complete Economic and Demographic Data Source (2015).

## POPULATION

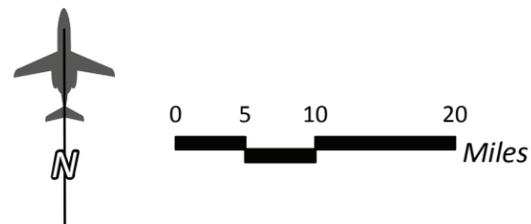
Total resident population for Clark County in 2014 is estimated at 2,102,238. As presented in the table, the county experienced a compound annual growth rate (CAGR) of 2.98 percent since 2000. The population for the area is forecast to increase to 2,715,000 by 2035, representing a 1.14 percent CAGR over the planning period. For comparative purposes, population for the State of Nevada has experienced a 2.54 percent CAGR since 2000, with a projected CAGR of 1.51 percent over the planning period.



**LEGEND**

- Registered Aircraft Location
- ✈ Boulder City Airport
- 30 Mile Buffer
- 20 Mile Buffer
- 10 Mile Buffer

Source: Historical FAA Aircraft Registration, ESRI Basemap Imagery 2013



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## EMPLOYMENT

Historical and forecast employment data for Clark County and the State of Nevada are also presented. Between 2000 and 2014, Clark County employment grew by an average of 1.97 percent annually. This growth rate was higher than the state's overall CAGR of 1.63 percent. Through the next 20 years, the County's employment is forecast to grow at a slower pace than what has been experienced since 2000. The state's employment is also forecast to increase at a slower rate when compared to the past 14 years.

## PER CAPITA PERSONAL INCOME

**Table 2B** also compares per capita personal income (PCPI), adjusted to 2009 dollars, for the County and the State. Clark County's adjusted PCPI for 2014 was \$35,535, slightly lower than the State of Nevada's PCPI at \$37,181. The County is projected to continue to show gains in PCPI through the planning period of this study, increasing at a 1.30 percent CAGR.

## 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 in the aviation industry include trend line projections, correlation/regression analysis, and market share analysis. By developing several projections for each aviation demand indicator, a reasonable planning envelope will emerge. The selected forecast may be one of the individual projections or a combination of several projections based on local conditions. The selected forecast will almost always fall within the planning envelope. Some combination of the following forecasting techniques is utilized to develop the planning envelope for each demand indicator.

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

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

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

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

It is important to note that forecasts will age, and the further a forecast is from the base year, the less reliable it may become, particularly due to changing local and national conditions. Nonetheless, the FAA indicates that a Master Plan include a 20-year forecast for the airport. Facility and financial planning usually require at least a 10-year view, since it often takes more than five years to complete a major facility development program. However, it is important to use forecasts which do not overestimate revenue-generating capabilities or understate demand for facilities needed to meet public (user) needs.

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

Using a broad spectrum of local, regional, and national socioeconomic and aviation information and analyzing the most current aviation trends, forecasts are presented for the following demand indicators:

**AIR TOUR SERVICE**

- Annual Enplaned Passengers
- Operations and Fleet Mix

**GENERAL AVIATION**

- Based Aircraft
- Based Aircraft Fleet Mix
- Aircraft Operations

**PEAKING CHARACTERISTICS**

- Air Tour Operator Activity
- General Aviation and Other Air Taxi Activity

**OTHER AIR TAXI AND MILITARY**

- Aircraft Operations

## COMMERCIAL SERVICE FORECASTS

Commercial air tour operators have been a large part of Boulder City Municipal Airport's history. Although the airport was constructed in 1933, it was not open for public use until 1936. Once the airport opened for public use, it was not long until air tour service began. Grand Canyon Airlines began service from the airport, offering service through the tour company Grand Canyon-Boulder Dam Tours (GCBDT), Inc. In 1938, GCBDT signed an agreement with Transcontinental and Western Airlines (TWA) that stated GCBDT would make improvements to the Boulder City Airport if TWA would lease the facility. TWA provided service at Boulder City Airport until the late 1940s, when the McCarran International Airport was built. TWA eventually left Boulder City Airport and began service from McCarran International Airport.

After TWA stopped providing service to Boulder City Airport, commercial service ceased to exist until the opening of the Boulder City Municipal Airport in the 1980s. Today, there are four commercial service air tour operators providing service from the Airport. Included in these four service providers is GCA, the parent company of Scenic Airlines and partnered with Papillon Grand Canyon Helicopters, who is headquartered at BVU and recently built the air tour terminal facility. Airport records indicate that a high of 300,553 passenger enplanements was experienced in 2008.

## ENPLANEMENT FORECASTS

As discussed in this chapter's introduction, the first step involved in updating an airport's forecasts include reviewing previous forecasts in comparison to actual activity to determine what changes, if any, may be necessary. After that comes the consideration of any new factors that could impact the forecasts, such as changes in the socioeconomic climate or the effects of changes in air carrier services.

### Previous Enplanement Forecasts

There are two existing enplanement forecasts at BVU to consider:

- Airport Layout Plan and Narrative Report (base year 2010)
- FAA's *Terminal Area Forecast* (base year 2014)

The forecasts from the Airport Layout Plan and Narrative Report are nearly five years old. Since this time, the industry has had an extended period of recovery from the Great Recession of 2007-2009.

The FAA TAF forecast is published annually and is utilized by the FAA as a starting point for considering and testing the reasonableness of master plan forecasts. **Table 2C** presents the enplanement forecasts developed previously for BVU. Actual historical enplanements are also included for comparative purposes for the base years of each analysis.

**TABLE 2C**  
**Previous Enplanement Forecasts**  
**Boulder City Municipal Airport**

Year	Actual Enplanements	2010-2013 ALP Update and Narrative Report	2015 FAA TAF
2007	68,632		
2010	169,923	169,923	
2014	211,648	213,065	98,318
2015		219,670	98,318
2020		255,897	98,318
2025		298,098	98,318
2030		336,816	98,318
2035			98,318
CAGR	8.45%	2.36%	0.00%

CAGR: Average annual growth rate

**Table 2C** depicts the annual enplaned passengers at Boulder City Municipal Airport since 2007. As mentioned, the airport’s highest annual enplanement level was 300,553 reached in 2008. This number of annual enplanements has yet to be exceeded or even closely matched. The economic recession of 2008 led to a period of uncertainty for many airports, including a period of market contraction by the national airlines. While other airports continued to struggle, BVU had two operators consistently serving the airport since 2007. Additionally, in 2009, Grand Canyon Airlines and Papillon Grand Canyon Helicopters headquartered their operations at the Airport.

Enplanement levels at BVU have been strong but widely disparate, ranging between a low of 68,632 in 2007 and an aforementioned high of 300,553 in 2008. Since 2008, the enplanement ranged upwards of 100,000 enplanements between 2010 and 2012. Passenger loads have appeared to stabilize over the last three years.

The widely fluctuating enplanement activity makes it unreasonable to rely on trend line, correlation, and regression analyses. Moreover, the airport has only had commercial service since 2007 and trend line and other mathematical models generally require a longer historic base for more accurate or reliable outputs. As such, the enplanement projections for this study will rely on other forecasting methods, such as comparative market share analysis.

**Enplanement Market Share Projections**

**Table 2D** examines the airport’s enplanements as a percentage of the domestic enplanements in the United States (market share) between 2007 and 2014 (last year FAA national data was available). Over the last 8 years, Boulder City’s market share has fluctuated from 0.010 percent in 2007 to a high 0.044

percent in 2008. **Table 2D** includes a constant market share projection that would maintain the 2014 share through 2035. Based upon the FAA’s 2014 forecast for domestic enplanements, this constant share projection would yield enplanement levels of 234,991 in 2020 and 301,182 in 2035, increasing at a compounded annual growth rate (CAGR) of 1.69 percent.

**TABLE 2D**  
**Enplanement Market Share and Ratio Projections**  
**Boulder City Municipal Airport**

Year	BVU Enplaned	U.S. Domestic Enplanements	BVU Market Share	BVU Enplaned	LAS Enplaned	BVU Ratio Per 1,000 LAS Enplanements	BVU Enplaned	Las Vegas Visitor Volume	BVU Ratio Per 1,000 Visitors
2007	68,632	688,500,000	0.010%	68,632	23,885,974	2.873	68,632	39,196,761	1.751
2008	300,553	680,700,000	0.044%	300,553	22,086,090	13.608	300,553	37,481,552	8.019
2009	194,838	630,800,000	0.031%	194,838	20,266,294	9.614	194,838	36,351,469	5.360
2010	169,923	634,800,000	0.027%	169,923	19,913,128	8.533	169,923	37,335,436	4.551
2011	103,259	650,100,000	0.016%	103,259	20,754,703	4.975	103,259	38,928,708	2.653
2012	200,400	653,800,000	0.031%	200,400	20,866,781	9.604	200,400	39,727,022	5.044
2013	204,212	654,400,000	0.031%	204,212	20,956,518	9.745	204,212	39,668,221	5.148
2014	211,648	668,400,000	0.032%	211,648	21,496,802	9.846	211,648	41,126,512	5.146
<b>Historical Average (CAGR—1.04%)</b>				<b>(CAGR—1.44)</b>			<b>(CAGR—0.54%)</b>		
2020	<b>205,163</b>	742,000,000	0.028%	<b>204,986</b>	23,835,584	8.600	<b>205,195</b>	43,575,175*	4.709
2025	<b>220,260</b>	796,600,000	0.028%	<b>229,360</b>	26,669,710	8.600	<b>215,327</b>	45,726,734*	4.709
2035	<b>262,952</b>	951,000,000	0.028%	<b>285,525</b>	33,200,529	8.600	<b>237,116</b>	50,353,804*	4.709
<b>Constant Rate Projection (CAGR—1.69%)</b>				<b>(CAGR—2.09%)</b>			<b>(CAGR—0.97%)</b>		
2020	<b>234,991</b>	742,000,000	0.032%	<b>234,781</b>	23,835,584	9.850	<b>224,249</b>	43,575,175*	5.146
2025	<b>252,283</b>	796,600,000	0.032%	<b>262,697</b>	26,669,710	9.850	<b>235,322</b>	45,726,734*	5.146
2035	<b>301,182</b>	951,000,000	0.032%	<b>327,025</b>	33,200,529	9.850	<b>259,134</b>	50,353,804*	5.146
<b>Increasing Rate Projection (CAGR—3.89%)</b>				<b>(CAGR—3.96%)</b>			<b>(CAGR—3.96%)</b>		
2020	<b>261,110</b>	742,000,000	0.035%	<b>259,808</b>	23,835,584	10.900	<b>265,809</b>	43,575,175*	6.100
2025	<b>305,974</b>	796,600,000	0.038%	<b>317,370</b>	26,669,710	11.900	<b>324,660</b>	45,726,734*	7.100
2035	<b>435,368</b>	951,000,000	0.046%	<b>471,448</b>	33,200,529	14.200	<b>478,361</b>	50,353,804*	9.500
<b>Master Plan Forecast (CAGR—2.31%)</b>									
2020	<b>240,000</b>	742,000,000	0.032%	<b>240,000</b>	23,835,584	10.069	<b>240,000</b>	43,575,175*	5.508
2025	<b>275,000</b>	796,600,000	0.035%	<b>275,000</b>	26,669,710	10.311	<b>275,000</b>	45,726,734*	6.014
2035	<b>350,000</b>	951,000,000	0.037%	<b>350,000</b>	33,200,529	10.542	<b>350,000</b>	50,353,804*	6.951

\*Forecast number adapted at constant rate from Las Vegas Convention and Visitors Authority.

Source: Airport Records; FAA Terminal Area Forecast; Las Vegas Convention and Visitors Authority; McCarran International Airport.

**Table 2D** also includes an examination of the market share ratio of BVU enplanements per 1,000 enplanements at McCarran International Airport. Given the large role and influence that Las Vegas plays in the commercial service area for BVU, a comparison to the enplanements occurring and forecast to occur at LAS provide another avenue in forecasting future enplanements at Boulder City Municipal Airport. The constant market share projection of BVU enplanements per 1,000 LAS enplanements presented in **Table 2D** yields enplanement levels of 234,781 in 2020 and 327,025 in 2035. This market share forecast maintains a CAGR of 2.09 percent.

One final market share projection examines Boulder City Municipal Airport enplanements as compared to the historical and forecast visitor volume tracked by the Las Vegas Convention and Visitors Authority. BVU enplanements are analyzed as a ratio per 1,000 Las Vegas visitors. This market share projection is a valid measure as many of the enplanements occurring at BVU stem from tourism taking place in Las Vegas. The constant rate projection of BVU enplanements per 1,000 Las Vegas visitors yields a total of 224,249 enplanements in 2020 and 259,134 in 2035, resulting in a CAGR of 0.97 percent.

### **FAA Enplanement Projection**

The FAA annually publishes an updated set of activity forecasts for each airport in the national system. The FAA's TAF should be considered and used for reasonableness against the master plan and other airport planning forecasts. The FAA TAF enplanement projection for the Airport is slightly less optimistic than the constant market share forecast projections presented earlier and as depicted on **Exhibit 2E**.

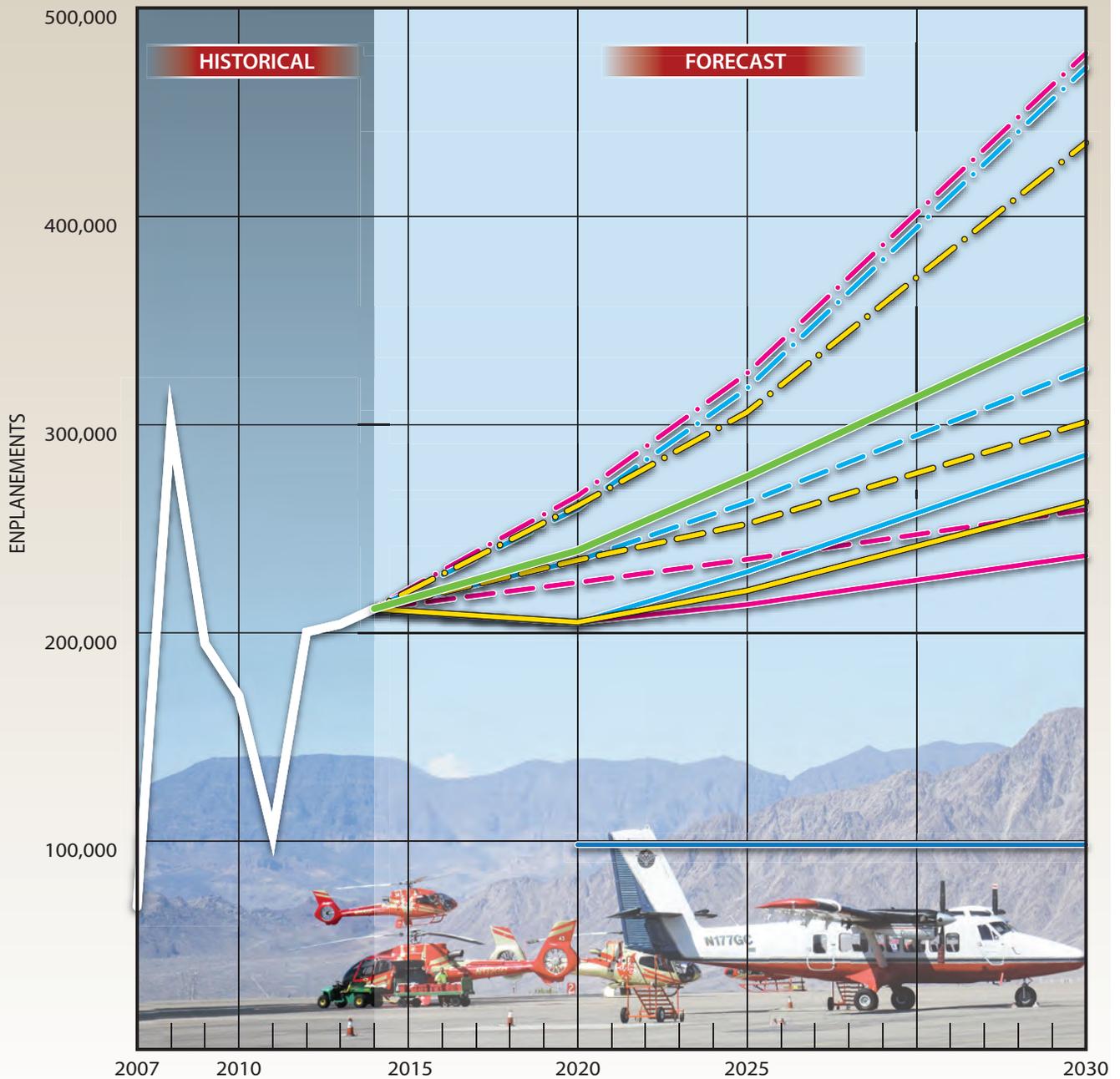
The TAF forecasts a flat, nonmoving total of 98,318 annual enplanements for BVU throughout the planning period. The FAA forecasting approach for non-towered airports typically follows this approach of flat forecasts.

### **Master Plan Forecast**

**Table 2D** and **Exhibit 2E** present the recommended forecast for master planning purposes, which is a conglomerate of each forecasting technique presented. The selected master plan forecast projects 240,000 enplanements in the near term, 275,000 in the intermediate term, and 350,000 enplanements in the long term, which results of a CAGR of 2.31 percent. Overall, the master plan forecast is projected to grow at a rate slightly higher than the constant rate projection ratio of LAS enplanements, which maintains a CAGR of 2.09 percent. Given that the air tourism market at BVU and the commercial air service market at LAS do not compete directly, the air tourism market can be classified as a sub market of McCarran International Airport as previously noted. However, Las Vegas visitors are not limited to air transportation when traveling to Las Vegas. Thus, the selected master plan forecast is valid in the calculation of a slightly higher CAGR of 2.31 percent.

### **COMMERCIAL SERVICE OPERATIONS FORECAST**

The commercial service fleet mix defines a number of key parameters in airport planning, including critical aircraft (airfield design standards, pavement strength, and ramp geometry), terminal complex layout, and aircraft performance capabilities (affecting runway length evaluations). A projection of the fleet mix for Boulder City Municipal Airport has been prepared through a review of the equipment used by the commercial operators serving the airport.



**LEGEND**

- |   |  |
|---|--|
| <b>Market Share of U.S. Domestic Enplanements</b> | <b>Ratio of Las Vegas Visitor Volume</b> |
| — Historical Enplanement Projection               | — Historical Enplanement Projection      |
| - - Constant Rate Projection                      | - - Constant Rate Projection             |
| - . - . Increasing Rate Projection                | - . - . Increasing Rate Projection       |
| <b>Ratio of LAS Enplaned</b>                      | — FAA Terminal Area Forecast (TAF)       |
| — Historical Enplanement Projection               | — Selected Master Plan Forecast          |
| - - Constant Rate Projection                      |  |
| - . - . Increasing Rate Projection                |  |

Changes in equipment, airframes, and engines have always had a significant impact on airlines and airport planning. There are many ongoing programs by the manufacturers to improve performance characteristics. These programs continue to focus primarily on improvements in fuel efficiency. Regional jets also became a larger factor as the airlines looked for ways to “right-size” service into an airport for capacity discipline, as well controlling costs. National trends suggest that many airlines replaced larger commercial jets, as well as commuter turboprops on smaller emerging routes with regional jets.

As mentioned earlier, Boulder City Municipal Airport is not a typical commercial service airport as it primarily serves on-demand, sight-seeing air tour passengers. The tour providers, unlike traditional airlines, utilize smaller turboprop and helicopter equipment in offering air tour services. At BVU, the air tour operators have been transitioning to more advanced turboprop fixed-wing aircraft and turbine helicopters in order to better accommodate market needs as well as noise regulations mandated by the FAA and National Park Service. The more advanced turbine aircraft employed by the tour operators at BVU allow for better efficiency, enabling operators to carry more passengers per operation while abiding by noise restrictions in place over the national parks and wilderness areas.

**Table 2E** presents the commercial service aircraft operational fleet mix segmented by seating capacity for 2014 at BVU. The average number of seats per aircraft departure in 2014 was 7.6. Turbine powered aircraft were the primary choice among air tour operators. Aircraft categories with a seating capacity of less than ten seats are made up of commercial service helicopters and the Cessna 208B Grand Caravan fixed-wing turboprop, while the 10-19 seating capacity category is made up solely of the De Havilland Twin-Otter Grand Caravan fixed-wing turboprop. Based on the total operations and number of seats per operation, the air tour operators maintained a board loading factor (BLF) of 97.4 percent in 2014. For traditional airlines, a BLF above 80 percent is very good, and anything above 90 percent is uncommon. Obviously, the on-demand nature of the air tour operations dictates that many if not most aircraft will go out relatively full. The operators are not beholden to a specific schedule and can delay departures awaiting additional passengers. Moreover, if the demand wanes at BVU at any time, and passengers do not show, the aircraft will not fly. This is not the case for scheduled carriers which will be required to leave regardless of passenger loads so as to position airplanes for later flights.

Over the course of the planning horizon, the BLF is forecast to remain at 100 percent. This can be attributed to the on-demand nature of the air tour operators previously described. The air tour operators are not restricted to a specific flight schedule and will not operate with a low BLF.

Throughout the planning horizon, the number of average seats per departure increase from 7.37 to 7.60. The increase in average seats per departure can be attributed to increases in technology and the potential for more passenger seats available in relation to the categories of aircraft currently being operated.

**TABLE 2E**  
**Air Tour Service Fleet Mix and Operations Forecast**  
**Boulder City Municipal Airport**

Fleet Mix Seating Capacity	Actual	Forecast		
	2014	2020	2025	2035
10-19	18.4%	18.4%	18.4%	18.4%
<10	81.6%	81.6%	81.6%	81.6%
<b>Total</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>	<b>100.0%</b>
Average Seats per Departures	7.37	7.60	7.60	7.60
Boarding Load Factor	100.0%	100.0%	100.0%	100.0%
Enplanements per Departure	7.37	7.60	7.60	7.60
Annual Enplanements	211,648	240,000	275,000	350,000
Annual Departures	28,748	31,579	36,184	42,424
Annual Operations	57,496	63,158	72,368	84,848

## GENERAL AVIATION FORECASTS

General aviation encompasses all portions of civil aviation except commercial service and military operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity at Boulder City Municipal Airport, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, aircraft fleet mix, and annual operations.

### BASED AIRCRAFT FORECAST

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft for the Airport, other general aviation activities and demand can be projected. The process of developing forecasts of based aircraft begins with an analysis of aircraft ownership in the primary general aviation service area through a review of historical aircraft registrations.

#### Service Area Aircraft Ownership

Analysis presented earlier indicates that Clark County is the primary service area for general aviation demand. Aircraft ownership trends for the primary service area typically dictate the based aircraft trends for an airport. As such, analysis of Clark County aircraft registrations was performed.

*Aircraft ownership trends for the primary service area typically dictate the based aircraft trends for an airport.*

**Table 2F** presents the history of registered aircraft in Clark County from 1993 through November 20, 2015 (excluding balloons, gliders, ultralights, etc.). These figures are derived from the FAA aircraft registration database that categorized registered aircraft by county based on the zip code of the registered

aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in the county, but based at an airport outside the county.

**TABLE 2F**  
**Historical Aircraft Registrations by Type**  
**Clark County**

Year	SEP	MEP	Jet	Turboprop	Helicopter	Total
1993	886	221	88	81	103	1,379
1994	914	231	85	82	110	1,422
1995	965	228	86	93	115	1,487
1996	1,031	234	89	96	121	1,571
1997	1,061	228	97	109	140	1,635
1998	1,118	217	101	128	155	1,719
1999	1,133	229	119	132	176	1,789
2000	1,213	271	141	123	192	1,940
2001	1,226	249	179	151	197	2,002
2002	1,226	253	184	151	198	2,012
2003	1,211	206	218	261	218	2,114
2004	1,269	211	216	252	265	2,213
2005	1,294	216	236	271	341	2,358
2006	1,501	253	161	114	393	2,422
2007	1,588	254	196	98	458	2,594
2008	1,473	280	251	141	463	2,608
2009	1,445	269	252	142	318	2,426
2010	1,406	275	278	129	258	2,346
2011	1,374	265	275	119	251	2,286
2012	1,291	205	261	121	250	2,128
2013	1,172	183	273	114	224	1,966
2014	1,170	186	278	101	237	1,978
2015*	1,192	179	292	108	243	2,033

\*Registered aircraft in Clark County as of November 20, 2015.

SEP - Single Engine Piston

MEP - Multi-Engine Piston

Source: FAA Aircraft Registration Database

As presented in the table, Clark County registered aircraft between 1993 and 2015 ranged between a low of 1,379 in 1993 to a high of 2,608 in 2008. The table also includes the types of aircraft registered in Clark County. As is typical for nearly all areas, single engine piston aircraft dominate the total aircraft numbers. In 2015, for example, there were 2,033 aircraft registered in the county, of which 1,192 were single engine piston aircraft. Aircraft registrations in 2015 also included 179 multi-engine piston aircraft, 292 jets, 108 turboprops, and 243 helicopters.

It should be mentioned that the generally decreasing aircraft registrations between 2008 and 2013 can be attributed to two primary factors. First, the economic recession of 2007-2009 had a very significant impact on general aviation aircraft ownership and usage. Historically, general aviation aircraft ownership and usage trends have closely followed economic conditions. Another, maybe equally important factor, is the FAA’s recertification process engaged in 2012, where the historic database was ultimately

purged of all unsubstantiated data. This was the first database purge the FAA has undertaken with registered aircraft, and it resulted in a reduction of nearly 30 percent of total active registered aircraft. As such, Clark County’s registered aircraft losses are likely the result of both aforementioned factors.

Registered aircraft projections are presented in **Table 2G**. These projections evaluate the potential growth of aircraft demand (registered aircraft) in Clark County over the next 20 years.

**TABLE 2G**  
**Registered Aircraft Projections**  
**Clark County**

Year	County Registrations <sup>1</sup>	U.S. Active Aircraft <sup>2</sup>	Market Share of U.S. Aircraft	Clark County Population <sup>3</sup>	Aircraft per 1,000 Residents
2000	1,940	217,533	0.8918%	1,393,240	1.392
2001	2,002	211,446	0.9468%	1,457,069	1.374
2002	2,012	211,244	0.9525%	1,516,604	1.327
2003	2,114	209,606	1.0086%	1,573,930	1.343
2004	2,213	219,319	1.0090%	1,647,734	1.343
2005	2,358	224,257	1.0515%	1,708,758	1.380
2006	2,422	221,942	1.0913%	1,777,168	1.363
2007	2,594	231,606	1.1200%	1,836,333	1.413
2008	2,608	228,664	1.1405%	1,865,746	1.398
2009	2,426	223,876	1.0836%	2,006,347	1.209
2010	2,346	223,370	1.0503%	2,036,358	1.152
2011	2,286	220,453	1.0370%	1,966,630	1.162
2012	2,128	209,034	1.0180%	2,008,654	1.059
2013	1,966	199,927	0.9834%	2,062,253	0.953
2014	1,978	198,860	0.9947%	2,102,238	0.941
2015	2,033	198,780	1.0227%	2,096,000*	0.970
<b>Constant Market Share of U.S. Active Aircraft Projections (CAGR - 038%)</b>					
2020	2,039	199,410	1.0227%	2,289,000	0.891
2025	2,066	201,970	1.0227%	2,455,000	0.841
2035	2,191	214,260	1.0227%	2,715,000	0.807
<b>Increasing Market Share Projection of U.S. Active Aircraft (CAGR - 2.30%)</b>					
2020	2,243	199,410	1.1247%	2,289,000	0.980
2025	2,498	201,970	1.2369%	2,455,000	1.018
2035	3,205	214,260	1.4960%	2,715,000	1.181
<b>Constant Ratio Projection per 1,000 County Residents (CAGR - 1.30 %) - SELECTED FORECAST</b>					
2020	2,220	199,410	1.1134%	2,289,000	0.970
2025	2,381	201,970	1.1791%	2,455,000	0.970
2035	2,634	214,260	1.2291%	2,715,000	0.970
<b>Historical Average Ratio Projection per 1,000 County Residents (CAGR - 2.54%)</b>					
2020	2,829	199,410	1.4188%	2,289,000	1.236
2025	3,034	201,970	1.5024%	2,455,000	1.236
2035	3,356	214,260	1.5662%	2,715,000	1.236

Source:

<sup>1</sup>FAA Aircraft Registration Database.

<sup>2</sup>FAA Aerospace Forecasts - Fiscal Years 2015-2035.

<sup>3</sup>U.S. Census Bureau; University of Las Vegas Center for Business and Economic Research; Woods & Poole Complete Economic and Demographic Data Source (2015).

\*University of Las Vegas Center for Business and Economic Research population forecast number. Coffman Associates analysis.

The number of registered aircraft in Clark County generally increased from 2000 through 2008. Since this time, the overall number of registered aircraft declined until 2013, and has since experienced consecutive increases in 2014 and 2015. As a result, various regression and time-series analyses did not result in a reliable forecast. Therefore, several market share forecasts have been developed.

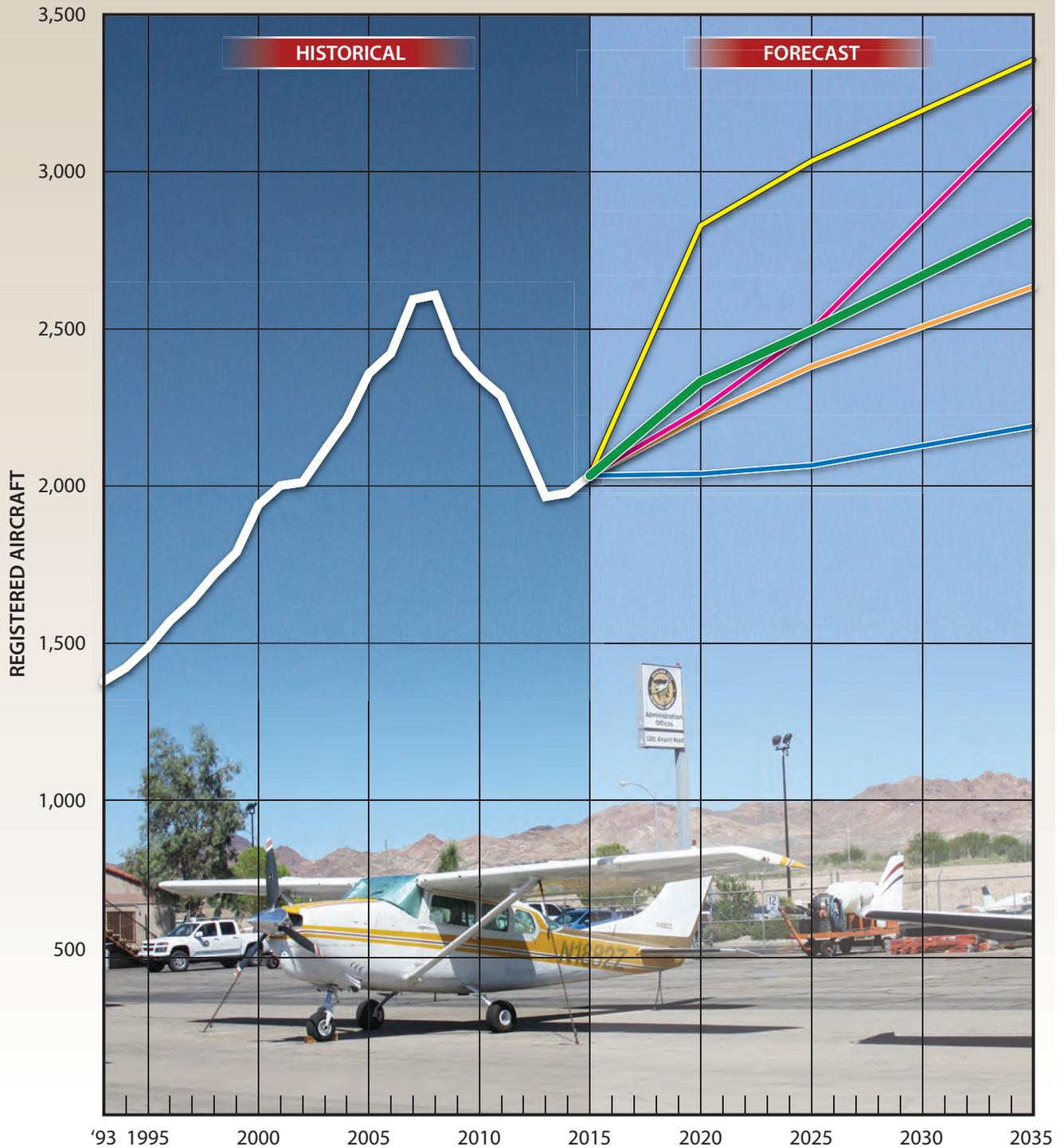
The first two forecasts consider the relationship between historical registered aircraft in the county and the active U.S. general aviation fleet as forecast by the FAA. The first projection considers the county maintaining its 2015 percentage (1.0227 percent) as a constant into the forecast years. This results in a long term projection of 2,191 registered aircraft and a compounded annual growth rate of 0.38 percent. A second market share forecast considers increasing market share through the long term planning period. As evidenced since 2000, the county has gained market share of the U.S. active fleet over the past several years, increasing from 0.8918 percent in 2000 to 1.0227 percent in 2015. This forecast projects 3,205 registered aircraft in Clark County by 2035, resulting in a 2.3 percent CAGR.

Two additional forecasts have been developed that consider the relationship between historical registered aircraft and the population. By maintaining the same ratio of aircraft per 1,000 people, a long term forecast emerges. In 2015, Clark County registered aircraft represented 0.970 aircraft per 1,000 residents. Projecting this ratio through the long term planning period yields 2,634 registered aircraft by 2035 and an CAGR of 1.30 percent. The second forecast considers the historical average ratio of registered aircraft per 1,000 people, which is more robust at 2.54 percent.

*The number of registered aircraft in Clark County generally increased from 2000 through 2008. Since this time, the overall number of registered aircraft declined until 2013, and has since experienced a consecutive increase in 2014 and 2015.*

**Exhibit 2F** summarizes the registered aircraft forecasts for Clark County, which present a reasonable planning envelope. The constant market share projection tends to be conservative based upon the increasing market shares of registered aircraft achieved by the county over the past several years. This projection serves as the low end of the planning envelope. The historical ratio projection per 1,000 county residents serves as the high boundary.

The selected forecast will likely fall between the high and low end of the planning envelope. Considering the two remaining projections, the increasing market share projection of U.S. active aircraft is fairly close and in line with the top end of the planning horizon. The constant ratio projection per 1,000 county residents considers that Clark County registered aircraft will continue to gain market share and hold a steady ratio per 1,000 residents through the long term planning period. This results in a number of registered aircraft increasing from 2,033 to 2,634 in 20 years, equating to a 1.30 percent CAGR. The constant ratio projection appears reasonable for planning purposes as it would represent a slowed, but continued growth curve for county aircraft registrations. This projection has been selected as it could represent an overall nonlinear long term growth which could be likely based on economic factors coming



**LEGEND**

- Constant Market Share of U.S. Active Aircraft Projections
- Increasing Market Share Projection of U.S. Active Aircraft
- Constant Ratio Projection per 1,000 County Residents
- Historical Average Ratio Projection per 1,000 County Residents
- Selected Registered Aircraft Forecast

to light at this time. The projection could represent short term tempered growth, due to current economic stagnation, and then higher levels of growth in the intermediate and long terms. The selected registered aircraft projection will be an element considered in the based aircraft forecast to follow.

### Based Aircraft Forecasts

Determining the number of based aircraft at an airport can be a challenging task because of the transient nature of based aircraft due to the availability and cost of aircraft storage. In 2015, there were a total of 245 (not including balloons, gliders, and ultralights) aircraft based at the airport according to airport records. Historical based aircraft data was obtained from the FAA TAF.

**Table 2H** includes several forecasts of based aircraft at Boulder City Municipal Airport. The first method used to project based aircraft considered the airport's historic share of registered aircraft in Clark County. As shown, the airport captured 12.05 percent of aircraft registered in the county in 2015. In previous years, the market share of BVU based aircraft totals to Clark County registered aircraft has ranged between the 2015 period high of 12.05 percent and a period low of 5.64 percent.

The first market share forecast of BVU based aircraft as a share of the county registered aircraft market assumes a constant market share of 12.1987 percent. This projection yields 317 aircraft by 2035, equating to a 1.30 percent CAGR. The second projection assumes the airport's market share will increase throughout the planning period, similar to what has generally occurred over the past 15 years. The increasing share projection yields 407 based aircraft by the year 2035, resulting in a growth rate of 2.57 percent annually.

Trends comparing the number of based aircraft with the Clark County population were also analyzed. A constant ratio of based aircraft per 1,000 people results in based aircraft growing at the same rate as the county population. This yields 318 based aircraft by 2035, which is an annual growth rate of 1.31 percent. This projection is nearly identical to the earlier constant market share of county registered aircraft, and for good reason as the selected registered aircraft projection considered a constant ratio of county population. Next, the airport's generally increasing historical ratio of based aircraft per 1,000 resident's projection was also used as a basis for projection. The increasing share ratio projection yields 396 based aircraft by 2035, resulting in a 2.43 percent CAGR.

Existing forecasts for Boulder City Municipal Airport were also reviewed to include projections from the FAA TAF. The 2015 TAF is the FAA's most current forecast of activity for the airport and included 234 based aircraft in 2015. The TAF calls for a -0.23 percent CAGR when compared to the reported 2015 based aircraft. As with the enplanements, the FAA TAF utilizes a constant, or flat, projection of based aircraft through the planning period. The TAF based aircraft is considered unreasonable for two reasons. First, the projection maintains a flat forecast of 234 aircraft which is nine (9) aircraft fewer than based in 2015. Second, the airport's based aircraft has been generally increasing over the last 15 years, increasing by 85.6 percent over the period. This growth slowed but continued.

**TABLE 2H**  
**Based Aircraft Forecasts**  
**Boulder City Municipal Airport**

Year	BVU Based Aircraft <sup>1</sup>	Clark County Registered Aircraft <sup>2</sup>	Market Share of Registered Aircraft	Clark County Population <sup>3</sup>	Aircraft per 1,000 Residents
2000	132	1,940	6.8041%	1,393,240	0.095
2001	132	2,002	6.5934%	1,457,069	0.091
2002	130	2,012	6.4612%	1,516,604	0.086
2003	129	2,114	6.1022%	1,573,930	0.082
2004	133	2,213	6.0099%	1,647,734	0.081
2005	133	2,358	5.6404%	1,708,758	0.078
2006	232	2,422	9.5789%	1,777,168	0.131
2007	235	2,594	9.0594%	1,836,333	0.128
2008	235	2,608	9.0107%	1,865,746	0.126
2009	253	2,426	10.4287%	2,006,347	0.126
2010	231	2,346	9.8465%	2,036,358	0.113
2011	231	2,286	10.1050%	1,966,630	0.117
2012	234	2,128	10.9962%	2,008,654	0.116
2013	234	1,966	11.9023%	2,062,253	0.113
2014	234	1,978	11.8301%	2,102,238	0.111
2015	245	2,033	12.0512%	2,096,000*	0.117
<b>Constant Market Share Projection of Registered Aircraft (CAGR—1.30)</b>					
2020	268	2,220	12.0512%	2,289,000	0.117
2025	287	2,381	12.0512%	2,455,000	0.117
2035	317	2,634	12.0512%	2,715,000	0.117
<b>Increasing Market Share Projection of Registered Aircraft (CAGR—2.57)</b>					
2020	285	2,220	12.8235%	2,289,000	0.124
2025	325	2,381	13.6452%	2,455,000	0.132
2035	407	2,634	15.4501%	2,715,000	0.150
<b>Constant Ratio Projection per 1,000 County Residents (CAGR—1.31)</b>					
2020	268	2,220	12.0636%	2,289,000	0.117
2025	287	2,381	12.0636%	2,455,000	0.117
2035	318	2,634	12.0598%	2,715,000	0.117
<b>Increasing Ratio Projection per 1,000 County Residents (CAGR—2.43)</b>					
2020	284	2,220	12.8134%	2,289,000	0.124
2025	323	2,381	13.5745%	2,455,000	0.132
2035	396	2,634	15.0490%	2,715,000	0.146
<b>FAA TAF Growth Rate (CAGR—(-0.23))</b>					
2020	234	2,220	10.5405%	2,289,000	0.102
2025	234	2,381	9.8278%	2,455,000	0.095
2035	234	2,634	8.8838%	2,715,000	0.086
<b>Selected Based Aircraft Forecast (CAGR—1.94)</b>					
2020	270	2,220	12.1622%	2,289,000	0.118
2025	295	2,381	12.3898%	2,455,000	0.120
2035	330	2,634	12.5285%	2,715,000	0.122

Source:

<sup>1</sup> FAA Aircraft Registration Database and Airport Records.

<sup>2</sup> FAA Aerospace Forecasts - Fiscal Years 2015-2035.

<sup>3</sup> U.S. Census Bureau; University of Las Vegas Center for Business and Economic Research; Woods & Poole Complete Economic and Demographic Data Source (2015).

\*University of Las Vegas Center for Business and Economic Research population forecast number. Coffman Associates analysis.

The forecasts previously discussed represent a reasonable planning envelope as depicted on **Exhibit 2G**. The selected forecast is factored into the four market share projections, and falls nearer the bottom of the planning envelope, as constraining conditions at the airport and a potential downturn in the economy may slow historic growth yields. The selected projection still offers strong 1.50 CAGR through the 20-year horizon and would produce 330 based aircraft by 2035.

Future aircraft basing at the airport will depend on several factors, including the state of the economy, fuel costs, available facilities, competing airports, and adjacent development potential. Forecasts assume a reasonably stable and growing economy, as well as reasonable development of airport facilities necessary to accommodate aviation demand. Competing airports will play a role in deciding demand; however, Boulder City Municipal Airport should fare well in this competition as it is served by a runway capable of handling the many general aviation aircraft and the airport’s capability of being expanded to meet future demand.

**BASED AIRCRAFT FLEET MIX**

The fleet mix of the based aircraft is oftentimes more important to airport planning and design than the total number of aircraft. For example, the presence of one or a few large business jets can impact design

*The airport is well-positioned to accommodate business jets in the future; however, smaller single engine piston-powered aircraft will continue to dominate the overall fleet mix.*

standards more than a large number of smaller single engine piston-powered aircraft.

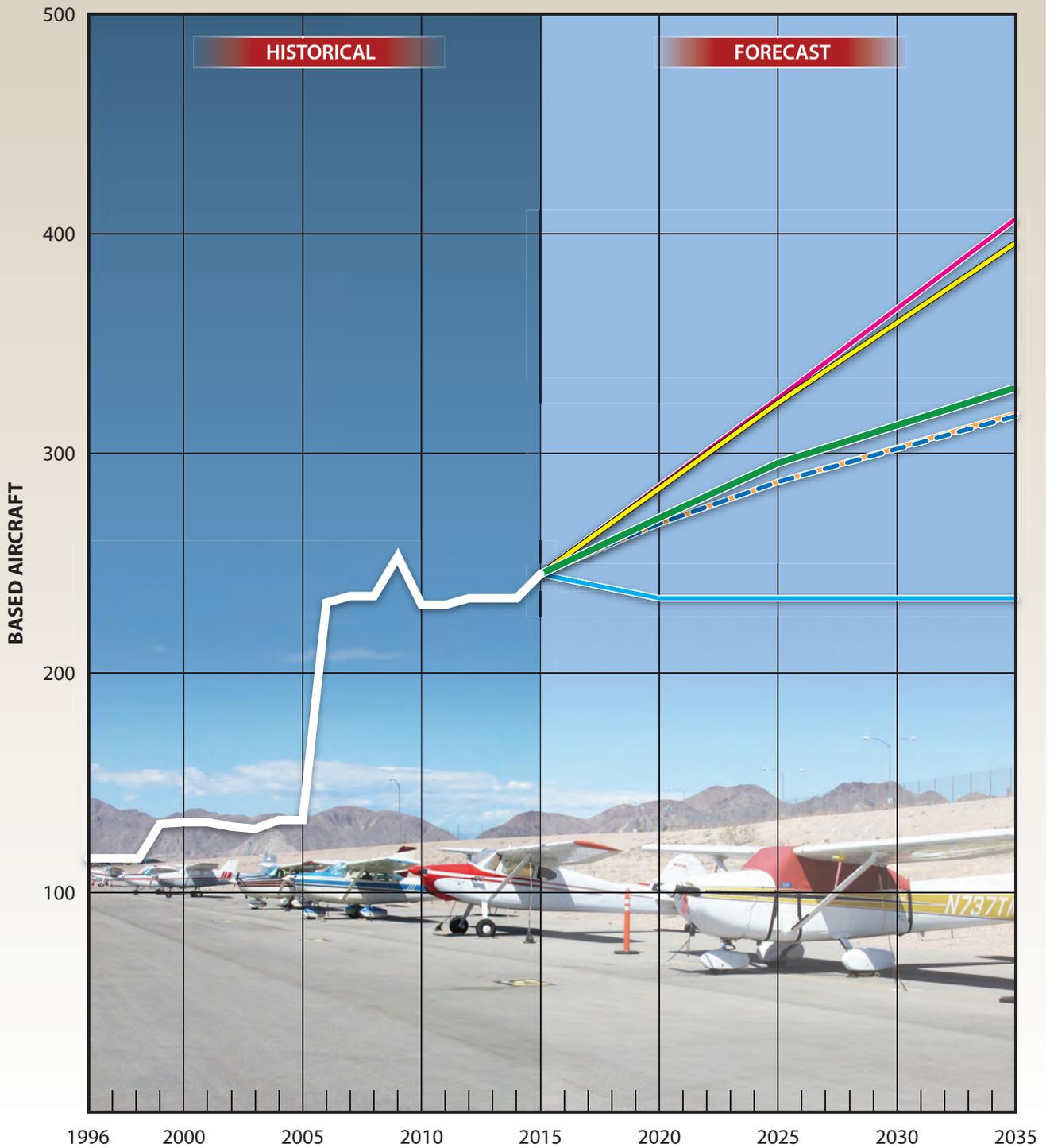
The based aircraft fleet mix at Boulder City Municipal Airport, as presented in **Table 2J**, was compared to the existing and forecast U.S. general aviation fleet mix trends as presented in *FAA Aerospace Forecasts*

– *Fiscal Years 2015-2035*. The FAA expects business jets will continue to be the fastest growing general aviation aircraft type in the future. The airport is well-positioned to accommodate business jets in the future; however, smaller single engine piston-powered aircraft will continue to dominate the overall fleet mix.

**TABLE 2J**  
**Based Aircraft Fleet Mix**  
**Boulder City Municipal Airport**

Aircraft Type	EXISTING		FORECAST					
	2015	%	2020	%	2025	%	2035	%
Single Engine Piston	171	69.79%	184	68.00%	194	67.00%	216	65.50%
Multi-Engine Piston	8	3.27%	9	3.50%	10	3.50%	10	3.00%
Jet	0	0%	1	0.50%	3	1.00%	7	2.00%
Turboprop	23	9.39%	29	10.50%	32	11.00%	41	12.50%
Helicopter	43	17.55%	47	17.50%	51	17.50%	56	17.00%
<b>Totals</b>	<b>245</b>	<b>100.00%</b>	<b>270</b>	<b>100.00%</b>	<b>290</b>	<b>100.00%</b>	<b>330</b>	<b>100.00%</b>

Source: FAA *Terminal Area Forecast*; Airport Records; Coffman Associates analysis.



**LEGEND**

- Constant Market Share of Registered Aircraft
- Increasing Market Share Projection of Registered Aircraft
- Constant Ratio Projection per 1,000 County Residents
- Increasing Ratio Projection per 1,000 County Residents
- FAA Terminal Area Forecasts (TAF)
- Selected Registered Aircraft Forecast

According to airport records, there are currently no jets based at the airport; they are forecast to increase to seven (7) by 2035. Turboprops are forecast to increase from 23 currently to 41 by 2035. Helicopters based at the airport are forecast to grow from 43 currently to 56 by the long term. Single and multi-engine piston aircraft are forecast to increase over the 20-year forecast period, but at a slower rate when compared to jets, turboprops, and helicopters.

## GENERAL AVIATION OPERATIONS

General aviation operations are classified as either local or itinerant. A local operation is a takeoff 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. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, local operations are characterized by training operations. Typically, itinerant operations increase with business and commercial use, since business aircraft are operated on a higher frequency. A breakdown of general aviation operations, along with overall operations at Boulder City Municipal Airport as presented in the FAA TAF, was detailed in Chapter One.

### Itinerant Operations

**Table 2K** depicts general aviation itinerant operations at Boulder City Municipal Airport from 2013 through 2015. National general aviation itinerant operations have been declining since at least 2000, but have taken a steeper decline since the beginning of the recession and have yet to recover; however, the FAA forecasts a reversal by 2015. From 2014 through 2035, the FAA forecasts an annual growth rate of 0.4 percent for itinerant general aviation operations in the United States.

In recent years prior to 2013, the airport averaged approximately 10,000 annual itinerant general aviation operations according to the FAA TAF. From 2013 to 2015, the TAF recorded a decrease in itinerant general aviation operations to approximately 5,000 annually. The airport recently submitted their annual operations estimate to the FAA for 2015. Airport administration has estimated a total of 6,570 itinerant general aviation operations at BVU.

Five forecasts have been developed which define the planning envelope for future itinerant general aviation operations. The planning envelope is intended as the range where the forecast may reasonably fall. The first two forecasts consider future itinerant general aviation operations in comparison to the airport's market share of national itinerant general aviation operations as forecast by the FAA. The first of these two considers the airport maintaining a constant market share (0.04716 percent) of national itinerant general aviation operations, which yields 7,130 itinerant operations by 2035. The next considers the airport regaining market share with a modestly increasing share of national itinerant general aviation operations. By the long term, the increasing market share forecast results in 7,484 operations.

**TABLE 2K**  
**Itinerant General Aviation Operations Forecast**  
**Boulder City Municipal Airport**

Year	BVU Itinerant GA Operations <sup>1</sup>	U.S. ATCT Itinerant GA Operations <sup>2</sup>	Market Share of Itinerant Operations	BVU Based Aircraft <sup>3</sup>	Itinerant Operations per Based Aircraft
2013	5,000	14,177,400	0.03527%	220	23
2014	5,000	13,977,500	0.03577%	220	23
2015	6,570	13,931,800	0.04716%	245	27
<b>Constant Market Share Projection (CAGR—0.27%)</b>					
2020	6,701	14,209,500	0.04716%	270	25
2025	6,838	14,499,400	0.04716%	290	24
2035	7,130	15,118,400	0.04716%	330	22
<b>Increasing Market Share Projection (CAGR—0.52%)</b>					
2020	6,821	14,209,500	0.04800%	270	25
2025	7,032	14,499,400	0.04850%	290	24
2035	7,484	15,118,400	0.04950%	330	23
<b>Constant Operation per Based Aircraft (CAGR—1.40%)</b>					
2020	7,290	14,209,500	0.05130%	270	27
2025	7,830	14,499,400	0.05400%	290	27
2035	8,910	15,118,400	0.05893%	330	27
<b>Increasing Operations per Based Aircraft (CAGR—4.25%)</b>					
2020	8,640	14,209,500	0.06080%	270	32
2025	10,730	14,499,400	0.07400%	290	37
2035	15,510	15,118,400	0.10259%	330	47
<b>FAA Terminal Area Forecast Growth Rate (CAGR—(-1.49%))</b>					
2020	5,000	14,209,500	0.03519%	270	19
2025	5,000	14,499,400	0.03448%	290	17
2035	5,000	15,118,400	0.03307%	330	15
<b>Selected Planning Forecast (CAGR—3.53%)</b>					
2020	8,000	14,209,500	0.05630%	270	30
2025	10,000	14,499,400	0.06897%	290	34
2035	13,500	15,118,400	0.08930%	330	41

Source:

<sup>1</sup>Current data from Airport as reported to FAA for Form 5010 Airport Master Record

<sup>2</sup>FAA Aerospace Forecasts - Fiscal Years 2015-2035

<sup>3</sup>Coffman Associates Based Aircraft Forecast  
Coffman Associates analysis

The constant and increasing market share projections result in CAGRs of 0.27 percent and 0.52 percent, respectively.

The next two projections consider the relationship between based aircraft and itinerant general aviation operations. In 2015, there were 27 itinerant general aviation operations per based aircraft. When maintaining this ratio, a forecast result is 8,910 itinerant general aviation operations by 2035. This represents an annual growth rate of 1.40 percent. The second forecast considers an increasing number of itinerant

general aviation operations per based aircraft. By 2035, itinerant general aviation operations reach 15,510, which correspond to 47 operations per based aircraft and an annual growth rate of 4.25 percent.

The 2015 FAA TAF also presents an itinerant general aviation operations forecast, which is included in the table. The TAF forecasts a minimal growth rate of -1.49 percent annually. This results in a 2035 itinerant general aviation operations projection of 5,000. As detailed earlier, the FAA TAF simply extends a constant number of operations into the future.

*The selected forecast equates to a 3.53 percent compound annual growth rate.*

The selected planning forecast factors all projections. The airport is currently in a growth pattern and could be utilized more for itinerant general aviation operations, especially by corporate aircraft in the future. BVU is a destination due to its proximity to Las Vegas

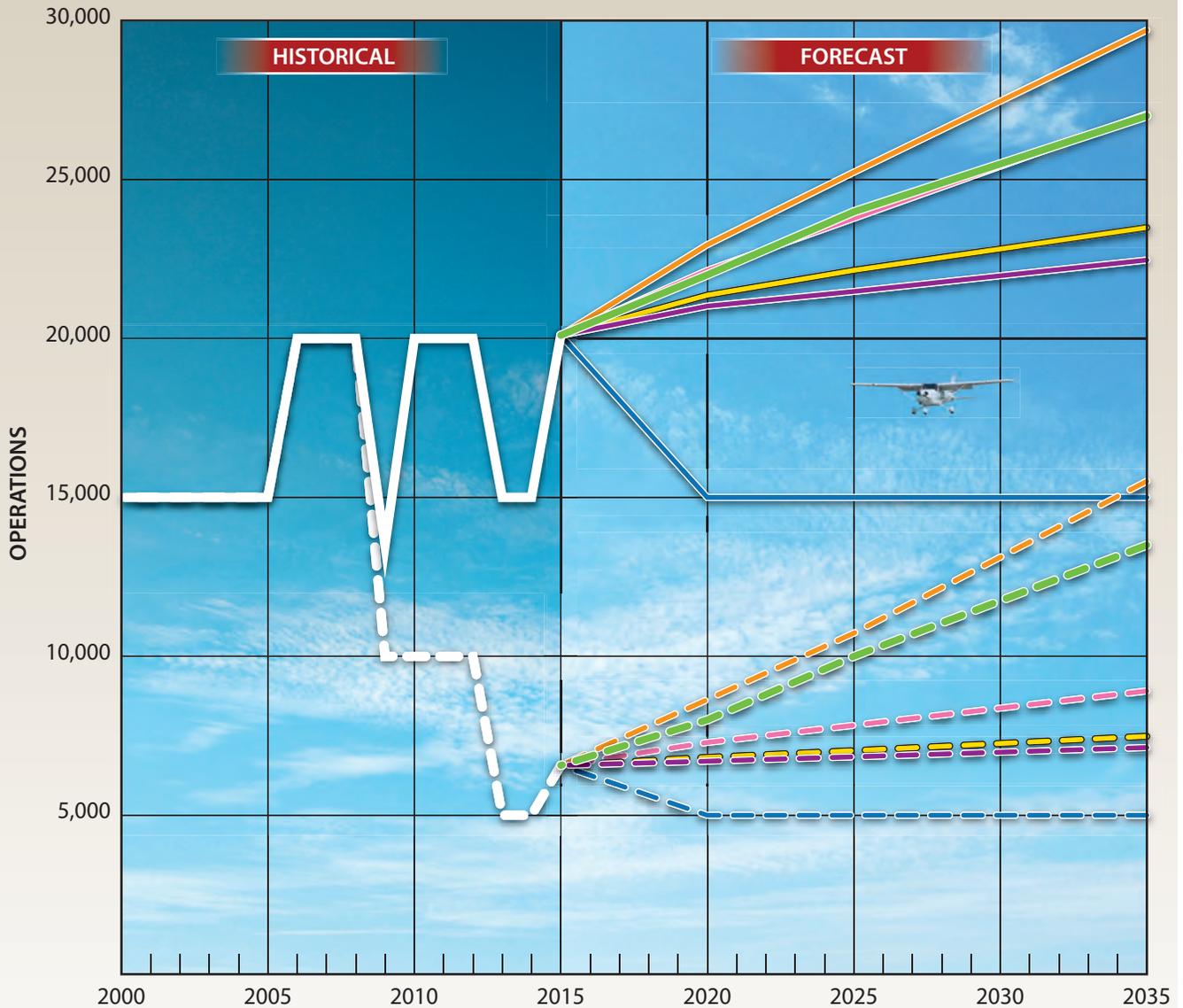
and other sight-seeing national attractions. The Airport is also much less congested than other airports in the region, especially in Las Vegas. As such, the number of itinerant general aviation operations will likely increase at a greater rate than national averages. As such, the selected projection offers a CAGR of 3.53 percent over the planning period. In the next five years, itinerant general aviation operations are forecast to reach 8,000. In 10 years, 10,000 annual itinerant general aviation operations are forecast, and by 2035, 13,500 annual itinerant general aviation operations are projected. **Exhibit 2H** presents the itinerant general aviation operations forecast.

## Local Operations

A similar methodology was utilized to forecast local general aviation operations. **Table 2L** depicts the history of local operations at Boulder City Municipal Airport and examines its historic market share of general aviation local operations at towered airports in the United States. Historical local operations reported in the FAA TAF range from a high of 20,000 prior to 2013, to a low of 15,000 through 2015. As with itinerant operations, airport administration has recently submitted an estimate for 2015. Airport records estimate that the airport experienced 20,100 local general aviation operations during the year of 2015.

As with national itinerant operations, the estimate of local operations has been generally declining for some time. The *FAA Aerospace Forecasts – Fiscal Years 2015-2035* estimate a modest annual growth rate for local general aviation operations going forward at approximately 0.5 percent. Five forecasts are considered when analyzing local general aviation operations at BVU.

The first two forecasts of local general aviation operations consider the airport's market share of national local general aviation operations as counted by the FAA. The first maintains the airport's 2015 market share at 0.17218 percent, resulting in 22,466 local general aviation operations by 2035. This forecast results in an annual growth rate of 56 percent. The second forecast applies an increasing market share



**LEGEND**

**Local General Aviation Operations**

- Constant Market Share Projection
- Increasing Market Share Projection
- Constant Operations per Based Aircraft
- Increasing Operations per Based Aircraft
- FAA Terminal Area Forecasts Growth Rate
- Selected Planning Forecast

**Itinerant General Aviation Operations**

- - - Constant Market Share Projection
- - - Increasing Market Share Projection
- - - Constant Operations per Based Aircraft
- - - Increasing Operations per Based Aircraft
- - - FAA Terminal Area Forecasts Growth Rate
- - - Selected Planning Forecast



of national local general aviation operations. This forecast results in 23,487 local general aviation operations by 2035 and an annual growth rate of 0.78 percent.

**TABLE 2L**  
**General Aviation Local Operations Forecast**  
**Boulder City Municipal Airport**

Year	BVU Local GA Operations <sup>1</sup>	U.S. ATCT Local GA Operations <sup>2</sup>	Market Share of Local Operations	BVU Based Aircraft <sup>3</sup>	Local Operations per Based Aircraft
2013	15,000	11,608,300	0.12922%	220	68
2014	15,000	11,748,300	0.12768%	220	68
2015	20,100	11,674,100	0.17218%	245	82
<b>Constant Market Share Projection (CAGR—0.56%)</b>					
2020	21,018	12,207,100	0.17218%	270	78
2025	21,478	12,474,700	0.17218%	290	74
2035	22,466	13,048,100	0.17218%	330	68
<b>Increasing Market Share Projection (CAGR—0.78%)</b>					
2020	21,362	12,207,100	0.17500%	270	79
2025	22,143	12,474,700	0.17750%	290	76
2035	23,487	13,048,100	0.18000%	330	71
<b>Constant Operations per Based Aircraft (CAGR—1.50%)</b>					
2020	22,140	12,207,100	0.18137%	270	82
2025	23,780	12,474,700	0.19063%	290	82
2035	27,060	13,048,100	0.20739%	330	82
<b>Increasing Operations per Based Aircraft (CAGR—1.97%)</b>					
2020	22,950	12,207,100	0.18801%	270	85
2025	25,230	12,474,700	0.20225%	290	87
2035	29,700	13,048,100	0.22762%	330	90
<b>FAA Terminal Area Forecast Growth Rate (CAGR—(-1.45%))</b>					
2020	15,000	12,207,100	0.12288%	270	56
2025	15,000	12,474,700	0.12024%	290	52
2035	15,000	13,048,100	0.22762%	330	45
<b>Selected Planning Forecast (CAGR—1.49%)</b>					
2020	22,000	12,207,100	0.18022%	270	81
2025	24,000	12,474,700	0.19239%	290	83
2035	27,000	13,048,100	0.20693%	330	82

Source:

<sup>1</sup> Historical data from Airport as reported to FAA for Form 5010 Airport Master Record (2015); *FAA Terminal Area Forecast*

<sup>2</sup> *FAA Aerospace Forecasts - Fiscal Years 2015-2035*

<sup>3</sup> Coffman Associates Based Aircraft Forecast  
*FAA Terminal Area Forecast* (January 2015)

The next two projections consider the relationship between based aircraft and local general aviation operations. In 2015, there were 82 local general aviation operations per based aircraft. When maintaining this ratio, a forecast results in 27,060 local general aviation operations by 2035. This represents an annual growth rate of 1.50 percent. The second forecast considers an increasing number of local general

aviation operations per based aircraft, which yields 29,700 operations by 2035. This represents a strong 1.97 percent CAGR.

The 2015 FAA TAF projection is also presented in the table. The TAF identifies a 2035 projection of 15,000 local general aviation operations. When compared with airport records of local general aviation operations experienced at the airport in 2015, this represents a negative growth of -1.21 percent through the planning period. Again, the FAA TAF represents a simple flat growth of 2014 estimated local operations.

**Exhibit 2H** also presents the local general aviation operations forecast. The selected forecast falls within the planning envelope of the five forecasts presented in the table and actually mirrors the constant operations per based aircraft projection. The selected planning forecast for annual local general aviation operations is 22,000 by 2020, 24,000 by 2025, and 27,000 by 2035. The CAGR is 1.49 percent over the planning period.

**OTHER AIR TAXI AND MILITARY**

According to airport records, there were 71,596 air taxi operations at Boulder City Municipal Airport in 2015. Of this total, 57,496 operations were conducted by air tour service providers reporting enplanements as previously discussed, leaving approximately 14,100 operations being included in the “other” air taxi activity. According to the current *FAA Aerospace Forecasts – Fiscal Years 2015-2035*, air taxi operations are projected to decrease; however, the decrease is largely reflective of small regional airline operations losses. General aviation and for-hire air taxi operations are projected to increase upwards of two percent annually over the next 20 years.

**TABLE 2M**  
**Other Air Taxi Operations**  
**Boulder City Municipal Airport**

Year	Other Air Taxi Operations
2015	14,100
<b>Forecast (CAGR = 1.23%)</b>	
2020	15,650
2025	16,350
2035	19,000

For BVU, other air taxi includes a wide variety of operations including those supporting tourism and parachuting. Other types of corporate operations are also included, such as fractional ownership aircraft usage. It is believed that the corporate component of this category will have the highest growth potential. The resulting other air taxi operation forecast for BVU based on local, regional, and national factors is presented in **Table 2M**.

In 2015, there were 496 military operations at the airport according to airport records. Utilizing historical military operational counts from the FAA TAF, the airport has experienced an average of 277 annual military operations since 2006. Developing a reliable forecast of military activity is inherently difficult, primarily because the military mission can change rapidly. Generally during peace time, civilian airports

will experience higher levels of military operations. When there are overseas commitments, many of those pilots and equipment will be out of the country. The FAA recognizes these challenges to forecasting military activity and, therefore, provides only a flat forecast for both local and itinerant military activity.

**Table 2N** presents the history of military activity at the airport. The forecast presented considers a zero growth scenario of 300 annual military operations. These operations are then categorized as either local or itinerant based on historical trends.

**TABLE 2N**

**Military Operations Forecast  
Boulder City Municipal Airport**

Year	Military Itinerant Operations	Military Local Operations	Total <sup>1</sup>
2000	0	0	0
2001	0	0	0
2002	0	0	0
2003	0	0	0
2004	0	0	0
2005	0	0	0
2006	400	0	400
2007	400	0	400
2008	400	0	400
2009	400	0	400
2010	25	0	25
2011	25	0	25
2012	25	0	25
2013	300	0	300
2014	300	0	300
2015*	496	0	300
<b>Military Operations Forecast</b>			
2020	300	0	300
2025	300	0	300
2035	300	0	300

\* Number provided by airport records

Source:

<sup>1</sup>FAA *Terminal Area Forecast* (January 2015)

Coffman Associates analysis

**COMPARISON TO THE FAA TAF**

The FAA will review the forecasts presented in this master plan for comparison to the TAF. The local Airports District Office (ADO) of the FAA can approve the forecasts if they do not differ by more than 10

percent in the first five years and 15 percent for years 6-10. If the planning forecasts exceed these parameters, then the forecasts must be forwarded to FAA headquarters in Washington, D.C. for further review. Any deviation from these thresholds will require specific local documentation. **Table 2Q** presents the direct comparison of the Master Plan forecasts with the TAF published in January 2015.

**TABLE 2Q**  
**Forecast Comparison to the 2015 FAA Terminal Area Forecast**  
**Boulder City Municipal Airport**

Year	Airport Activity	FAA TAF	Percent Difference
<b>PASSENGER ENPLANEMENTS</b>			
2014	211,648	98,318	115.27%
2020	240,000	98,318	136.88%
2025	275,000	98,318	166.67%
2035	350,000	98,318	242.74%
CAGR	2.55%	0.00%	1.69%
<b>BASED AIRCRAFT</b>			
2015	245	234	4.70%
2020	270	234	13.25%
2025	290	234	21.79%
2035	330	234	38.89%
CAGR	1.50%	0.00%	1.17%
<b>ANNUAL OPERATIONS</b>			
2015	98,762	80,300	18.69%
2020	109,108	80,300	24.28%
2025	123,018	80,300	29.78%
2035	144,648	80,300	39.53%
CAGR	1.93%	0.00%	1.22%

Source: FAA TAF (2015); Coffman Associates analysis

The reason the FAA allows this differential is because the TAF forecasts are not meant to replace forecasts developed locally (i.e., in this Master Plan). While the TAF can provide a point of reference or comparison, their purpose is much broader in defining FAA national workload measures.

The Master Plan forecast for passenger enplanements far exceeds the 10 and 15 percent tolerances of the TAF for the five- and 10-year timeframes as described above. For the five-year timeframe, the Master Plan projects passenger enplanement levels that are 144 percent higher than the TAF. For the 10-year timeframe, the difference increases to 178 percent. Overall, the master plan forecasts call for reasonable growth in passenger enplanements through 2035 based on actual activity at BVU. The Master Plan projects enplanements to increase at approximately 2.55 percent annually, while the TAF exhibits a flat-lined forecast. The TAF’s flat line projection is problematic but not as concerning as the TAF

base year enplanements being less than half the actual count. Obviously, BVU's current actual enplanements being more than twice as much as the FAA's base year puts the entire model out of the desired parameters stated above. The enplanements forecast selected in this analysis is reasonable based on actual activity and demand for sight-seeing air tour services in the Las Vegas region.

Regarding based aircraft, the Master Plan and TAF are very close when it comes to current based aircraft, but the TAF begins with a base year of 11 fewer, or 4.7 percent, lower than actual. The forecast for based aircraft at BVU for the five-year timeframe is 15.38 percent higher than the TAF, and the forecast for the 10-year timeframe is 23.93 percent higher than the TAF. If you remove the roughly five percent base year difference, the master plan forecasts fall at the high end of the FAA TAF allowance in the five-year and just outside for the 10-year. Again, the TAF presents a flat-line, or no-growth, scenario for based aircraft as it did for all forecasting elements. For reasons outlined earlier, BVU based aircraft will continue to increase to meet regional and local demand components.

The total annual base year operations detailed in this analysis are 23 percent higher than the base year TAF estimate. The master plan total operations projection is 35.88 percent higher than the TAF in the five-year timeframe. The 10-year master plan annual operations forecast is 53.20 percent higher than the TAF. The primary reason for this is that the TAF has a lower base operations number than what was actually realized according to airport records. In addition, the TAF utilizes a flat-line forecasting technique which contributes to the increasing percentage difference over the planning horizon.

### **PEAKING CHARACTERISTICS**

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

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

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

**AIR TOUR PEAKING CHARACTERISTICS**

Peaking characteristics related to airline activity is important for planning and design of the passenger terminal building, as well as associated facilities and services. The analysis is commonly used as a basis for determining the appropriate size of the terminal and the functional spaces therein.

For the purposes of this study, an industry planning standard of ten percent was applied to the total annual enplanements to calculate the peak month. The design day was, in turn, calculated by dividing the peak month by 31 days. Given that the number of flights provided by the air tour service operators fluctuate on a seasonal basis, the length of the summer months, July and August, were used to calculate the number of days divided by the peak month.

The design hour is calculated at the industry planning standard of 15 percent of the design day. The operations projections follow a similar analysis and are presented in **Table 2R**.

**TABLE 2R**  
**Peaking Characteristics**  
**Boulder City Municipal Airport**

	2014	2020	2025	2035
<b>AIRLINE ENPLANEMENTS</b>				
Annual Enplanements	211,648	240,000	275,000	350,000
Peak Month	21,165	24,000	27,500	35,000
Design Day	683	774	887	1129
Design Hour	102	116	133	169
<b>AIR TOUR SERVICE OPERATIONS</b>				
Annual Operations	57,496	63,158	72,368	84,848
Peak Month	5,750	6,316	7,237	8,485
Design Day	185	204	233	274
Design Hour	28	31	35	41
<b>GENERAL AVIATION, "OTHER" AIR TAXI, AND MILITARY OPERATIONS</b>				
Annual Operations	41,266	45,950	50,650	59,800
Peak Month	4,127	4,595	5,065	5,980
Busy Day	166	185	204	241
Design Day	133	148	163	193
Design Hour	20	22	25	29

Source: Coffman Associates analysis

## GENERAL AVIATION AND OTHER AIR TAXI PEAKING CHARACTERISTICS

The peak period forecasts for general aviation, “other” air taxi, and military have been determined utilizing the most current airport records. The peak month was calculated using an industry planning standard of ten percent of the annual operations. The design day operations were calculated by dividing the peak month by the number of days in a month (31).

Busy day peaking characteristics were calculated at 25 percent greater than the design day operations. Design hour operations were determined to be approximately 15 percent of the design day operations. The peaking characteristics are summarized in **Table 2R** for general aviation, “other” air taxi, and military activity projected at the airport.

## ANNUAL INSTRUMENT APPROACHES

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

Given that the airport does not currently have instrument approach capabilities, historical data on instrument approaches to the airport is not readily available. Therefore, an estimate of AIAs was prepared based upon information from similar airports. Assuming that instrument approach capabilities will be available in the future, the number of AIAs was calculated for the planning period by utilizing an industry standard of 2.5 percent of itinerant operations, which may be high for the Las Vegas region but adequate for planning purposes. The AIA projections are presented on **Exhibit 2J**.

## FORECAST SUMMARY

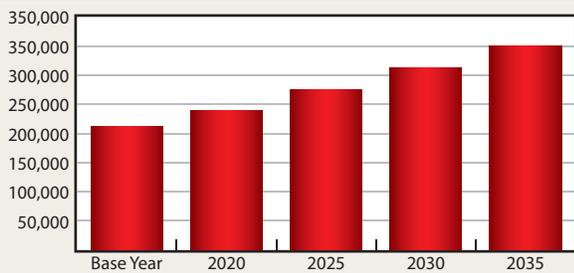
This chapter has outlined the various activity levels that might reasonably be anticipated over the planning period. **Exhibit 2J** is a summary of the aviation forecasts prepared in this chapter. Actual activity is included for 2014 and 2015, which are the base years for the forecasts. The forecasting effort extends through the next 20 years to the year 2035. Forecasts for aviation activity, including enplanements, based aircraft, and operations, is key to determining future facility requirements.

## AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

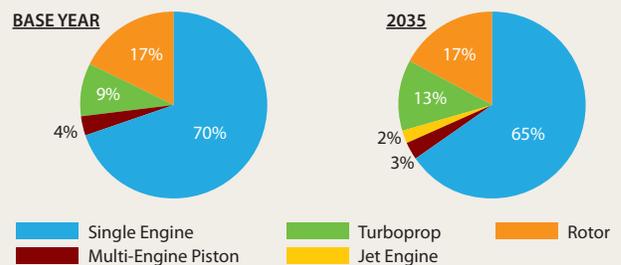
The FAA has established several aircraft classification systems that group aircraft types based on their performance (approach speed in landing configuration) and on design characteristics (wingspan and

	Base Year	2020	2025	2035
<b>ANNUAL ENPLANEMENTS</b>				
Total Annual Enplanements	211,648	240,000	275,000	350,000
<b>ANNUAL OPERATIONS</b>				
<i>Itinerant</i>				
Air Carrier	0	0	0	0
Air Tour Commercial	57,496	63,158	72,368	84,848
Other Air Taxi	14,100	15,650	16,350	19,000
General Aviation	6,570	8,000	10,000	13,500
Military	496	300	300	300
<b>Total Itinerant</b>	<b>78,662</b>	<b>87,108</b>	<b>99,018</b>	<b>117,648</b>
<i>Local</i>				
General Aviation	20,100	22,000	24,000	27,000
Military	0	0	0	0
<b>Total Local</b>	<b>20,100</b>	<b>22,000</b>	<b>24,000</b>	<b>27,000</b>
<b>Total Annual Operations</b>	<b>98,762</b>	<b>109,108</b>	<b>123,018</b>	<b>144,648</b>
<b>BASED AIRCRAFT</b>				
Single Engine	171	184	194	216
Multi-Engine Piston	8	9	10	10
Jet	0	1	3	7
Turboprop	23	29	32	41
Rotor	43	47	51	56
<b>Total Based Aircraft</b>	<b>245</b>	<b>270</b>	<b>290</b>	<b>330</b>
<b>ANNUAL INSTRUMENT APPROACHES (AIAs)</b>				
Total Annual AIAs	N/A	2,175	2,475	2,940

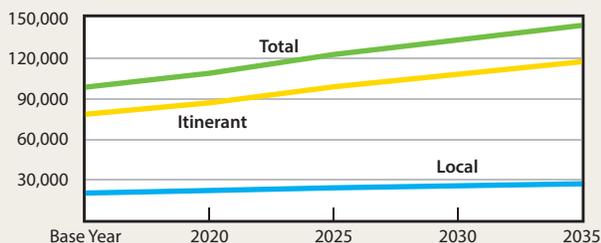
Annual Enplanements Forecasts



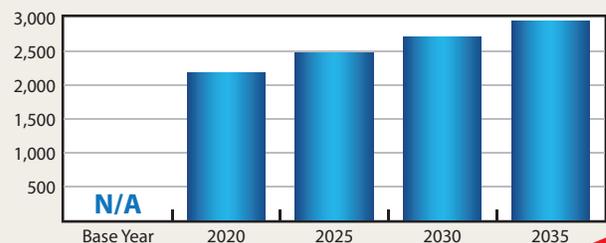
Based Aircraft Forecasts



Annual Operations Forecasts



Annual Instrument Approaches Forecasts



landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

## AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or a composite aircraft representing a collection of aircraft. The design aircraft is classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). FAA AC 150/5300-13A, Change 1, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2K**.

*The design aircraft may be a single aircraft type or a composite aircraft representing a collection of aircraft.*

**Aircraft Approach Category (AAC):** A grouping of aircraft based on a reference landing speed ( $V_{REF}$ ), if specified, or if  $V_{REF}$  is not specified, 1.3 times stall speed ( $V_{SO}$ ) at the maximum certificated landing weight.  $V_{REF}$ ,  $V_{SO}$ , and the maximum certificated landing weight are those values as established for the aircraft by the certification authority of the country of registry.

The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter A through E, is the aircraft approach category and relates to aircraft approach speed (operational characteristic). The AAC generally applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

**Airplane Design Group (ADG):** The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft which relates to aircraft wingspan or tail height (physical characteristic). When the aircraft wingspan and tail height fall in different groups, the higher group is used. The ADG influences design standards for taxiway safety area (TSA), taxiway object free (TOFA), taxilane object free area, apron wingtip clearance, and various separation distances.

**Taxiway Design Group (TDG):** A classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance. The TDG relates to the undercarriage dimensions of the design aircraft. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are

**AIRCRAFT APPROACH CATEGORY (AAC)**

Category	Approach Speed
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

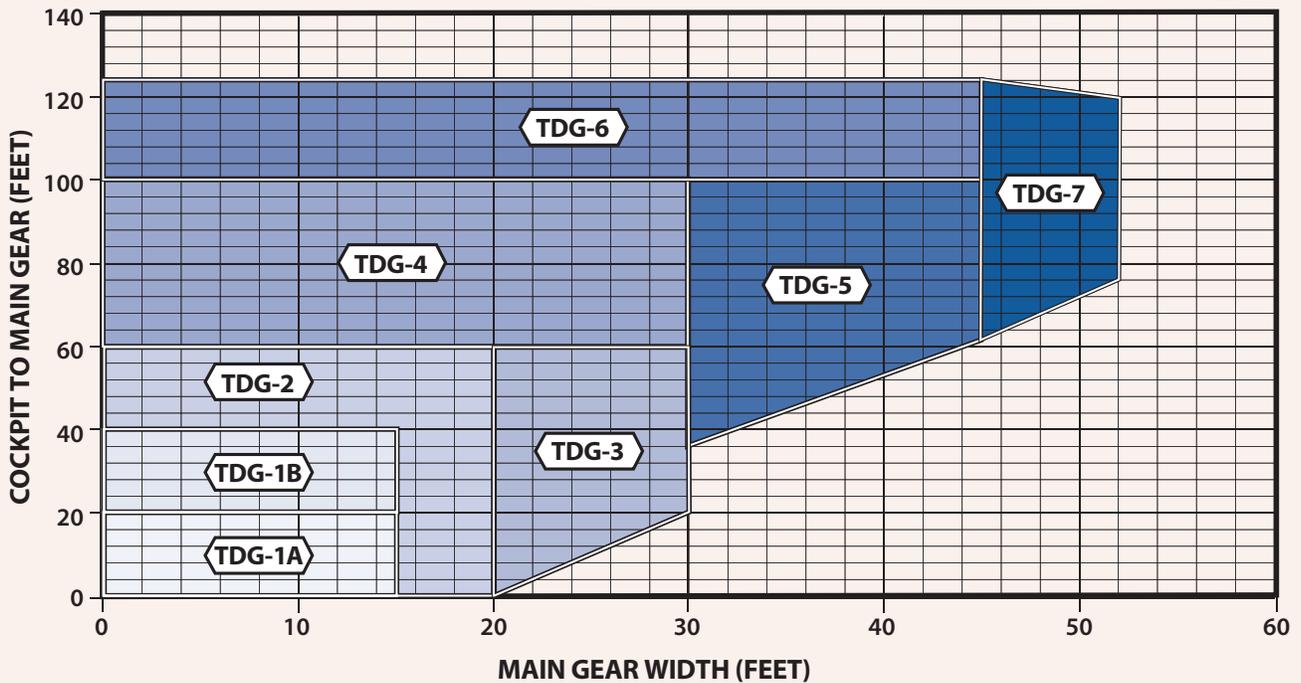
**AIRPLANE DESIGN GROUP (ADG)**

Group #	Tail Height (ft)	Wingspan (ft)
I	<20	<49
II	20-<30	49-<79
III	30-<45	70-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

**VISIBILITY MINIMUMS**

RVR (ft)	Flight Visibility Category (statute miles)
VIS	3-mile or greater visibility minimums
5,000	Lower than 3 miles but not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile (APV ≥ ¾ but < 1-mile)
2,400	Lower than ¾-mile but not lower than ½-mile (CAT-I PA)
1,600	Lower than ½-mile but not lower than ¼-mile (CAT-II PA)
1,200	Lower than ¼-mile (CAT-III PA)

**TAXIWAY DESIGN GROUP (TDG)**



**KEY**

APV: Approach Procedure with Vertical Guidance  
PA: Precision Approach

RVR: Runway Visual Range  
TDG: Taxiway Design Group

Source: FAA AC 150/5300-13A,  
Change 1, Airport Design

determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

**Exhibit 2L** summarizes the classification of the most common jet aircraft in operation today. Generally, most business jets will fall in approach categories B and C, while commercial aircraft will fall in C and D. Business jets typically have slower approach speeds as compared to commercial transport aircraft. Recreational and business piston and turboprop aircraft will generally fall in AACs A and B and ADGs I and II.

## AIRPORT AND RUNWAY CLASSIFICATION

These classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

**Airport Reference Code (ARC):** An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport. The current Airport Layout Plan (ALP) for Boulder City Municipal Airport, which will be updated as part of this master planning effort, identifies an existing ARC of B-II currently and a future ARC of B-II.

**Runway Design Code (RDC):** A code signifying the design standards to which the runway is to be built. The RDC is based upon planned development and has no operational component.

The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a particular runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristic), whichever is most restrictive. The third component relates to the visibility minimums expressed by RVR values in feet of 1,200 ( $\frac{1}{8}$ -mile), 1,600 ( $\frac{1}{4}$ -mile), 2,400 ( $\frac{1}{2}$ -mile), 4,000 ( $\frac{3}{4}$ -mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component should read "VIS" for runways designed for visual approach use only.

**Approach Reference Code (APRC):** A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under particular meteorological conditions where no special operating procedures are necessary, as opposed to the RDC which is based upon planned development with no operational component. The APRC for a runway is established based upon the minimum runway-to-taxiway centerline separation.

**Departure Reference Code (DPRC):** A code signifying the current operational capabilities of a runway and associated parallel taxiway with regard to takeoff operations. The DPRC represents those aircraft that can takeoff from a runway while any aircraft are present on adjacent taxiways, under particular



**A-I**

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



**C-II, D-II**

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



**B-I**

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



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

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



**B-II**

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



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

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



**A-III, B-III**

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



**C-IV, D-IV**

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



**C-I, D-I**

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



**D-V**

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

Note: Aircraft pictured is identified in bold type.

meteorological conditions with no special operating conditions. The DPRC is similar to the APRC, but is composed of two components: ACC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

### CRITICAL DESIGN AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using or are expected to use an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft or a composite aircraft representing a collection of aircraft classified by the three parameters: AAC, ADG, and TDG. In the case of an airport with multiple runways, a design aircraft is selected for each runway.

The first consideration is the safe operation of aircraft likely to use an airport. Any operation of an aircraft that exceeds design criteria of an airport may result in either an unsafe operation or a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

**The design aircraft is defined as the most demanding category of aircraft, or family of aircraft, which conducts at least 500 itinerant operations per year at an airport or the most demanding aircraft in regularly scheduled commercial service.** Planning for future aircraft use is of particular importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short term development does not preclude the reasonable long range potential needs of the airport.

According to FAA AC 150/5300-13A, *Airport Design*, “airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft never likely to be served by the airport are not economical.” Selection of the current and future critical design aircraft must be realistic in nature and supported by current data and realistic projections.

### AIRPORT DESIGN AIRCRAFT

The airport experiences frequent activity by turboprop aircraft conducting air tours. The turboprops currently in service at the airport are the De Havilland DHC-6-300 Twin Otter and Cessna 208B Grand Caravan as operated by Scenic and Grand Canyon Airlines. The Airport also experiences some activity by business jets, including the Cessna Citation Bravo, Cessna Citation Ultra/Encore, and Raytheon Hawker 800.

The FAA maintains the Traffic Flow Management System Count (TFMSC) database which documents certain aircraft operations at airports. Information is added to the TFMSC database when pilots file flight plans and/or when flights are detected by the National Airspace System, usually via radar. It includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors such as incomplete flight plans and limited radar coverage, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type. Therefore, it is likely that there are more operations at the airport than are captured by this methodology. TFMSC data is available for activity at Boulder City Municipal Airport and was utilized in this analysis.

**Exhibit 2M** presents the TFMSC annual jet and turboprop activity from March 2009 through October 2015. As can be seen, several types and sizes of jets can and do operate at the airport. The exhibit also shows the breakout of these jets by AAC and ADG. Over the sample period, the greatest number of operations in any single design family combined was 1,912 in B-II. These accounted for approximately 48 percent of logged turbine activity. The most demanding jets, in terms of design standards, to operate at the airport during the time period are those in design categories A-II and B-II and include the Falcon 20, Citation Sovereign, Citation Excel, De Havilland Twin Otter, King Air 200GT, and King Air 350. Overall, the most demanding jets to utilize the airport in terms of ARC were jets, such as the Challenger 604, Hawker 800, Hawker 4000, Gulfstream 150, and Gulfstream 400, which fall in AACs C-II and D-II.

Boulder City Municipal Airport has exhibited a long term trend of significant turbine-powered aircraft activity. The majority of these operations have been conducted by turboprop aircraft; however, business jets have also utilized the airport.

The aviation demand forecasts indicate the potential for growth in jet activity at the airport. This includes a forecast increase in based business jets and business jet operations through the 20-year planning horizon. The type and size of jet aircraft using the airport regularly can impact the design standards to be applied to the airport system. Therefore, it is important to have an understanding of what type of aircraft may use the airport in the future. Factors such as population and employment growth in the airport service area, the proximity and level of service of other regional airports, and development at the airport can influence future activity.

## **RUNWAY DESIGN CODE (RDC)**

Each runway is assigned an RDC. The RDC relates to specific FAA design standards that should be met in relation to each runway.

### **Runway 9-27**

Runway 9-27 is the primary runway and should be designed to accommodate the critical design aircraft. This runway is 4,803 feet long by 75 feet wide and has a visual approach. The current ALP for the airport defines Runway 9-27 as an existing ARC B-II and ultimate ARC B-II.

According to the TFMSC data, operations by aircraft in AAC B have not exceeded the 500 operations threshold in recent years. Over the past seven years, operations in AAC B have averaged approximately 361 annually, with the highest one-year total being 506 in 2010. While the TFMSC data does not constitute an upgrade to the current RDC, the level of operations is considerable. Unless there is a discernable decreasing trend in operations by aircraft in this category, an airport should not be downgraded. **Therefore, this Master Plan will utilize an existing RDC of B-II-VIS for Runway 9-27.** Future planning should consider the increased use of business jets at the airport. Furthermore, the airport achieving visibility minimums down to 1-mile associated with the LPV approach on its primary runway would be advantageous for air tour operators as well as business jet operations. As a result, **the future RDC for Runway 9-27 is B-II-5000.**

*Future planning should consider the increased use of business jets at the airport.*

### Runway 15-33

A crosswind runway primarily functions to provide an alternate runway for periods when wind conditions do not favor the primary runway orientation. Runway 15-33 is the main crosswind runway measuring 3,852 feet long and 75 feet wide. This runway is utilized primarily by general aviation aircraft when the winds dictate. The runway is designated as being able to accommodate air tour operations when needed and does so occasionally. **The existing RDC for Runway 15-33 is A-I-VIS.** It should continue to be planned for occasional use by turboprop aircraft. In addition, it would be advantageous for the runway to be served by improved safety margins. As such, **the ultimate RDC is B-II-VIS.**

### Airport Design Summary

**Table 2S** summarizes the design aircraft components as applied currently to the airport and the runways. The ultimate RVR (visibility) components for Runways 9-27 and 15-33 may change based on analysis and recommendations regarding potential instrument approach capability.

**TABLE 2S**  
**Design Aircraft Parameters**  
**Boulder City Municipal Airport**

Runway Design Parameters	Runway Design Code (RDC)	Approach Reference Code (APRC)	Departure Reference Code (DPRC)
<b>EXISTING</b>			
Runway 9-27 (240' rwy/twy separation)	B-II-VIS	B/II/VIS	B/II
Runway 15-33 (240' rwy/twy separation)	A-I-VIS	B-II-VIS	B/II
<b>ULTIMATE</b>			
Runway 9-27 (240' rwy/twy separation)	B-II-5000	B/II/5000	B/II
Runway 15-33 (240' rwy/twy separation)	B-II-VIS	B/II/VIS	B/II

Source: FAA AC 150/5300-13A, Change 1, *Airport Design*

**AIRPORT REFERENCE CODE OPERATIONS SUMMARY**

ARC Code	Grouping	2009*	2010	2011	2012	2013	2014	2015**
A-I	Citation Mustang	0	2	8	0	4	0	0
	Eclipse 500	68	10	4	0	2	4	0
	P-750 XSTOL	6	0	0	0	0	2	0
	Piper Meridian	4	8	2	2	2	6	4
	Epic Dynasty	0	0	0	0	0	12	12
	Mitsubishi Solitaire	0	2	0	6	0	0	24
	<b>Total</b>	<b>78</b>	<b>22</b>	<b>14</b>	<b>8</b>	<b>8</b>	<b>24</b>	<b>40</b>
A-II	DH-6 Twin Otter	94	188	172	196	140	146	209
	<b>Total</b>	<b>94</b>	<b>188</b>	<b>172</b>	<b>196</b>	<b>140</b>	<b>146</b>	<b>209</b>
B-I	Beechjet 400	4	0	0	4	6	0	0
	Cessna Citation I/SP	2	4	6	6	4	8	6
	Cessna CJ 1/2/3/4	2	12	4	8	12	20	10
	L-39 Albatross	2	0	2	0	0	0	0
	Phenom 100	0	4	6	0	0	4	0
	Raytheon Premier I	0	4	0	0	4	0	0
	Swearingen SJ-30	0	6	0	0	0	0	0
	Piper Cheyenne	0	0	12	8	0	22	6
	Swearing Merlin	6	16	20	18	28	8	0
	Cessna 208 Caravan	18	28	6	8	4	2	6
	Socata TBM	4	6	8	8	4	2	8
<b>Total</b>	<b>38</b>	<b>80</b>	<b>64</b>	<b>60</b>	<b>62</b>	<b>66</b>	<b>36</b>	
B-II	Citation Bravo	2	14	0	0	2	2	6
	Citation III/VI/VII	0	2	0	0	0	0	0
	Citation Sovereign	0	6	0	4	0	0	0
	Citation Ultra/Encore	4	10	0	2	4	6	4
	Citation XLS	0	2	4	0	2	2	0
	Falcon 20/50	0	0	0	0	6	0	0
	Beech C-99 Airliner	2	0	0	0	0	0	0
	Cessna 425 Conquest	6	0	4	6	2	6	0
	Commander 680/690	6	0	6	0	0	2	2
	King Air 90/100/200/350	334	354	348	262	174	132	170
	Piaggio Avanti	0	6	0	2	0	0	0
	Saab 340	0	0	0	4	0	0	0
	Pilatus PC-12	12	32	28	34	36	52	16
<b>Total</b>	<b>366</b>	<b>426</b>	<b>390</b>	<b>314</b>	<b>226</b>	<b>202</b>	<b>198</b>	
C-I	Learjet 25	0	4	0	0	0	0	0
	Learjet 31/35/36	0	6	2	0	0	2	0
	Learjet 40/60	0	4	0	0	4	6	0
	<b>Total</b>	<b>0</b>	<b>14</b>	<b>2</b>	<b>0</b>	<b>4</b>	<b>8</b>	<b>0</b>

ARC Code	Grouping	2009*	2010	2011	2012	2013	2014	2015**
C-II	Challenger 300	0	12	2	0	0	0	0
	Challenger 600/601/604	0	0	2	4	2	0	0
	Citation X	0	0	0	2	4	0	0
	Hawker 800/1000/4000	0	0	4	0	0	2	4
	<b>Total</b>	<b>0</b>	<b>12</b>	<b>8</b>	<b>6</b>	<b>6</b>	<b>2</b>	<b>4</b>
D-II	Gulfstream G-150	4	4	0	0	0	2	0
	Gulfstream G-400	0	0	4	0	0	0	0
	<b>Total</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>
E-I	F-16	0	0	0	2	0	0	0
	<b>Total</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>0</b>

**AIRPORT REFERENCE CODE OPERATIONS SUMMARY**

Turbine Operations by Airport Reference Code							
ARC	2009	2010	2011	2012	2013	2014	2015
A-I	78	22	14	8	8	24	40
A-II	94	188	172	196	140	146	209
B-I	38	80	64	60	62	66	36
B-II	366	426	390	314	226	202	198
C-I	0	14	2	0	4	8	0
C-II	0	12	8	6	6	2	4
D-II	4	4	4	0	0	2	0
E-I	0	0	0	2	0	0	0
<b>Total</b>	<b>580</b>	<b>746</b>	<b>654</b>	<b>586</b>	<b>446</b>	<b>450</b>	<b>487</b>

Turbine Operations by Aircraft Approach Category							
AAC	2009*	2010	2011	2012	2013	2014	2015**
A	172	210	186	204	148	170	249
B	404	506	454	374	288	268	234
C	0	26	10	6	10	10	4
D	4	4	4	0	0	2	0
E	0	0	0	2	0	0	0
<b>Total</b>	<b>580</b>	<b>746</b>	<b>654</b>	<b>586</b>	<b>446</b>	<b>450</b>	<b>487</b>

Turbine Operations by Airplane Design Group							
ADG	2009*	2010	2011	2012	2013	2014	2015**
I	116	116	80	70	74	98	76
II	464	630	574	516	372	352	411
<b>Total</b>	<b>580</b>	<b>746</b>	<b>654</b>	<b>586</b>	<b>446</b>	<b>450</b>	<b>487</b>

\* 2009 from 3/12/09 thru 12/31/09

\*\* 2015 from 1/1/15 thru 10/31/15

Source: Traffic Flow Management System Counts

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## *SUMMARY*

Boulder City Municipal Airport is a significant aviation facility that serves a vital function for the regional economy. As a general observation, the airport is well-positioned for growth in the future. The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The range of forecasts developed here will be taken forward in the next chapter as planning horizon activity levels that will serve as milestones or activity benchmarks in evaluating facility requirements.