Henderson Executive Airport

Master Plan Update









HND HENDERSON EXECUTIVE AIRPORT

CLARK COUNTY DEPARTMENT OF AVIATION

Henderson Executive Airport

Master Plan Update

Prepared for:

Clark County Department of Aviation

November 2021

NOTICE: The preparation of this document was financed in part through a planning from the Federal Aviation Administration (FAA) as provided under Section 505 of the Airport and Airway Improvement Act as Amended. The contents of this document do not necessarily reflect the official views of the FAA. Acceptance of the report by the FAA does not in any way constitute a commitment on the part of the United States to participate in any development depicted herein, nor does it indicate that the proposed development is environmentally acceptable in accordance with applicable public laws.

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HND HENDERSON EXECUTIVE AIRPORT

CLARK COUNTY DEPARTMENT OF AVIATION



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INTRODUCTION

An Airport Master Plan is a comprehensive study of an airport and typically describes the development plans over a 20-year planning horizon, required to meet current and future aviation demand. The development around an airport can have a significant impact on the safety of aircraft operations; therefore, it's important to systematically update an airport master plan if a surge in development has or is anticipated to occur.

Henderson Executive Airport is owned by Clark County, Nevada and operated by the Department of Aviation as a part of the Clark County System of Airports. The System of Airports includes McCarran International Airport, Henderson Executive Airport, North Las Vegas Airport, Jean Airport and Overton Airport. In 1996, the Clark County Department of Aviation purchased Sky Harbor Airport as a part of an ongoing effort to meet the future aviation needs of Southern Nevada, with a vision to transform the small airport into an executive reliever for McCarran International Airport. The facility's name was changed to Henderson Executive Airport, and work began on the expansion plans. The original Master Plan for Henderson Executive Airport was adopted in April 1997, and in less than ten years, the Airport was transformed from the original single runway general aviation airport to the dual runway executive reliever it is today.

Over the past decade, the medium and large aircraft activity at Henderson Executive Airport has increased, while the small aircraft flight training has decreased. The shift in operational activity and the growth of the surrounding community will be a focus of the Airport Master Plan Update. Ultimately, the Airport Master Plan Update will provide guidelines for the airport's overall development, maintenance, and operation in an environmentally and fiscally responsible manner while adhering to appropriate safety design standards.

The Henderson Executive Airport Master Plan Update has been prepared by Clark County Department of Aviation and primary consultant, Kimley-Horn. Additional specialized consultants involved in the project included Coffman Associates, Martinez Geospatial, VTN, and Flight Tech Engineering. The goals and recommendations of the Update were developed and guided by numerous stakeholders recognized below:

- Clark County Board of County Commissioners
- City of Henderson City Council
- Planning Advisory Committee Members
  - Anthem Highlands Homeowner Association (HOA)
  - Clark County
  - City of Henderson
  - Inspirada HOA
  - Nevada Department of Transportation (DOT)
  - Seven Hills HOA
- Technical Advisory Committee Members
  - All In Aviation
  - Cactus Aviation
  - Federal Aviation Administration
  - Henderson Hangars Owner Association
  - Lone Mountain Aviation
  - Maverick Helicopters
  - Nevada DOT
  - Ribiero Corp.
  - Serco
  - Thrive Aviation



Purpose of the Airport Master Plan

This Airport Master Plan Update covers a planning period of 20 years. The planning period has been divided into three terms: short term (upcoming 5 years), intermediate term (6 to 10 years), and long term (11 to 20 years). The intermediate- and long-term planning periods are typically considered strategic in nature and help to ensure that short-term actions are consistent with longer-term development needs and that regional aviation needs are met in a feasible and fiscally responsible manner.

The purpose of this Airport Master Plan Update is to provide Clark County Department of Aviation a means to establish a long-range development strategy for sustained, responsible growth of the Airport through 2039, the 20-year planning period. The Airport Master Plan Update is focus on optimizing operations and providing flexible options for growth while identifying areas suitable for new facilities.

The Airport Master Plan Update improvements aim to satisfy projected aviation demand, ensure the safety of airport operations, and be compatible with the environment and other community development plans. Above all else, the improvements must be technically sound, practical, economically, and fiscally feasible.

The Airport Master Plan Update is submitted to the FAA for approval and use in evaluating grant requests and other actions involving the Airport. Thus, it provides guidance on the priority of airport development projects.

More specifically, the objectives of this Airport Master Plan Update are to:

- Illustrate, through demand forecasts, the growth in activity that is anticipated at Henderson Executive Airport;
- Provide plans for infrastructure enhancements that are consistent with the Airport's role in the Clark County System of Airports;
- Provide a tool for communicating to a broad range of stakeholders including tenants, local government, community groups, and state and federal agencies, to aide in the decision-making process;
- Supplement long-term resource planning for local and regional bodies;
- Help establish the key milestones of airport development, carefully triggered by demand, and supported by adequate justification for implementation;
- Demonstrate the probable costs required over the life of the study and ensure that the program is financially viable;
- Enable the CCDOA, City of Henderson, and others to assess local social and environmental impacts and provide an opportunity to develop preliminary proposals on how those impacts could be mitigated, as appropriate.

As part of this Master Plan Update, a new Airport Layout Plan (ALP)—a technical document set that depicts both existing facilities and planned development for an airport—has also be created and approved by the FAA. The Airport's prior Airport Layout Plan was approved in 2018.

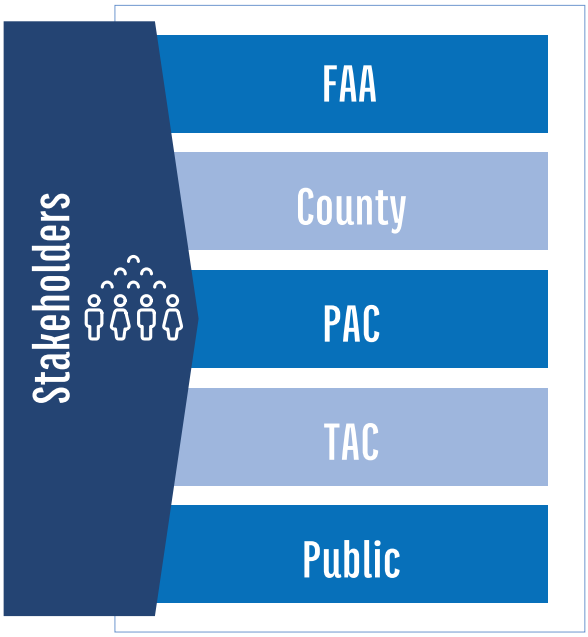
The master planning process involves collecting readily available data, forecasting future aviation demand, determining facility requirements, studying various alternatives, and developing future plans and schedules. The process takes into consideration the needs and concerns of Clark County Department of Aviation, the City of Henderson, Henderson Executive Airport's tenants and users, and the general public.

This Airport Master Plan Update has been prepared in accordance with FAA Advisory Circular (AC) 150/5300-13A, Change 1, *Airport Design; FAA AC 150/5070-6B, Airport Master Plans*; and other FAA design standards and planning criteria. Specific elements of this technical report include:

- Inventory of Existing Conditions
- Aviation Forecasts
- Demand/capacity analysis and facility requirements
- Alternatives development
- Implementation Planning, and
- Airport layout plan drawing set preparation.

Stakeholder Involvement

Stakeholder engagement will be emphasized throughout the Master Plan Update and will include multiple advisory committees whose will input influence planning decisions. Additionally, community members are invited to participate and ask questions about the development of this plan through a series of public workshops.



The stakeholder involvement program includes two advisory committees and public outreach strategies, including:

- **Technical Advisory Committee (TAC):** A group of participants with technical skills related to airport environments, transportation expertise, and airport user groups. The committee provides a critical role in guiding and reviewing the project's technical analyses, alternatives, and recommendations. These participants are typically airport users and tenants, as well as aviation regulatory agency representatives.
- **Planning Advisory Committee (PAC):** A group of participants from the surrounding communities, local governments, stakeholders, special interest groups, and large employers with a stake in the airport. The committee also plays a critical role in guiding and reviewing project goals, technical analyses, alternatives, and recommendations.
- **Public Workshops:** Meetings at key milestones to inform the general public and solicit feedback
- **Targeted Stakeholder Briefings:** Individual briefings as necessary to governmental agencies and other specific stakeholders as needed
- **Additional Outreach:** Information dissemination via social media and other media outlets.

TECHNICAL ADVISORY COMMITTEE MEETINGS:

- **Meeting 1:** Project Kick-Off
- **Meeting 2:** Inventory and Forecasts
- **Meeting 3:** Facility Requirements
- **Meeting 4:** Development Alternative Concepts
- **Meeting 5:** Recommended Development Plan

PLANNING ADVISORY COMMITTEE MEETINGS:

- **Meeting 1:** Project Kick-Off and Inventory
- **Meeting 2:** Forecasts and Facility Requirements
- **Meeting 3:** Development Alternative Concepts
- **Meeting 4:** Recommended Development Plan

Input from the committee meetings and public workshops helped inform the Recommended Development Plan.

1. INVENTORY OF EXISTING CONDITIONS

The information collected as part of this chapter establishes a baseline of existing conditions for the Airport Master Plan Update. Not only can this information provide insight into Henderson Executive Airport and its surroundings from both a physical and operational perspective, but it also serves as an input in determining the Airport's ability to meet forecasted demand throughout the 20-year planning horizon. Thus, this Inventory of Existing Conditions provides the basis from which the Airport's future can be envisioned.

1.1. Background and Local Setting

Henderson Executive Airport is located in the City of Henderson, Nevada, approximately 9 miles south of the Las Vegas CityCenter, as depicted in **Figure 1.1**. The Airport is owned by Clark County and operated by the Clark County Board of County Commissioners through the Clark County Department of Aviation (CCDOA). Clark County encompasses 8,061 square miles in Southern Nevada and includes five incorporated cities and 20 census-designated places. According to the U.S. Census Bureau's 2018 population estimates, Clark County's population is approximately 2.2 million and is home to more than 73 percent of the State of Nevada's population.

The Airport is physically located within the southwestern portion of the corporate limits of the City of Henderson, which is 11 miles southwest of downtown Henderson. The City of Henderson is in central Clark County between the City of Las Vegas to the north and the Sloan Canyon National Conservation Area to the south. Both the Airport and the city are situated in the southern portion of the Las Vegas Valley and north of McCullough Mountain Range. Per the U.S. Census Bureau's 2018 population estimates, the City of Henderson has a population of 310,390—the second most-populated city in Clark County behind the City of Las Vegas.

Henderson Executive Airport covers approximately 760 acres at an elevation of 2,492 feet above mean sea level (MSL).[1] The Airport is bounded by Nevada State Route 146/Saint Rose Parkway to the north, Volunteer Boulevard to the south, Raiders Way to the west, and the Seven Hills master-planned community to the east. Interstate 15 is approximately 2 miles west of the Airport and is the major north-south interstate traversing the Las Vegas Valley.



1 Clark County Department of Aviation, Henderson Executive Airport, Airport Layout and Property Map Set, 2018.

Figure 1.1 – *Airport Vicinity*



Sources: Esri. ArcGIS Online. HERE. Garmin. Intermap. Increment P Corp. GEBCO. USGS. FAO. NPS. NRCAN. GeoBase. IGN. Kadaster NL. Ordnance Survey. Esri Japan. METI. Esri China (Hong Kong). OpenStreetMap contributors. GIS User Community. Clark County GIS Management Office. Kimley-Horn, 2020.

Henderson, Nevada, is in the northwest quadrant of the Mojave Desert and experiences a dry, desert climate that can be characterized as subtropical with long, hot summers and short, cool winters. According to the National Weather Service Forecast Office, the average annual temperature in the Henderson/Las Vegas area, between 2009 and 2019, was 70.8 degrees Fahrenheit, with monthly mean average temperatures ranging between 48 and 68 degrees Fahrenheit during winter and 76 and 94 degrees Fahrenheit during summer. During the hottest month of the year (July), the mean maximum temperature—or the mean of the monthly maximum temperatures observed—was 104.9 degrees Fahrenheit for the same 10-year period. Due to the desert climate, average monthly precipitation (between 2009 and 2019) ranged from 0 to 0.66 inches with an annual average of 3.49 inches, and there was no measured snow or sleet precipitation at the Airport. The region's high temperatures, dry desert climate, and elevation at approximately 2,500 feet MSL contribute to reduced air density that impacts aircraft engine horsepower output, causing increased required takeoff and landing distances and decreased climb rates.[2]

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1.1.1. Regional Aviation Facilities

The following is a high-level overview of the facilities and services provided at airports within a 30-mile radius of Henderson Executive Airport. This information, which is intended to provide context regarding the Airport's role within the regional system of airports, is summarized in **Table 1.1** and displayed in **Figure 1.2**.

BOULDER CITY MUNICIPAL AIRPORT

Owned and operated by the City of Boulder City, Nevada, Boulder City Municipal Airport is a public-use airport located near the Arizona border and approximately 21 miles southeast of the Las Vegas CityCenter. The Airport is situated at 2,203 feet MSL and encompasses approximately 530 acres.[3] With 240 based aircraft[4], Boulder City Municipal Airport's two runways—9/27 and 15/33—accommodate a variety of operations, including general aviation (GA), extensive air tours, flight instruction, and skydiving activity. Although the Airport currently does not have an airport traffic control tower (ATCT), the construction of a tower is included in the City's FY21-25 Capital Improvement Plan, which was approved by the City Council of Boulder City on May 26, 2020. Local and federal funds are earmarked for construction of the tower in 2025 and beyond.[5]

JEAN SPORT AVIATION CENTER

Located approximately 25 miles southwest of the Las Vegas CityCenter, Jean Sport Aviation Center is a non-towered, public-use airport owned and operated by CCDOA. With two parallel runways—2L/20R and 2R/20L—the Airport covers an area of 232 acres and is situated at 2,835 feet MSL. Jean Sport Aviation Center is designated as a GA airport and is home to 37 based aircraft. The Center is mainly used for recreational aviation including GA, aerobatic, glider, ultralight, and skydiving operations.

MCCARRAN INTERNATIONAL AIRPORT

McCarran International Airport is in the Las Vegas CityCenter and serves as the main passenger gateway to the Las Vegas Valley. The towered, public-use airport is owned and operated by CCDOA. With four runways—1L/19R, 1R/19L, 8L/26R, and 8R/26L—McCarran International Airport covers approximately 2,800 acres at an elevation of 2,181 feet MSL and is home to 148 based aircraft. Designated as a large hub airport, McCarran International Airport offers direct passenger service to more than

2 Federal Aviation Administration, Density Altitude Publication, 2011.

3 Federal Aviation Administration, Airport Data and Information Portal (ADIP), 2020.

4 Federal Aviation Administration, Terminal Area Forecast (TAF), 2020.

5 City of Boulder City, FY21-25 Capital Improvement Plan – Future Projects, 2020, https://www.bcnv.org/DocumentCenter/View/7606/FY21-25-Capital-Improvement-Plan-Part-3

150 destinations around the world. The Airport is served by more than 30 airlines and is a hub for Allegiant Air, Frontier Airlines, Southwest Airlines, and Spirit Airlines. In 2018, the Federal Aviation Administration (FAA) listed McCarran International Airport as the ninth-busiest airport in the U.S. with more than 23 million passenger enplanements.

NELLIS AIR FORCE BASE

Nellis Air Force Base is a U.S. Air Force installation located approximately 12 miles northeast of the Las Vegas CityCenter. The base's towered airfield covers approximately 1,598 acres at an elevation of 1,869 feet MSL and contains two runways—3L/21R and 3R/21L. Nellis Air Force Base's mission is accomplished through dedicated airspace, thousands of personnel, and an array of aircraft, including fighters, bombers, refuelers, and aircraft used for transport, close-air-support, command-and-control, and combat search-and-rescue.[6]

NORTH LAS VEGAS AIRPORT

Located 7 miles northwest of the Las Vegas City Center, North Las Vegas Airport is a towered, public-use airport owned and operated by the CCDOA. The Airport occupies 920 acres at an elevation of 2,205 feet MSL and is equipped with three runways: 7/25, 12L/30R, and 12R/30L. As a reliever airport for McCarran International Airport, North Las Vegas Airport is home to 593 based aircraft and accommodates a variety of operations, including air tours, flight instruction, charter flights, and GA activity.

PERKINS FIELD

Perkins Field (Perkins) is outside of the 30 mile-radius of Henderson Executive Airport; however, it is part of the Clark County Airport System. Owned and operated by the CCDOA, Perkins is in the Moapa Valley and approximately 52 miles northeast of the Las Vegas City Center. The Airport is situated at 1,366 feet MSL and encompasses approximately 250 acres. As a GA airport, Perkins has one runway—13/31— and is home to 12 based aircraft. The Airport was originally built to provide an emergency landing area for aircraft departing Nellis Air Force Base, but now accommodates ultralight, skydiving, and GA aircraft operations.

SKY RANCH ESTATES

Located approximately 33 miles southwest of the Las Vegas CityCenter near the Town of Sandy Valley, Sky Ranch Estates is a privately-owned, public-use airport that is owned and operated by the Sky Ranch Homeowners Association. The Airport covers an area of 158 acres at an elevation of 2,599 feet MSL. With 77 based aircraft and two runways—3/21 and 12/30—the non-towered, GA airport primarily serves the residential community of Sky Ranch Estates.

6 U.S. Air Force, Fact Sheet: Nellis Air Force Base, 2012, https://www.nellis.af.mil/About/Fact-Sheets/Display/Article/284174/nellis-air-force-base/.

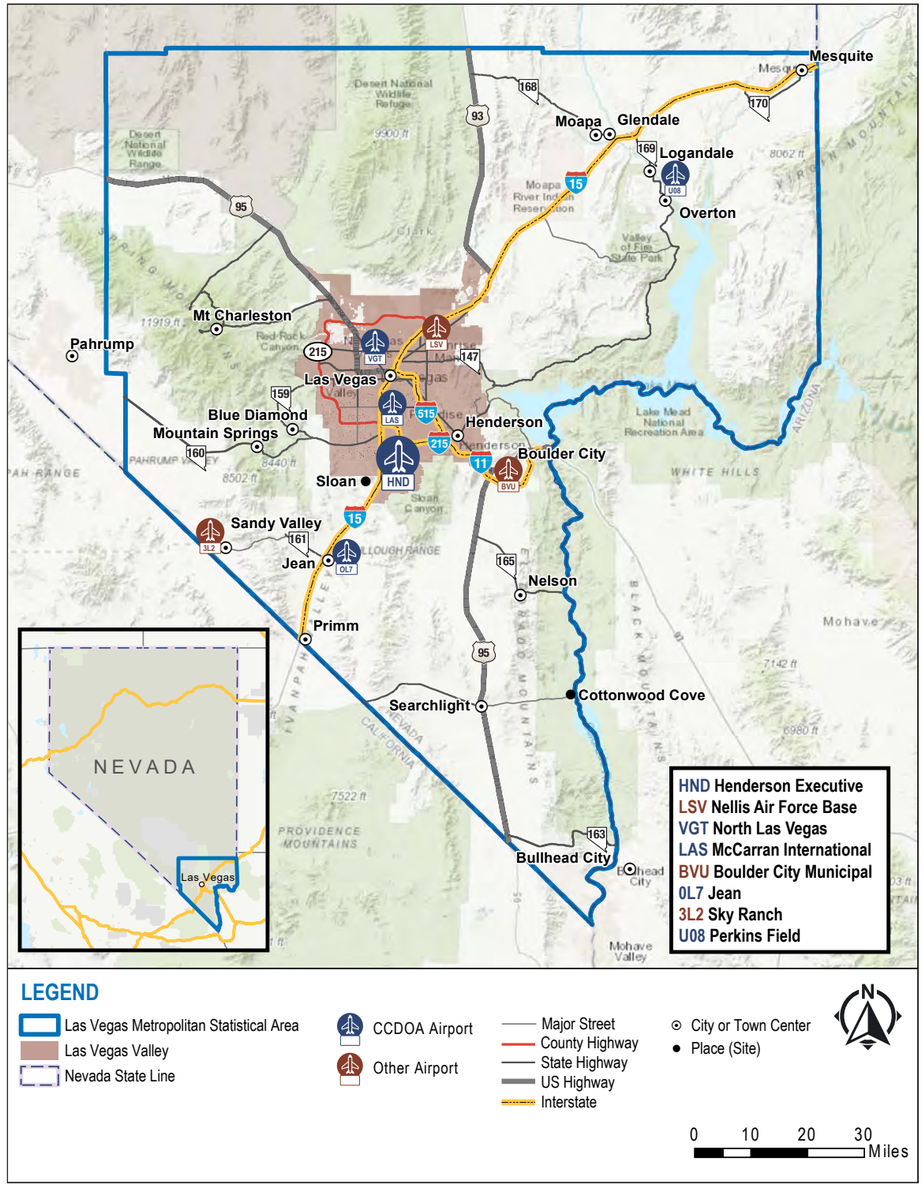
Table 1.1 – *Summary of Regional Aviation Facilities*

Airport	Distance from the Airport (miles)	Distance from Las Vegas City Center (miles)	Runway Configuration and Length (feet)	ATCT	FBO	Towered/ Non-towered	2019 NPIAS Role	Area (acres)	Elevation (MSL)	Based Aircraft (March 2020)
Henderson Executive Airport	N/A	9	**17L/35R:** 5,001 x 75 **17R/35L:** 6,501 x 100	Yes	Yes	Towered	Nonhub Primary	760	2,492	280
Boulder City Municipal Airport	16	21	**9/27:** 5,103 x 75 **15/33:** 3,852 x 75	No	Yes	Non-towered	Nonhub Primary	530	2,203	240
Jean Sport Aviation Center	18	25	**2L/20R:** 4,600 x 75 **2R/20L:** 3,700 x 60	No	Yes	Non-towered	GA	232	2,835	37
McCarran International Airport	8	0	**1L/19R:** 8,988 x 150 **1R/19L:** 9,771 x 150 **8L/26R:** 14,515 x 150 **8R/26L:** 10,526 x 150	Yes	Yes	Towered	Large Hub	2,800	2,181	148
Nellis Air Force Base	19	12	**3L/21R:** 10,120 x 200 **3R/21L:** 10,051 x 150	Yes	No	Towered	N/A	1,598*	1,869*	N/A
North Las Vegas Airport	16	7	**7/25:** 5,005 x 75 **12L/30R:** 4,199 x 75 **12R/30L:** 5,000 x 75	Yes	Yes	Towered	Reliever	920	2,205	593
Perkins Field	56	52	**13/31:** 4,811 x 75	No	Yes	Non-towered	GA	250	1,366	12
Sky Ranch Estates	30	33	**3/21:** 3,340 x 45 **12/30:** 3,300 x 105	No	No	Non-towered	N/A	158	2,599	77

Sources:
FAA Airport Data and Information Portal (ADIP) (accessed 3/18/2020).
FAA Terminal Area Forecast TAF) (accessed 3/18/2020).

Notes:
N/A = not applicable
ATCT = airport traffic control tower
FBO = fixed base operator
NPIAS = National Plan of Integrated Airport Systems
MSL = mean sea level
** = estimated/official data unavailable.*

Figure 1.2 – *Regional Aviation Facilities*



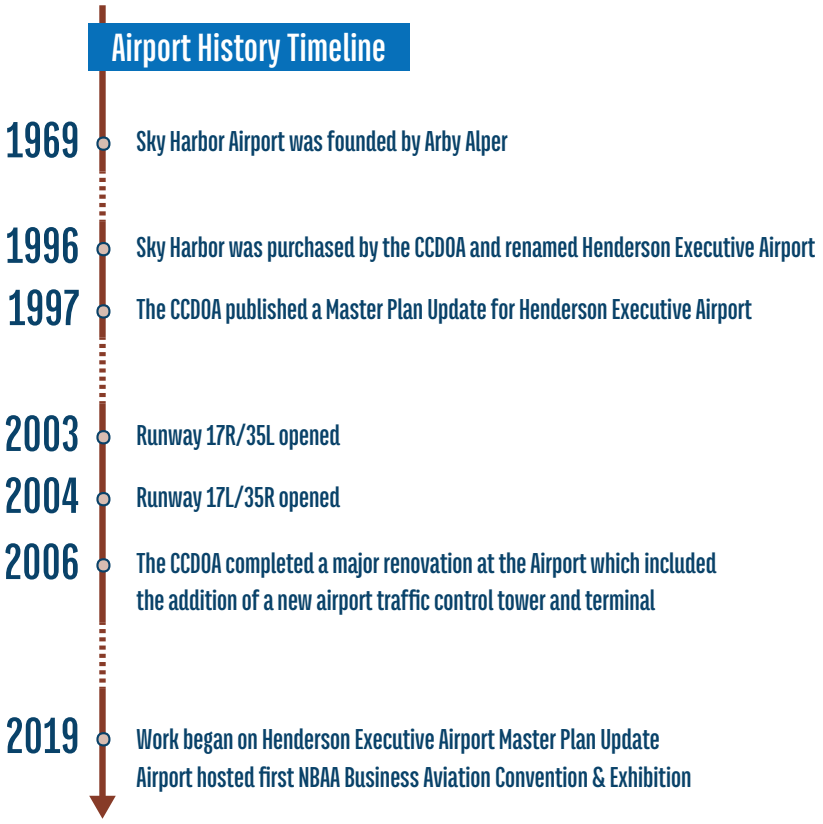
Sources: Esri. ArcGIS Online. HERE. Garmin. Intermap. Increment P Corp. GEBCO. USGS. FAO. NPS. NRCAN. GeoBase. IGN. Kadaster NL. Ordnance Survey. Esri Japan. METI. Esri China (Hong Kong). OpenStreetMap contributors. GIS User Community. Clark County GIS Management Office. Data.gov. Kimley-Horn, 2020.

1.1.2. Airport History

In 1969, Arby Alper created a new GA airport located in the Las Vegas Valley, south of the major population center. The airport, known as Sky Harbor, served both GA and corporate flyers as well as some Grand Canyon sightseeing airlines. Slow, steady growth made Sky Harbor a small, but active airport throughout the 1970s and 1980s. Alper built new hangars and added new services, when possible, in support of the aviation industry in the valley. Sky Harbor's location away from heavily populated areas made it popular with private pilots and GA enthusiasts.

The CCDOA purchased Sky Harbor in 1996 and changed the Airport's name to Henderson Executive. At the time, the Airport had one 5,000-foot runway, a single terminal building with an airport traffic control tower (ATCT), several large hangars, ten T-hangars, and a handful of trailers. In 2005, the FAA changed the Airport's designation from GA to reliever due to increased operations.[7]

Figure 1.3 – *Airport History Timeline*



Source:
Kimley-Horn, 2020.

To help meet the growing demand for aviation facilities and services in Southern Nevada, the CCDOA invested more than $30 million in Henderson Executive Airport to create a premier corporate aviation facility and an attractive, convenient, and economical alternative to McCarran International Airport. The following are among the most notable projects over the last 24 years.

- The construction of two parallel runways, the longest being 6,500 feet
- The construction of a stand-alone ATCT, replacing the original control that was salvaged from Nellis Air Force Base in the 1940s
- Substantial utility infrastructure including a new maintenance building
- Fifteen acres of aircraft parking ramp with new storage hangars for 95 private aircraft
- A new terminal building opened in 2006, providing a seamless transition between aircraft and ground transportation

In **Figure 1.3**, it illustrates the Henderson Executive Airport's history timeline as mentioned above.

1.1.3. Ownership and Management

The Clark County system of airports includes: McCarran International Airport, Henderson Executive Airport, North Las Vegas Airport, Jean Sport Aviation Center, and Perkins Field—all of which are owned by Clark County, Nevada. The system is operated under the policy direction of the Board of County Commissioners, the authority of the County Manager, and the management of the Director of Aviation. Reporting to the Assistant Director of General Aviation Airports, the Henderson Executive Airport Manager oversees the daily operations at Henderson Executive Airport.

7 Federal Aviation Administration, National Plan of Integrated Airport Systems (NPIAS) Report, 2005.

1.1.4. Airport Strengths, Weaknesses, Opportunities, and Threats Analysis



As discussed in the Introduction chapter of this Airport Master Plan Update, the stakeholder involvement program includes two advisory committees—the Technical Advisory Committee (TAC) and Planning Advisory Committee (PAC), which will help guide and review project goals and recommendations. As part of the first PAC and TAC meetings—held on November 14, 2019—each committee participated in a facilitated exercise known as a Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis. The analysis was conducted separately for each group to foster candid feedback and provide input as to the opportunities and challenges at Henderson Executive Airport from both a user and community perspective. These findings will help form the foundation from which future facility needs will be identified while being mindful of the surrounding community's perceptions of the Airport. The findings of the SWOT analyses are summarized below.

STRENGTHS

- The Airport's location south of the Las Vegas Strip is attributed to its sustained success.
- The Airport is well managed by CCDOA and is considered to be safe, well-regarded, and a good neighbor to the surrounding communities.
- With a suite of services and amenities—including a restaurant, lounge areas, Wi-Fi, televisions, sleeping quarters, showers, on-site rental car counters, flight-planning stations, and fuel service—the Airport caters well to personal, corporate, and charter aircraft as well as aviation enthusiasts.
- The on-site airfield maintenance team is directly managed by CCDOA and is known for its fast response times.
- Accessibility to the Airport is currently a strength but will be closely monitored as new development is constructed in the immediate vicinity of the Airport.
- The Airport's dual runways, ATCT, and taxiway network enable the efficient movement of aircraft with minimal congestion.
- As a reliever to McCarran International Airport, CCDOA encourages corporate jets and GA traffic to use Henderson Executive Airport and its advantageous pricing structure.
- Given its role within the CCDOA airport system, the Airport's air traffic controllers work closely with their McCarran International Airport counterparts to ensure the safe and efficient flow of air traffic in the area.
- Forecasted aviation demand is strong at the Airport given its central location and the favorable flying conditions of the Las Vegas Valley.
- The Airport's tenants and users represent a diverse mix of aviation- and nonaviation-related businesses, services, and interests.
- The Airport's modern facilities paired with opportunities for expansion position the Airport to take full advantage of the surrounding area's growth and continue to be an economic driver for the City of Henderson and Las Vegas Valley.

WEAKNESSES

- The topography and natural terrain near the Airport create airspace obstructions and approach limitations for aircraft.
- The aforementioned natural features limit the Airport's expansion potential and can also drive up construction costs for new projects.
- The hot desert climate during the summer months greatly affects aircraft performance, limiting airport departures.
- Due to its close proximity to McCarran International Airport and shorter runways, traffic may choose to use the larger airport, which causes Henderson Executive Airport to miss potential revenue.
- The Airport does not have customs and border patrol on site, which causes international flights to divert to McCarran International Airport.
- The Airport's proximity to McCarran International Airport presents challenges in deconflicting operations in the airspace for air traffic control (ATC).
- New development around the Airport will likely cause increased congestion throughout the local roadway network.
- Growing residential communities in the immediate vicinity of the Airport may lead to additional noise complaints from aircraft operations.

OPPORTUNITIES



- Henderson Executive Airport is uniquely positioned to support a rapidly growing community.
- Responsible land planning, sustainable practices, and airport-compatible land uses can be applied to new development on and near the Airport (i.e., industrial and commercial).
- Economic growth around the Airport may translate to operational changes such as extended operating hours to support the growth in demand.
- The Airport has the opportunity to promote its growth through a variety of mechanisms. The National Business Aviation Association's Annual Convention & Exhibition, which is hosted every other year in Las Vegas and brings substantial traffic to the Airport, is a great opportunity to promote the Airport on the national stage. The Airport's Fixed-Base Operator (FBO) was recently recognized by the Air Elite Network for the high-quality standards of its facilities and services.
- At the local level, increased collaboration with the City of Henderson and CCDOA, along with enhanced public outreach, will be crucial in promoting the Airport's growth objectives.

THREATS

- Commercial and residential growth near the Airport, including the new Las Vegas Raiders training and headquarters facility, will likely increase congestion on the local roadway network and make Airport connectivity more difficult.
- The encroachment of high-density residential and other incompatible land uses may negatively affect Airport perception.
- Since major stakeholders of the Airport include governmental agencies, frequent changes in City and County staff creates difficulties in maintaining close relationships. This could prove to be threatening as Airport expansion projects rely heavily on partnership with public entities. However, a growing community results in more stakeholders that may influence local development, public policy, and Airport operations.
- Corporate jets have recently undergone international scrutiny due to climate change and environmental concerns, and GA accidents have impacted the public perception of safety in private aviation.
- As the economy has sustained a period of consistent growth, fears of an impending recession and its potential effect on GA persist across the country.

1.2. Airport System Planning Role

Airports are integral elements of intertwined aviation and transportation networks. For this reason, airport planning is not accomplished independently, but through coordinated planning efforts at the local, state, and national levels. The primary goal of airport system planning is to study the performance and interaction of an entire aviation system to understand the relationship of member airports, produce a cost-effective development plan, and establish a balanced and integrated system.[8] An effective airport system plan maximizes system efficiency and produces an optimal system of airports that is consistent with goals for funding, transportation, land use, economic growth, and the environment.

As Henderson Executive Airport exists within national, state, and local systems, the Airport's functional role is considered during the respective system planning processes. On the national level, the Airport is included in the FAA's National Plan of Integrated Airport Systems (NPIAS). On the state level, the Airport's role within the state system of airports is outlined in the Nevada Aviation System Plan. And on the local level, the Southern Nevada Regional Airport System Plan analyzed the Airport's role within the Clark County system of airports.

Levels of Airport System Planning



Source: Kimley-Horn, 2020.

1.2.1. Federal System Planning

The aviation system plays a vital role in the success and growth of the U.S. transportation network and economy. Due to the vast network of public-use airports in the U.S., the federal government is responsible for providing development and funding guidance for the country's airport system to meet the growing demand for civil aviation. Pursuant to Title 49 United States Code (U.S.C.), Section 47103, the FAA established the NPIAS to assist in programming federal funds that support aviation development.[9] Last updated in 2019 for the planning period of 2019 to 2023, the NPIAS identifies 3,328 public-use airports that are considered significant to national air transportation and are, therefore, eligible to receive grants under the FAA's Airport Improvement Program. The NPIAS categorizes the nation's airports based on types of service provided and

8 Federal Aviation Administration, Advisory Circular 150/5070-7, Change 1, The Airport System Planning Process, 2004.

9 Federal Aviation Administration, National Plan of Integrated Airport Systems (NPIAS) Report, 2019.

quantity of passengers enplaned, which influences the level of federal funding each type of airport is eligible for. The FAA defines airport categories as follows:

- Commercial Service: Publicly-owned airports that have at least 2,500 enplanements each calendar year and receive scheduled passenger service. Commercial service is further subdivided into:
  - Nonprimary: Commercial service airports with at least 2,500 and less than 10,000 enplanements each year.
  - Primary: Commercial service airports with at least 10,000 enplanements each year. Hub categories for primary airports (i.e., large, medium, small, or nonhub) are determined by the number of annual enplanements handled by each airport and are defined as a percentage of total annual enplanements within the U.S.
    - Large Hub – handles 1 percent or more of U.S. enplanements
    - Medium Hub – handles between 0.25 and 1 percent of U.S. enplanements
    - Small Hub – handles between 0.05 and 0.25 percent of U.S. enplanements
    - Nonhub – handles less than 0.05 percent of U.S. enplanements but more than 10,000 enplanements
- Cargo Service: Airports served by aircraft providing cargo-only air transportation with a total annual landed weight of more than 100 million pounds. "Landed weight" means the weight of aircraft transporting only cargo. An airport may be both a commercial service and a cargo service airport.
- Reliever: Designated by the FAA to relieve GA traffic congestion at nearby commercial service airports and to provide improved GA access to the overall community. These may be publicly or privately-owned airports.
- General Aviation: Public-use airports that do not have scheduled air carrier service or have less than 2,500 enplanements.

The number of airports within each classification as presented in the NPIAS 2019-2023 Report is displayed in **Table 1.2** along with an example of a Nevada airport in each class.

Table 1.2 – *National Plan of Integrated Airport Systems Airports*

Classification	Number of Airports		Nevada Example
	In the U.S.	In Nevada	
Primary Commercial Service			
Large Hub	30	1	McCarran International Airport
Medium Hub	31	0	N/A
Small Hub	72	1	Reno/Tahoe International Airport
Nonhub	247	3	Henderson Executive Airport
Non-Primary Commercial Service	126	0	N/A
Reliever	261	3	North Las Vegas Airport
General Aviation	2,554	22	Perkins Field
Total	**3,321**	**30**	

Source:
FAA 2019-2023 National Plan of Integrated Airport Systems (NPIAS) (accessed March 2020).

Note:
N/A = not applicable

As shown above in **Table 1.2**, the NPIAS 2019-2023 Report classifies Henderson Executive Airport as a nonhub primary commercial service airport. The FAA has classified 247 airports as nonhub primary, which account for 3 percent of all enplanements nationwide. Nonhub primary airports are eligible to receive Airport Improvement Program grants based on the number of enplaned passengers. The FAA reports that 63,445 revenue passengers boarded aircraft at Henderson Executive Airport in fiscal year 2018. It is estimated that airport improvement projects totaling $18,359,958 are eligible for Airport Improvement Program grants over the NPIAS 5-year planning horizon. As detailed in **Figure 1.4**, $8,843,038 in program grants have been distributed to Henderson Executive Airport since 2010.

1.2.2. State System Planning

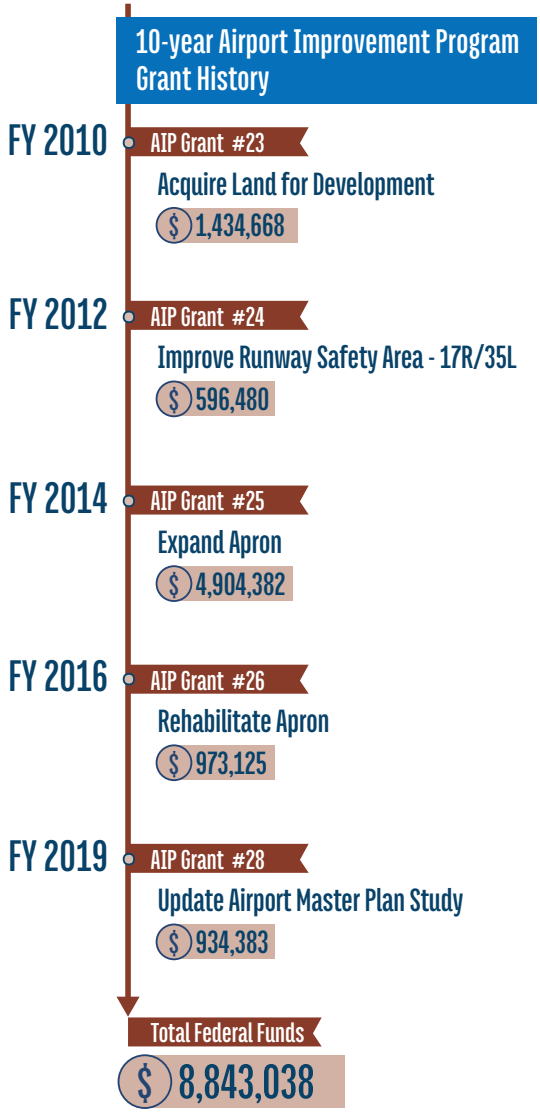
Established and incorporated within the Nevada Department of Transportation (NDOT) Planning Division, the Aviation Planning Section (NDOT Aviation) is responsible for aviation planning and works to improve the statewide airport system to meet Nevada's multimodal transportation needs. NDOT Aviation also prepares and administers the State Airport Systems Plan, known as the Nevada Aviation System Plan. Providing guidance for the future of aviation development in Nevada, the Nevada Aviation System Plan is critical to the State airport system's ability to accommodate current and forecasted demand.

In the most current version of the Nevada Aviation System Plan, published in September 2004, it is due for an update. Henderson Executive Airport is classified as a reliever airport for McCarran International Airport in the state system plan. However, as described in the section above, the NPIAS 2019-2023 Report reclassified Henderson Executive Airport as a nonhub primary commercial service airport. This classification can be accredited to an increase in annual passenger enplanements at the Airport, notably scheduled air tours from Maverick Aviation Group. Though officially classified as a nonhub primary commercial service airport, Henderson Executive Airport still acts in a reliever capacity to ease GA activity from McCarran International Airport.

The NPIAS 2019-2023 Report reclassified the Airport from a reliever airport to a nonhub primary commercial service airport. This classification can be accredited to an increase in annual passenger enplanements at the Airport, notably scheduled air tours from Maverick Aviation Group.

The NPIAS 2019-2023 Report classifies Henderson Executive Airport as a nonhub primary commercial service airport.

Figure 1.4 – *Henderson Executive Airport 10-year Airport Improvement Program Grant History*



Sources:
FAA Airport Improvement Program Grant History Look Up Tool (accessed March 2020).
Kimley-Horn, 2020.

1.2.3. Local System Planning

Local system planning at the Henderson Executive Airport was addressed in the Southern Nevada Regional Airport System Plan (2001), which concluded that the Airport is expected to accommodate a growing number of corporate and aviation activity in the region. As McCarran International Airport consistently ranks within the top 10 busiest airports in the U.S. based on annual enplanements, County officials are finding ways to alleviate congestion at the large hub. The facilities at Henderson Executive Airport are critical to this effort and the Southern Nevada economy since the County's airports operate as an integrated system. As one of five public-use airports in the Las Vegas metropolitan area, Henderson Executive Airport is an essential component of the transportation system for the rapidly growing Clark County and Southern Nevada region. Within the Las Vegas Valley, McCarran International and North Las Vegas Airports alone cannot accommodate the demand for GA and corporate jets, as an overabundance of traffic at these airports may contribute to increased delays and reduced efficiency. Henderson Executive Airport serves as a convenient base for local pilots, a popular departure point for tours of the Grand Canyon, and a gateway to the City of Henderson and the Las Vegas Valley. Additionally, new development in public and private land proximate to the Airport, including the Inspirada master-planned community and the Las Vegas Raiders training and headquarters facility, may increase demand on existing infrastructure. Overall, Henderson Executive Airport is well positioned to play a substantial role in the region's economic growth by supporting the efficient movement of people and goods.

1.3. Airspace Structure and Approach Capabilities



Source: Kimley-Horn, 2019.

he U.S. National Airspace System is an integrated collection of controls, procedures, and policies implemented and regulated by FAA. To ensure safe and efficient air operations, ATC directs pilots through the airspace and provides applicable advisories. At airports with an ATCT, or controlled airports, tower controllers also direct aircraft ground movements from the apron to the runway and vice versa. At uncontrolled airports, or those not served by an ATCT, specific patterns and procedures exist to prevent collisions in the air and on the ground. As a controlled airport, tower controllers at Henderson Executive Airport manage traffic flow in and out of the Airport's airspace and direct the ground movement of aircraft. Once aircraft depart the Airport, however, flight operations are dictated by FAA as the CCDOA does not have the authority to regulate or control airspace.

Once aircraft depart the Airport, its operation is dictated by FAA. The CCDOA does not have the authority to regulate or control airspace.

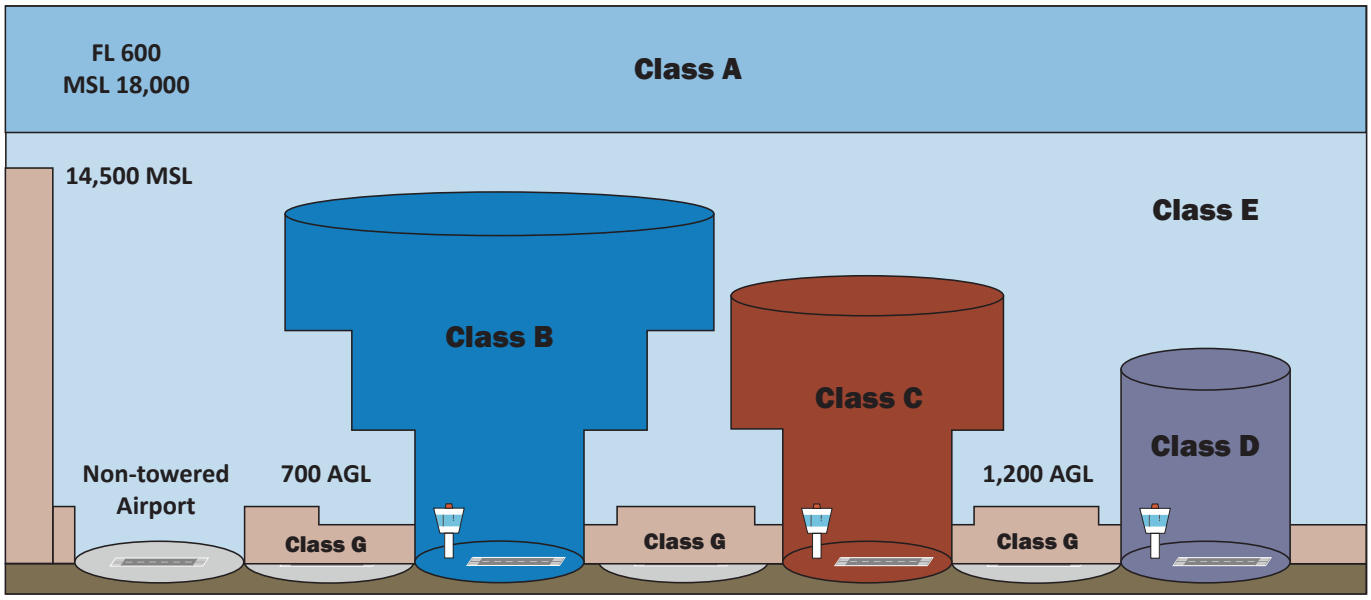
Replacing the original control tower built in the 1940s, Henderson Executive Airport's stand-alone tower was constructed in 2006 and has a cab floor height (distance from the ground to the cab floor) of 64.2 feet. The tower is operated 14 hours per day, between 6 a.m. and 8 p.m. local time, seven days a week. It operates under the FAA's Contract Tower Program, where ATCTs are staffed by employees of private companies rather than FAA. Under this program, Henderson Executive Airport's ATCT is operated by Serco, Inc.

The remainder of this section describes the airspace classifications, instrument approach capabilities, departure procedures, and noise abatement measures at Henderson Executive Airport.

1.3.1. Airspace

U.S. airspace is categorized as regulatory and nonregulatory. Within these two categories, there are four types: controlled and uncontrolled—which are depicted in **Figure 1.5**—special use, and other airspace. Controlled airspace is an overarching term that is used to describe the different classifications of airspace (i.e., Class A, Class B, Class C, Class D, and Class E) and the defined dimensions within which ATC service is provided relative to each airspace classification. Uncontrolled airspace, also known as Class G, is the airspace that has not been designated as Class A, B, C, D, or E, and within which ATC has neither the authority nor the responsibility to control air traffic. Special use airspace is airspace in which certain activities must be confined or where limitations may be imposed on aircraft operations that are not part of those activities. Other airspace is a generic term referring to the majority of remaining airspace, including, but limited to, national security areas, temporary flight restrictions, military training routes, etc.

Figure 1.5 – *Classes of Airspace*



Sources:
FAA, Aeronautical Information Manual (accessed December 2019).
Kimley-Horn, 2020.

Notes:
FL = flight level
MSL = mean sea level
AGL = above ground level

The airspace surrounding Henderson Executive Airport is complex. This is a result of the Airport's proximity to McCarran International Airport, North Las Vegas Airport, Boulder City Municipal Airport, and Nellis Air Force Base, along with heavy tour operator traffic and terrain constraints. The airspace in the immediate vicinity of the Airport is described below (note: there is no Class C airspace within 30 nautical miles of the Airport). The Visual Flight Rules (VFR) sectional chart displaying Henderson Executive Airport and surrounding airspace is presented in **Figure 1.6**.

- **Class A:** All airspace from 18,000 feet above MSL up to and including Flight Level 60 (Flight Level [FL] 60 = 60,000 feet MSL). Unless otherwise authorized, all operations within Class A airspace are conducted under Instrument Flight Rules (IFR). In the case of the Henderson Executive Airport, all Class A airspace above the Airport is controlled by the Los Angeles Air Route Traffic Control Center.
- **Class B:** The airspace surrounding major commercial airports, including McCarran International Airport. To enter this airspace, communication and/or clearances must be received from ATC. Henderson Executive Airport is located under the Class B airspace designated for McCarran International Airport. This airspace begins at 5,000 feet MSL above the Airport and extends to 10,000 feet MSL.
- **Class D:** The terminal area airspace surrounding towered and military airports. Class D airspace typically contains a horizontal radius of 5 nautical miles (nm) from an airport, extending from the surface up to a designated vertical limit above the airport. Within Class D airspace, aircraft are required to communicate with ATC. The airspace immediately surrounding Henderson Executive Airport is Class D and extends up to, but does not include, 4,000 feet MSL.
- **Class E:** General controlled airspace that includes most of the remaining airspace. This airspace typically begins at 1,200 feet above ground level (AGL) and extents up to, but does not include, 18,000 feet MSL. However, where specified, Class E airspace can begin at 700 feet AGL—this is the case of the airspace surrounding Henderson Executive Airport. Most flights to and from the surrounding airports, as well as local operations remaining within the Airport's traffic pattern, will enter the Class E airspace that surrounds the Las Vegas Valley. The Class E airspace directly above the Airport begins at 4,000 feet MSL where the Airport's Class D airspace ends. However, the airspace then becomes Class B at 5,000 feet MSL above the Airport.
- **Class G:** The remaining airspace is considered uncontrolled. Class G airspace lies between the surface and the overlaying Class E airspace (700 to 1,200 feet AGL). Aircraft in Class G airspace climb into or descend from overlying Class E and Class B controlled airspace.
- **Special Use Airspace:** Special use airspace includes designated Prohibited Areas, Restricted Areas, Warning Areas, Military Operation Areas (MOAs), and Alert Areas. MOAs in the vicinity of Henderson Executive Airport include the A□481 MOA and the Desert MOA, located approximately 16 and 28 nm north of the Airport, respectively. Additionally, the Shoshone and Silver North MOAs are located approximately 42 nm southwest of the Airport. Restricted areas near the Airport include R-4806W, a continuous restriction, and R-4806E, designated a restriction Monday-Saturday from 5:00 a.m. to 8:00 p.m. These restrictive areas are used by the military and, when active, are off□limits for public use unless granted permission from the controlling agency. In addition to the areas used for military operations, special use airspace exists near the Airport for the region's national park, recreation, and wilderness areas. When using this airspace, aircraft are requested to operate above 2,000 AGL.

Figure 1.6 – *VFR Sectional Chart*



LEGEND

- Class B Airspace
- Class D Airspace
- Class E Airspace
- Special Use Airspace

N

0 5.5 11 16.5 Miles

Sources: FAA National Aeronautical Charting Office (accessed April 2020). Kimley-Horn, 2020.

1.3.2. Procedures and Instrument Approaches

VFR and IFR are two sets of regulations established by the FAA under which pilots operate. VFR and IFR include unique sets of procedures, criteria, and guidelines, and the utilization of each is determined mainly by weather conditions such as cloud ceiling and visibility. VFR conditions, which require a ceiling of greater than 3,000 feet AGL and visibility of greater than 5 miles, permit pilots to navigate based on visual references and with limited instrumentation. IFR conditions, which must be used when the ceiling is less than 1,000 feet AGL and/or the visibility is less than 3 miles, requires pilots to use navigational systems that provide lateral and/or vertical path guidance.

Instrument flight procedures aid pilots flying under IFR in determining their position, navigating between points, and approaching and departing an airport. This section describes the current published instrument flight procedures at Henderson Executive Airport.

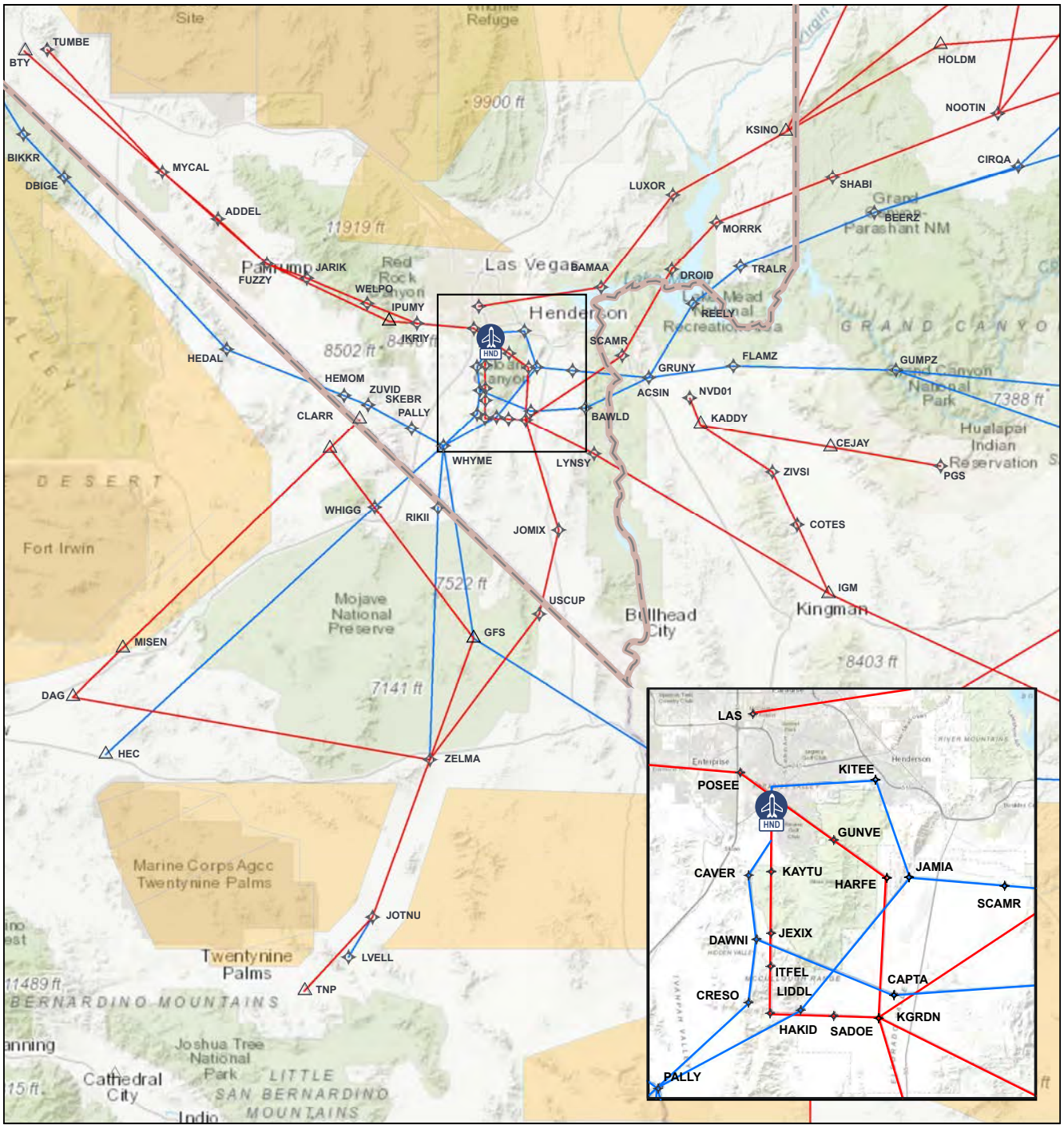
Procedures can greatly enhance aircraft safety and efficiency during approach and departure by providing a defined route along which pilots and controllers know aircraft will operate and by helping to reduce pilot-controller communications, aircraft fuel burn, and pollution in the airspace surrounding an airport.

STANDARD TERMINAL ARRIVAL PROCEDURES

The Airport is served by eight Standard Terminal Arrival Routes (STARs) (see **Figure 1.7**), which provide for transition from the en route environment to the beginning of the instrument approach procedures. For aircraft operating under IFR, these procedures provide for traffic separation from nearby airports while the aircraft is in communication with Las Vegas Approach Control. The eight STARs at Henderson Executive Airport are:

- CLARR THREE
- FUZZY EIGHT
- KADDY THREE
- LUXOR TWO AND LUXOR TWO, CONT.1
- ADDEL ONE (RNAV)
- JOMIX ONE (RNAV)
- KNGMN TWO (RNAV)
- NOOTN TWO (RNAV)

Figure 1.7 – *Standard Terminal Arrival Routes and Standard Instrument Departures*



LEGEND

- Fix
- Waypoint
- Standard Terminal Arrival Route
- Standard Instrument Departure
- Special Use Airspace
- Nevada State Line

N

0 25 50 75 Miles

Sources: Esri. HERE. Garmin. Intermap. Increment P Corp. GEBCO. USGS. FAO. NPS. NRCAN. GeoBase. IGN. Kadaster NL. Ordnance Survey. Esri Japan. METI. Esri China (Hong Kong). OpenStreetMap contributors. GIS User Community. Kimley-Horn, 2020.

INSTRUMENT APPROACH CAPABILITY

Henderson Executive Airport is served by two Standard Instrument Approach Procedures (SIAP). Both procedures are limited to circling lines of minima. Pilots prefer straight-in approaches, when possible, to prevent un-stabilized approaches. Having a stabilized, consistently repeatable, straight-in approach can lead to shallower descent angles. Additionally, not having to break off the approach path and perform a tight circle around the pattern is quicker and requires less low-level maneuvering, which, from a pilot's perspective, could lead to a better passenger experience.

The first SIAP is an Area Navigation (RNAV) Global Positioning System (GPS)-B, which is aligned with Runway 35L. It has a steep vertical descent path of 6.44 degrees due to high terrain south of the Airport whereas standard descent paths of instrument approaches are 3 degrees. The procedure supports only aircraft categories A-C and has minimums that are more than standard VFR minimums (1,500 height above threshold; 3 statute miles).

The second SIAP is a Very-High Frequency Omni-directional Range (VOR)-C, which utilizes conventional ground-based navigation equipment. The final approach course is not aligned with a runway and requires visual circling to the runway end that is currently in use. As a result, this procedure contains night limitations for Runway 35L. The ceiling minimums range from 1,200-2,400 height above threshold and 1.25-3 statute miles visibility depending on aircraft category. Similar to the RNAV procedure, the VOR-C procedure does not provide support for Category D aircraft.

DEPARTURE PROCEDURES

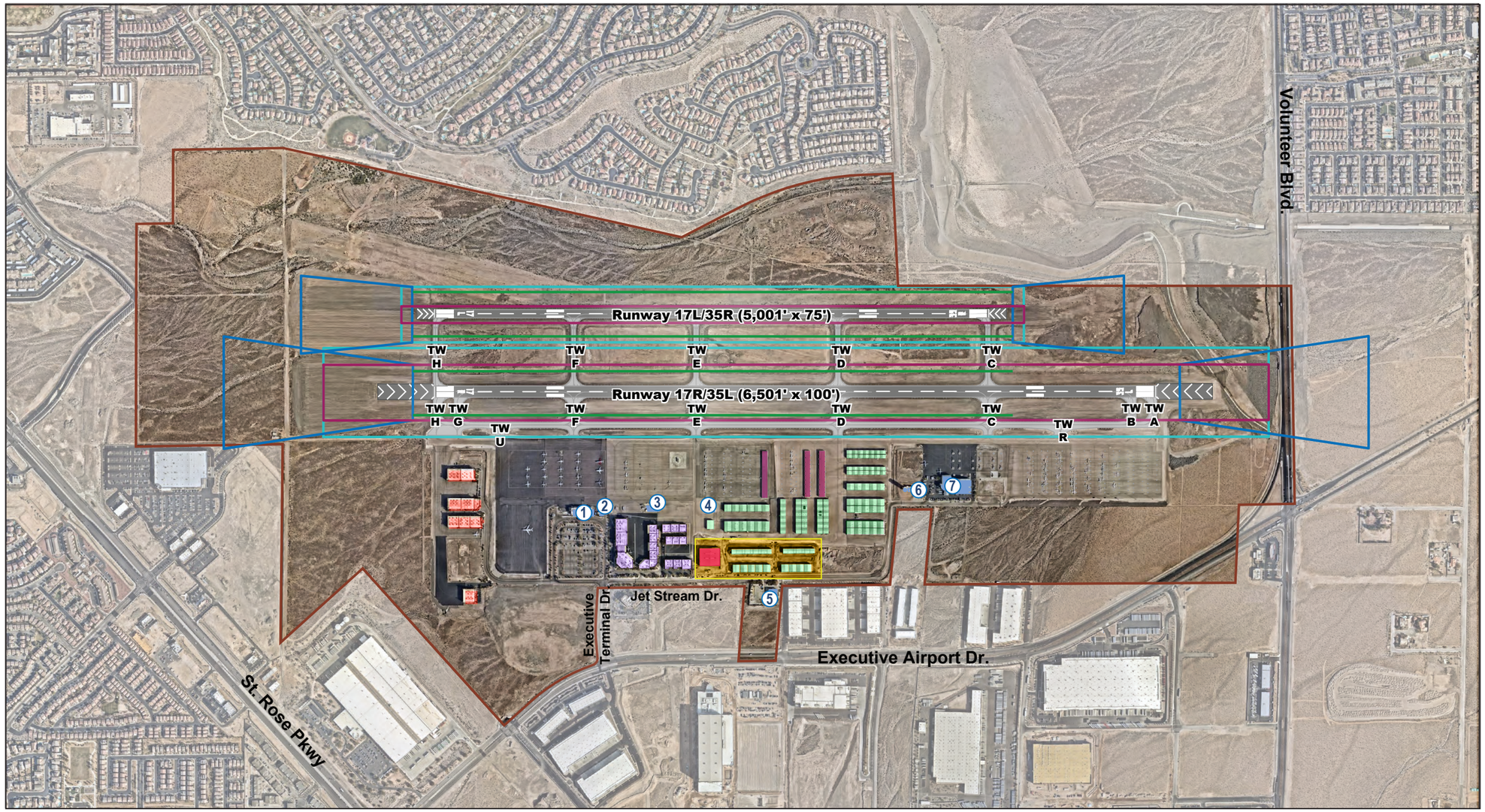
Henderson Executive Airport is served by three Standard Instrument Departures: ASCIN SIX (RNAV); FLAMZ SIX (RNAV); and PALLY SIX (RNAV). These procedures are depicted above in **Figure 1.7**.

1.4. Airside Facilities

Airside facilities accommodate the takeoff and landing of aircraft and the movement of those aircraft about the Airport. The following describes the primary airside infrastructure systems at Henderson Executive Airport, including runways, taxiways, navigational aids (NAVAID), and lighting as of December 2019. These facilities also are depicted in **Figure 1.8**.



Figure 1.8 – *Existing Airport Facilities (2019)*



LEGEND

- Airport Boundary
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)
- Area Under Construction
- Quail Air Center
- Quail Commercial Air Center
- Shade Hangars
- Box Hangars
- Conventional Hangar (Maintenance Hangar)

1. Main Terminal
2. Bulk Fuel Storage
3. Fuel Island
4. Wash Rack
5. Maintenance Facility
6. Airport Traffic Control Tower
7. Maverick Helicopters

0 400 800 1600 Feet

Sources: Henderson Executive Airport Layout & Property Map Set, 2018. Kimley-Horn, 2020. AGIS survey data. Nearmap (accessed March 2020).

1.4.1. Airport Design Standards

Airport design standards are contained within FAA Advisory Circular (AC) 150/5300-13A, Change 1, Airport Design. The standards relate to various airport infrastructure and their functions and cover a wide range of size and performance characteristics of aircraft that are anticipated to use an airport.

One of the most important aspects of AC 150/5300-13A, Change 1, is the consideration of an airport's critical design aircraft and Airport Reference Code (ARC). As defined by FAA, the critical design aircraft is the most demanding aircraft that conducts at least 500 operations per year at the airport. This may be one aircraft, or a combination of multiple aircraft, which present the most demand on the airport in terms of operational and physical characteristics.

The ARC is used to relate airport design criteria to the operational and physical characteristics of the aircraft types that will operate at the airport. The ARC is comprised of two components: 1) the aircraft approach category (AAC), which is designated with a capital letter (A through E) and is based on operational characteristics; and 2) the airplane design group (ADG), which is designated by a Roman numeral (I through VI) and is based on an aircraft's wingspan and tail height (physical characteristics).

AAC and ADG are detailed below in **Tables 1.3** and **1.4**, respectively.

Table 1.3 – *Aircraft Approach Categories*

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

Source:
FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.

Table 1.4 – *Airplane Design Groups*

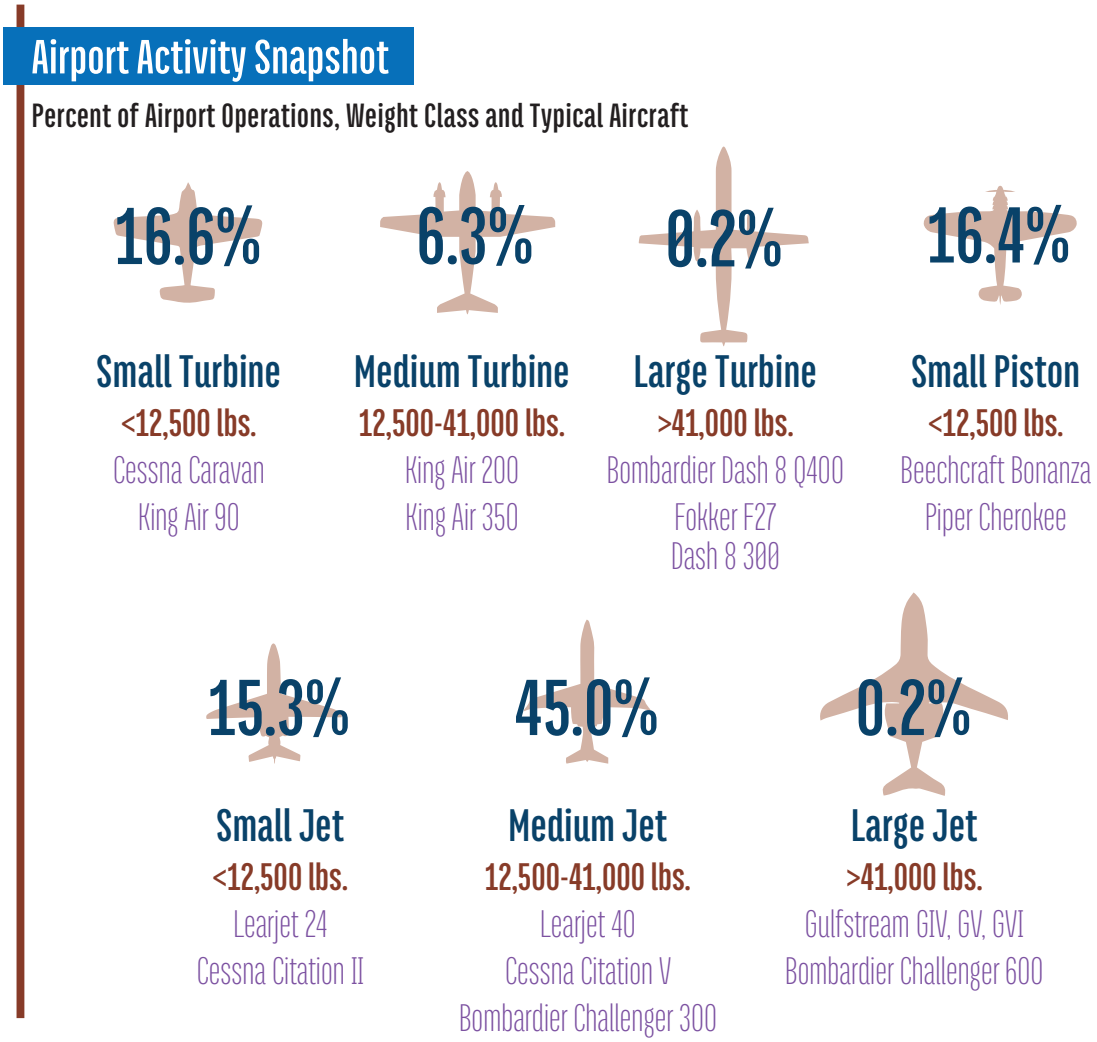
Airplane Design Group	Tail Height (feet)	Wingspan (feet)
I	< 20'	< 49'
II	20'- < 30'	49' - < 79'
III	30'- < 45'	79' - < 118'
IV	45' - < 60'	118' - < 171'
V	60' - < 66'	171' - < 214'
VI	66' - < 80'	214' - < 262'

Source:
FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.

The 2018 Airport Layout and Property Map Set for Henderson Executive Airport, or Airport Layout Plan, assigned an ARC of B-III to the Airport, with the Fokker F27 as the critical design aircraft for Runway 17R/35L and the Beechcraft Super King Air 200 as the critical design aircraft for Runway 17L/35R. The ARC and critical design aircrafts were reevaluated as part of the aviation forecast in this Airport Master Plan Update. Based on operational data obtained by the FAA's Traffic Flow Management System Count (TFMSC) database, the existing ARC was identified as C-II with a critical design aircraft of a Bombardier Challenger 300. Also using TFMSC data, operations at Henderson Executive Airport from January 2018 to September 2019 are summarized in **Figure 1.9**.

Based on operational data obtained by the FAA's Traffic Flow Management System Count database, the existing ARC was identified as C-II with a critical design aircraft of a Bombardier Challenger 300.

Figure 1.9 – *Airport Activity Snapshot*



Sources:
FAA Traffic Flow Management System Counts (accessed December 2019).
Kimley-Horn, 2020.

Note:
Data for January 2018 to September 2019

1.4.2. Runways

There are two parallel runways at Henderson Executive Airport with a centerline separation distance of 700 feet. According to FAA AC 150/5300-13A, Change 1, simultaneous operations using VFR may occur on parallel runways with a minimum centerline separation of 700 feet. Therefore, the runways at the Airport can accommodate simultaneous landings and takeoffs for VFR flights. The runways are oriented in a north-south alignment resulting in designations of Runway 17R/35L (to the west) and Runway 17L/35R (to the east). This section provides an overview of each runway.

RUNWAY 17R/35L

Originally constructed in 2003, Runway 17R/35L measures 6,501 feet long by 100 feet wide and serves as the primary runway at Henderson Executive Airport. The runway is constructed of asphalt and has 10-foot-wide paved shoulders along its length. Runways 17R and 35L both have marked blast pads—paved surfaces adjacent to the ends of runways that reduce the erosive effect of jet blast and propeller wash—each measuring 500 feet long and 140 feet wide. While runway shoulders and blast pads must be capable of supporting "occasional" passage of aircraft as well as emergency and maintenance vehicles, they are not comprised of full-strength pavement and, thus, are not available for regular aircraft use[10].

Runway 17R/35L is equipped with nonprecision pavement markings, medium intensity runway lights (MIRL), and precision approach path indicators (PAPIs) for both runway ends. A PAPI is a vertical glide slope indicator consisting of an array of light units (four in the case of Henderson Executive Airport) positioned beside the runway, that present a color-coded visual indication to the pilot of an aircraft's position relative to the glide path to the runway. Runways 17R and 35L also are equipped with runway end identifier lights (REILs) that consist of two synchronized flashing lights, one on each side of the runway centerline, aimed towards the approach area. The function of the REILs is to provide rapid and positive identification of the end of the landing threshold.

RUNWAY 17L/35R

Runway 17L/35R was constructed in 2004, one year after the construction of the parallel runway, and is 5,001 feet long by 75 feet wide. The asphalt runway has 10-foot-wide shoulders along the entire length and is marked with blast pads at both ends, each measuring 150 feet long by 95 feet wide. Like Runway 17R/35L, this runway is equipped with nonprecision pavement markings, MIRLs, PAPIs, and REILs for both runway ends.

DIMENSIONAL CRITERIA

The following dimensional criteria are established in FAA AC 150/5300-13A, Change 1. The required dimensions for Henderson Executive Airport are provided in **Table 1.5**.

- **Runway Safety Area (RSA):** The RSA is a surface surrounding a runway identified to reduce the risk of damage to an aircraft in the event of an undershot, overshot, or excursion from the runway. The RSA must be cleared and graded and have no hazardous surface variations and free of objects, except for objects needed for air navigation or aircraft ground maneuvering. The FAA does not permit modifications to the standards of an RSA.
- **Runway Object Free Area (ROFA):** The ROFA is an area centered and surrounding the runway that precludes parked airplanes and objects, except those needed for air navigation. The ROFA clearing standard requires clearance of above ground objects protruding above the nearest point of the RSA. It is acceptable for objects that need to be located in the ROFA for air navigation or aircraft ground maneuvering purposes to protrude above the nearest point of the RSA, and to taxi and hold aircraft in the ROFA. Objects nonessential for air navigation or aircraft ground maneuvering purposes must not be placed in the ROFA.

10 Federal Aviation Administration, Advisory Circular 150/5320-6E, Airport Pavement Design and Evaluation, 2009.

- **Obstacle Free Zone (OFZ):** An OFZ is a three-dimensional volume of airspace along the runway and extended runway centerline that provides clearance protection for arriving and departing aircraft. The OFZ is required to be free of all penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function. An additional OFZ component is its height, which is the airspace above the surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline.
- **Runway Protection Zone (RPZ):** The RPZs function is to enhance the protection of people and property on the ground. The RPZ is trapezoidal in shape and centered on the extended runway centerline. There are both approach and departure RPZs applicable to each runway end and their location is dependent upon landing and takeoff distances. In the case of Henderson Executive Airport, both the approach and departure RPZs are located with respect to the physical runway ends. The approach RPZ dimension for a particular runway end is a function of the type of aircraft and approach visibility minimums associated with that runway end.

The existing ROFA and RPZ for Runway 35R extend beyond the Airport's eastern boundary as well as the southern portion of the Runway 35L RPZ; therefore, portions of the ROFA and RPZ are not under the control of CCDOA. The parcel into which the Runway 35R ROFA and RPZ extend is owned by the U.S. government and is used as a detention basin by the Clark County Regional Flood Control District (RFCD). The Runway 35R RPZ extends across Volunteer Boulevard into land that is currently vacant. Refer back to **Figure 1.8** for an illustration of these surfaces. A full analysis of required dimensional standards associated with the existing and future ARC will be performed as part of the Facility Requirements of this Airport Master Plan Update.



Table 1.5 – *Existing Runway Characteristics (2019)*

Runway Component	Runway 17L/35R (feet)		Runway 17R/35L (feet)	
	17L End	35R End	17R End	35L End
Runway Length	5,001'		6,501'	
Runway Width	75'		100'	
Aircraft Approach Category (AAC)	B		D	
Airplane Design Group (ADG)	II		II	
Runway Visual Range (RVR)	5,000'		5,000'	
Runway Design Code (RDC)	B-II-5000		D-II-5000	
Critical Design Aircraft	Beechcraft Super King Air 200		Gulfstream G-IV	
Pavement Type	Asphalt		Asphalt	
Pavement Markings	Nonprecision		Nonprecision	
Edge Lights	MIRL		MIRL	
Declared Distances	N/A		N/A	
Displaced Threshold	None	None	None	None
Runway End Elevation (MSL)	2,402.00'	2,402.00'	2,402.00'	2,491.50'
Approach Lighting	None	None	None	None
Runway End Identifier Lights (REILs)	Yes	Yes	Yes	Yes
Runway Visual Range (RVR) Equipment	None	None	None	None
Visual Approach Aids	PAPI 4L	PAPI 4L	PAPI 4L	PAPI 4L
Runway Shoulder Width	10'		10'	
Runway Blast Pad Width	140'	140'	95'	95'
Runway Blast Pad Length	500'	500'	150'	150'
Runway Centerline to Holding Position Distance	120'		200'	
RSA Width	150'		500'	
RSA Length Beyond Runway End	300'		1,000'	
ROFA Area Width	500'		800'	
ROFA Length Beyond Runway End	300'		1000'	
OFZ Width	400'		400'	
OFZ Length Beyond Runway End	200'		200'	
RPZ Length	1,700'	1,700'	1,700'	1,700'
RPZ Inner Width	500'	500'	500'	500'
RPZ Outer Width	1,010'	1,010'	1,010'	1,010'

Sources:
FAA 5010 Airport Master Record (2019).
Henderson Executive Airport Layout and Property Map Set (2018).
Google Earth.

Notes:
AAC = aircraft approach category
ADG = airplane design group
RVR = runway visual range
RDC = runway design code
MSL = mean sea level
REILs = runway end identifier lights
RSA = runway safety area
ROFA = runway object free area
OFZ = obstacle free zone
RPZ = runway protection zone
MIRL = medium intensity runway lights
PAPI 4L = precision approach path indicator – four lights
N/A = not applicable

1.4.3. Taxiways

Taxiways provide for the movement of aircraft between runways, terminals, cargo facilities, aprons, and other airport elements. As depicted in **Figure 1.8** previously and summarized in **Table 1.6**, the taxiway system at Henderson Executive Airport consists of one full parallel taxiway along Runway 35L/17R (Taxiway A), four runway entrance/exit taxiways (Taxiways A, B, C, G, and H), four crossing taxiways that also serve as ramp connectors (Taxiways C, D, E, and F), and two taxiways that serve solely as ramp connectors (Taxiways R and U). The Airport's taxiways are equipped with edge lighting.

Table 1.6 – *Existing Airport Taxiways*

Taxiway	Type	Taxiway Width (feet)	Shoulder Width (feet)
Segments Between Parallel Runways			
C	Runway Entrance/Exit	35'	10'
D	Crossing Taxiway	35'	10'
E	Crossing Taxiway	35'	10'
F	Crossing Taxiway	35'	10'
H	Runway Entrance/Exit	35'	10'
Segments West of Runway 17R/35L			
A	Full Parallel Taxiway	50'	20'
A	Runway Entrance/Exit	62.5'	20'
B	Runway Entrance/Exit	62.5'	20'
C	Crossing Taxiway/Ramp Connector	75'	25'
D	Crossing Taxiway/Ramp Connector	75'	25'
E	Crossing Taxiway/Ramp Connector	75'	25'
F	Crossing Taxiway/Ramp Connector	75'	25'
G	Runway Entrance/Exit	62.5'	20'
H	Runway Entrance/Exit	62.5'	20'
R*	Ramp Connector	109'	15'
U*	Ramp Connector	75'	*25'*

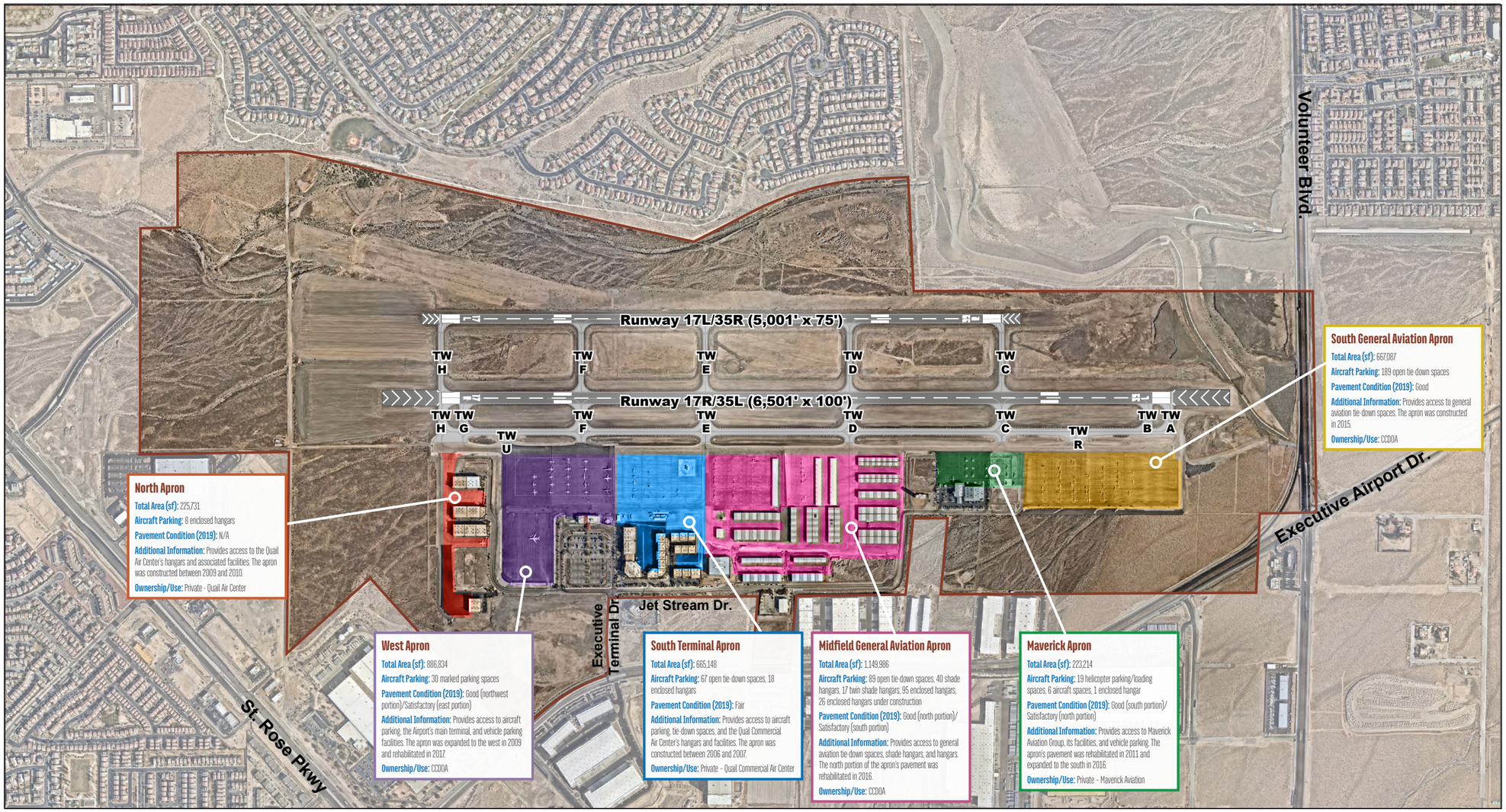
Sources:
Henderson Executive Airport Layout and Property Map Set (2018).
Kimley-Horn, 2020.
Google Earth.

Notes:
** = Taxiway information not included in Airport Layout Plan.*
Measurements based on Airport's GIS data collected for this Airport Master Plan Update.

1.4.4. Apron Areas

Aprons are located in the nonmovement area of an airport, typically adjacent to terminal or hangar areas, and are utilized for accommodating aircraft during the loading and unloading of passengers or cargo, fueling, maintenance, and for short- or long-term parking. The apron areas at Henderson Executive Airport are depicted in **Figure 1.10**. The designations of apron areas referenced in this document are for the purposes of this Airport Master Plan Update and may not be the official names of apron areas.

Figure 1.10 – *Airport Aprons*



Sources: Henderson Executive Airport Layout & Property Map Set, 2018. Airport Pavement Management Program Services - 2019 Pavement Condition Index Report for Henderson Executive Airport. Kimley-Horn, 2020. AGIS survey data. Nearmap (accessed March 2020).

Notes: N/A = not applicable. CCDOA = Clark County Department of Aviation. The North Apron's pavement condition was not evaluated as part of the Airport Pavement Management Program Services report. Ownership/use information procured from 2018 Airport Layout Plan.

1.4.5. Meteorological Conditions

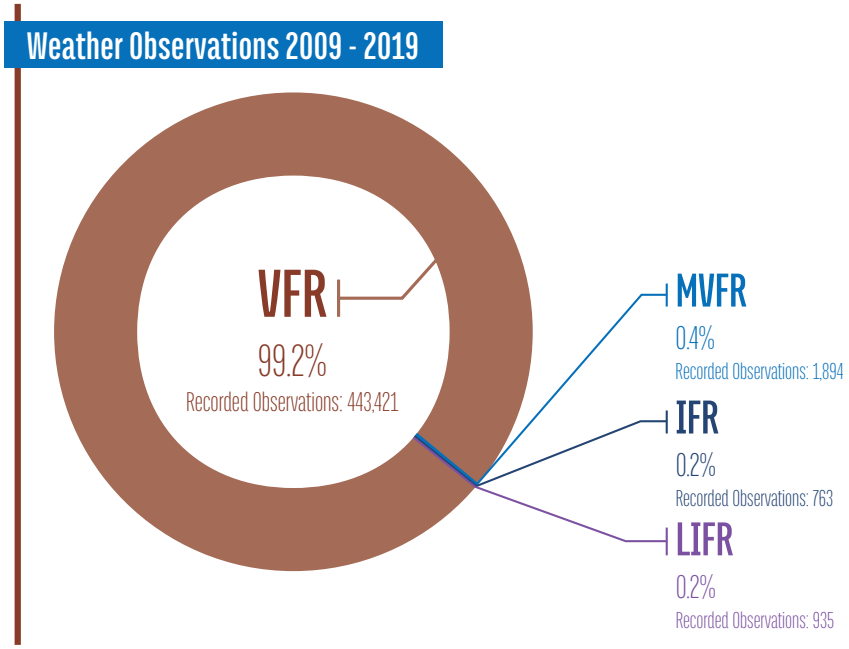
Meteorological conditions can have significant impacts on airport operations, planning, and design. Wind direction and velocity are used to determine runway orientation and usage, temperatures affect runway length requirements, and visibility and cloud coverage influence the use of NAVAID, lighting, and aircraft flight procedures. The following is an analysis of weather trends and wind characteristics at the Airport.

Henderson Executive Airport is equipped with an Automated Weather Observing System (AWOS) that provides continuous, real-time weather reports for Airport users. The AWOS data also is shared with the National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS) for their use in analyzing and forecasting weather trends. These sections employ data obtained from the AWOS, NOAA, and NWS.

WEATHER CONDITIONS

FAA AC 00-45G, Change 2, Aviation Weather Service, specifies weather flying categories and criteria that are to be followed for flight operation planning. Additionally, the FAA Safety Team, in conjunction with the FAA General Aviation Joint Steering Committee, published the Personal Minimums Safety Briefing in February 2015 that provides procedures, rules, criteria, and guidelines for pilots to determine the conditions under which to operate in the National Airspace System. Flight condition categories as defined by FAA include:

Figure 1.11 – *Weather Observations (2009-2019)*



Sources:
Iowa State University Iowa Environment Mesonet.
Henderson Executive Airport AWOS Observations.
FAA Advisory Circular 00-45G Change 2, Aviation Weather Service.
FAA Personal Minimums Safety Briefing.
Kimley-Horn, 2020.

Notes:
VFR = Visual Flight Rules
MVFR = Marginal Visual Flight Rules
IFR = Instrument Flight Rules
LIFR = Low Instrument Flight Rules
Data range is January 1, 2009 to November 1, 2019. Analysis includes complete weather readings only. Analysis includes a 0.05% margin of error.

- **VFR conditions:** VFR is the set of regulations, procedures, and conditions that permit a pilot to operate and navigate an aircraft based on visual reference to the surrounding environment with limited instrumentation. This requires favorable weather conditions with a cloud ceiling of greater than 3,000 feet AGL and visibility of greater than 5 statute miles.
- **Marginal Visual Flight Rule (MVFR) conditions:** MVFR is a subcategory of VFR and represents a cloud ceiling of 1,000 to 3,000 feet AGL and/or visibility of 3 to 5 statute miles. When MVFR conditions are forecasted, pilots may face ceiling, cloud, or visibility conditions less than that specified for VFR.

- **IFR conditions:** Properly trained and equipped pilots operate aircraft using navigational systems that provide lateral and/or vertical path guidance based on specific meteorological conditions. Specific IFR procedures must be used when the cloud ceiling is less than 1,000 feet AGL and/or the visibility is less than 3 statute miles.
- **Low Instrument Flight Rule (LIFR) conditions:** LIFR is a subcategory of IFR defined by a cloud ceiling of less than 500 feet AGL and visibility of less than 1 statute mile. LIFR conditions are just above the standard minimums for instrument landing system approaches.

As depicted in **Figure 1.11**, wind and weather data from the Henderson Executive Airport AWOS indicate that VFR conditions occur approximately 99.2 percent of the time, MVFR conditions occur approximately 0.4 percent of the time, IFR conditions occur approximately 0.2 percent of the time, and LIFR conditions occur approximately 0.2 percent of the time.

TRAFFIC FLOW

Aircraft primarily takeoff and land into the wind. Depending on wind direction, aircraft at Henderson Executive Airport takeoff and land to the north or south. According to ATCT personnel, the majority of winds during the summer months come from the south, initiating a south-flow configuration with aircraft using Runways 17L and 17R. In the spring and fall, the winds change multiple times per day, causing the Airport's flow configuration to switch throughout the day. During these months, ATCT personnel have indicated that the Airport typically operates in a south flow in early morning, switches to a north flow for the majority of the day, then ends the day in a south flow. Winds from the north prevail in the winter, therefore, requiring aircraft to operate from Runways 35L and 35R in the north-flow configuration. During discussions with the local ATC staff, they noted that north-flow operations are preferred.

CROSSWIND COVERAGE

Prevailing winds are winds that blow predominately in a given direction. At an airport, the direction of prevailing winds determines the desired alignment, configuration, and usage of a runway. Aircraft can only tolerate limited crosswind, a component of wind that blows perpendicular to the runway centerline. Ideally, runways are configured to allow aircraft to takeoff and land into the wind 100 percent of the time. Since winds change direction, FAA planning standards indicate that an airport's primary runway should be capable of operating under allowable wind conditions at least 95 percent of the time. The 95 percent wind coverage is based on a crosswind not exceeding the wind speed listed in **Table 1.7**.[11] If a runway does not meet this 95 percent coverage, then FAA funding assistance for the development of a crosswind runway may be advisable. Also listed in **Table 1.7** are the ARCs acceptable for each crosswind component. For more information on ARC and ADG, see **Section 1.5.1 - Design Standards**.

If a runway does not meet 95 percent wind coverage, then FAA funding assistance for the development of a crosswind runway may be advisable.

Table 1.7 – *Crosswind Components*

Allowable Crosswind	Airport Reference Code	Aircraft Characteristics
10.5 knots (12 mph)	A-I and B-I	Small single-engine and light-twin aircraft
13 knots (15 mph)	A-II and B-II	Larger and heavier turboprop and medium jet-type aircraft
16 knots (18.4 mph)	A-III, B-III and C-I through D-III	Larger corporate/military jet and narrow-body commercial type aircraft
20 knots (23 mph)	A-IV through D-VI and E-I through E-VI	Larger narrow-body and wide-body commercial-type aircraft

Source:
FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.

Note:
mph = miles per hour

11 Federal Aviation Administration, Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.

Table 1.8 presents the calculated coverage of Runway 17/35 for each of the four crosswind components (10.5, 13, 16, and 20 knots). It should be noted that, per FAA guidelines, this analysis uses the Airport's true runway headings of 180 and 0 degrees. While runway designations represent the magnetic heading when they are created (Runway 17/35 represents the magnetic headings of 170 degrees and 350 degrees), the Earth's magnetic lines slowly drift over time causing the true runway headings to shift.

As shown above in in **Table 1.7**, with an ARC of D-II the Airport's runway configuration should provide availability of at least 95 percent on the basis of the crosswind component not exceeding 16 knots. Overall, the existing runway heading exceeds the FAA's 95 percent recommendation under VFR, IFR, and all-weather conditions for the D-II aircraft category. Although the IFR wind coverage for the crosswind component of 13 knots falls below the FAA's recommendation at 93.12 percent, IFR conditions only occur approximately 0.2 percent of the time at the Airport (as previously identified in **Figure 1.11**) and this factor is not expected to have a significant impact on operations. However, smaller aircraft at Henderson Executive Airport, which are typically used by small flight schools and generally operate only in VFR conditions, are unable to use the Airport approximately seven percent of the time due to a lack of crosswind coverage.

Table 1.8 – *Crosswind Coverage for Runway 17/35*

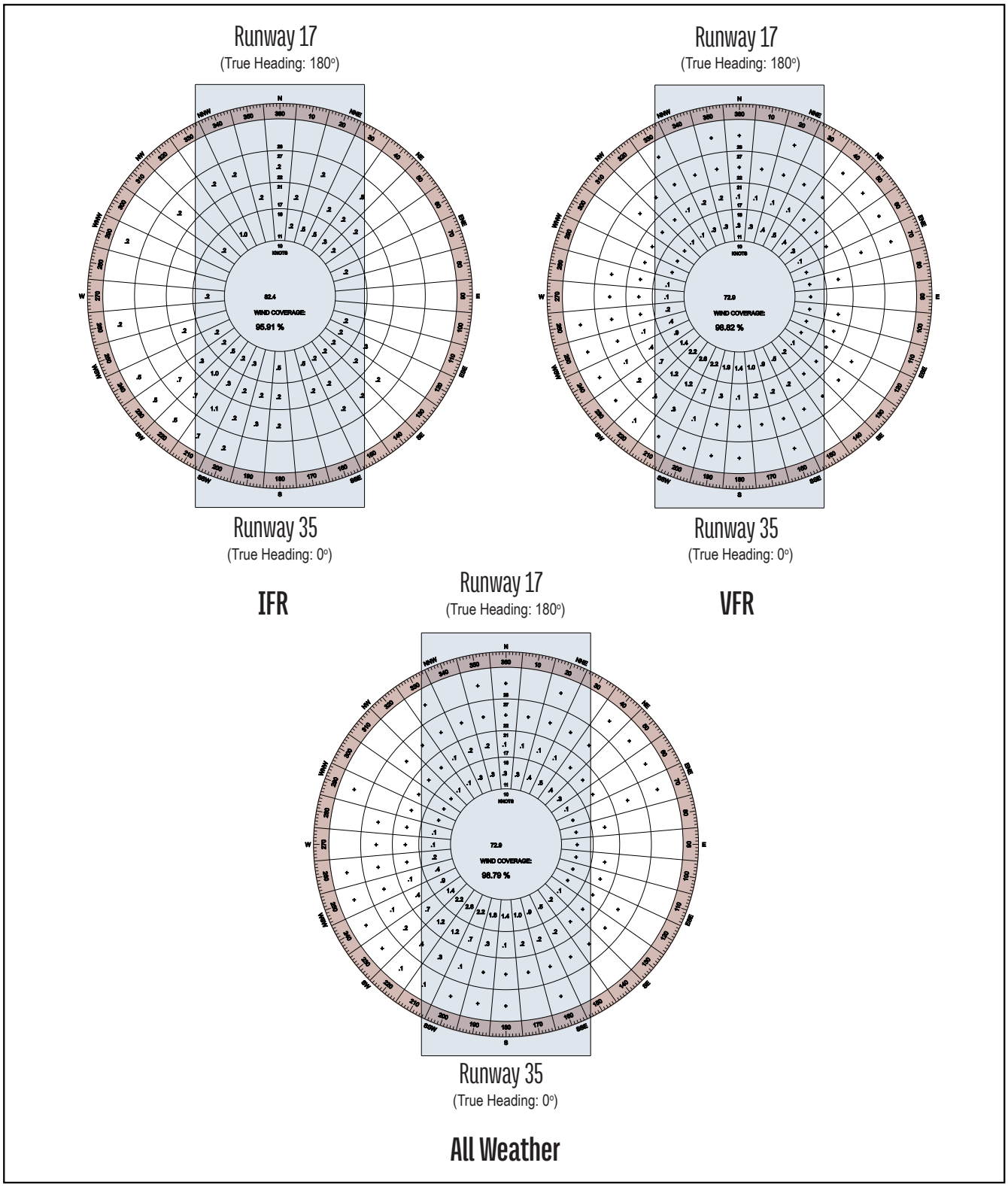
Crosswind	VFR Wind Coverage	IFR Wind Coverage	All Weather Coverage
10.5 knots	93.15%	90.38%	93.14%
13 knots	96.63%	93.12%	96.61%
16 knots	98.82%	95.91%	98.79%
20 knots	99.73%	98.21%	99.72%

Sources:
FAA Wind Rose Generator 2019 (true runway headings of 180o, 0o).
NOAA National Climate Data Center Henderson Executive Airport (2010-2019) (total 83,576 observations).
Kimley-Horn, 2020.

Notes:
VFR = Visual Flight Rules
IFR = Instrument Flight Rules

Historical wind data was used to create VFR, IFR, and all-weather wind roses for 16 knots, presented in **Figure 1.12**. The wind roses for 16 knots are displayed here to correspond with the Airport's ARC of D-II.

Figure 1.12 – *Wind Roses (16-knot crosswind coverage), Runway 17/35*



Source: FAA AGIS Wind Analysis Tool.

Notes:
IFR = Instrument Flight Rules
VFR = Visual Flight Rules
Wind data period is 2009-2019. Not to scale.

1.4.6. Airfield Lighting

Henderson Executive Airport uses various runway and taxiway lighting to aid pilots to, from, and around the airfield. The Airport's two runways are lighted to identify the edge of usable pavement and to assist pilots in takeoff and landing procedures. Both runways are equipped with MIRL as well as REILs, which consist of synchronized flashing lights on either side of the runway landing threshold. Additionally, PAPI lighting is present on both runways at each runway end, a system that aids pilots in the proper glide path to the runway. **Table 1.9** summarizes the runway lighting and marking systems.

Table 1.9 – *Airfield Lighting*

Item	Runway 17L/35R	Runway 17R/35L
Runway Lighting	MIRL	MIRL
Runway Markings	Nonprecision	Nonprecision
Visual Approach Aids	PAPI 4L	PAPI 4L
Runway End Lighting	REILs	REILs

Source:
Henderson Executive Airport Layout and Property Map Set (2018).

Notes:
MIRL = medium intensity runway lights
PAPI 4L = precision approach path indicator-four lights
REILs = runway end identifier lights

1.4.7. Navigational Aids

In addition to the lighting system and markings previously discussed, the Airport is equipped with other NAVAIDS to assist pilots in takeoff and landing procedures. NAVAIDs are any ground-based visual or electronic devices used to provide course guidance, altitude information, or weather conditions to pilots. Both visual and electronic NAVAIDs can be found at Henderson Executive Airport and are listed below and depicted in **Figure 1.13**.

- **Rotating beacon:** The rotating beacon indicates the Airport location at night or in adverse weather conditions. The Airport's beacon is located on top of the ATCT, and is a rotating light projecting an alternating green and white beam of light, 180 degrees apart. The beacon operates from sunset to sunrise.
- **PAPI:** PAPIs provide guide slope guidance to pilots during final approach to a runway. PAPIs allow pilots to determine if their approach is too high, too low, or on-slope through a combination of lights. Both runways are equipped with PAPIs for each runway end, each consisting of a grouping of four lights.
- **Segmented circle with wind indicator:** A segmented circle is a visual aid that provides airport traffic pattern information to pilots. Wind indicators, also known as "windsocks" or "wind cones," are used to indicate the direction and approximate speed of the wind at the surface as compared to the wind at altitude. The segmented circle and wind indicator at the Airport are located at midfield, east of Runway 17R/35L and south of Taxiway E.

» **AWOS:** The AWOS provides continuous, real-time weather reports for Airport users. Henderson Executive Airport's AWOS is an AWOS-3 P/T and provides pilots and Airport personnel with critical weather information, including current altimeter setting, density altitude, temperature, dew point, wind speed and direction with gust indication, visibility, cloud height and sky conditions, precipitation identification and intensity, and thunderstorm reporting with local area lightning tracking.[12] The Airport's AWOS is located east of Runway 17R/35L and south of Taxiway C.

» **Very-High Frequency Omnidirectional Range Tactical Air Navigation (VORTAC):** The VORTAC facility that is utilized for the Airport's air navigation guidance is located in Boulder City, Nevada, approximately 14 miles from the Airport. The VOR is a ground-based system that transmits very high frequency navigation signals to help pilots identify their location relative to the Airport. The VOR provides support for approach capabilities and also is used for terminal and en route navigation purposes.



12 Federal Aviation Administration, Surface Weather Observation Stations, 2020.

Figure 1.13 – *Visual and Electronic NAVAIDs*



LEGEND

Airport Boundary ● NAVAID

0 400 800 1600 Feet

N

Sources: Henderson Executive Airport Layout & Property Map Set, 2018. Kimley-Horn, 2020. AGIS survey data. Nearmap (accessed March 2020).

Notes:
ATCT = airport traffic control tower
AWOS = Automated Weather Observing System
REILs = runway end identifier lights
PAPI 4L = precision approach path indicator – four lights

1.4.8. Airfield Pavement

Airfield pavement—runways, taxiways, and aprons—encompasses a large capital investment and directly impacts the operational capacity and safety of an airport. The CCDOA maintains a pavement management program for Henderson Executive Airport to maximize the value and life of the pavement by monitoring the condition, developing project programming, and proactively addressing wear and tear. As pavement deteriorates over time, continuous assessments and routine maintenance will extend the life of the pavement at lower costs than deferring maintenance until substantial pavement rehabilitation may be needed.

To prevent damage and ensure the life span of the pavement, the Aircraft Classification Number of aircraft using the pavement should not typically exceed the Pavement Classification Number of the pavement.

RUNWAY PAVEMENT STRENGTH

The FAA employs the standardized International Civil Aviation Organization (ICAO) method to report runway pavement strength known as the Aircraft Classification Number – Pavement Classification Number (ACN-PCN) method.[13] PCN expresses the relative load carrying capacity of a pavement section in terms of a standard single-wheel load. Similarly, ACN are determined for specific aircraft models and express the relative effect of the aircraft on the pavement. To prevent damage and ensure the life span of the pavement, the ACN of aircraft using the pavement should not typically exceed the PCN of the pavement.

As presented in **Table 1.10**, the PCN for both runways at Henderson Executive Airport were calculated in the 2019 Airfield Pavement Condition Index Report (Kimley-Horn, 2019) based on the pavement system and aircraft usage characteristics.

Table 1.10 – *Runway Pavement Classification Number and Gross Weight*

	Runway 17L/35R	Runway 17R/35L
Pavement Classification Number (PCN)	33/F/A/X/T	45/F/A/X/T
Single-wheel	87,000 lbs.	111,000 lbs.
Dual-wheel	135,000 lbs.	185,000 lbs.
Dual Tandem Wheel	257,000 lbs.	335,000 lbs.
Double Dual Tandem Wheel	N/A	770,000 lbs.

Source:
Pavement Management Program Services - 2019 Pavement Condition Index Report for Henderson Executive Airport.

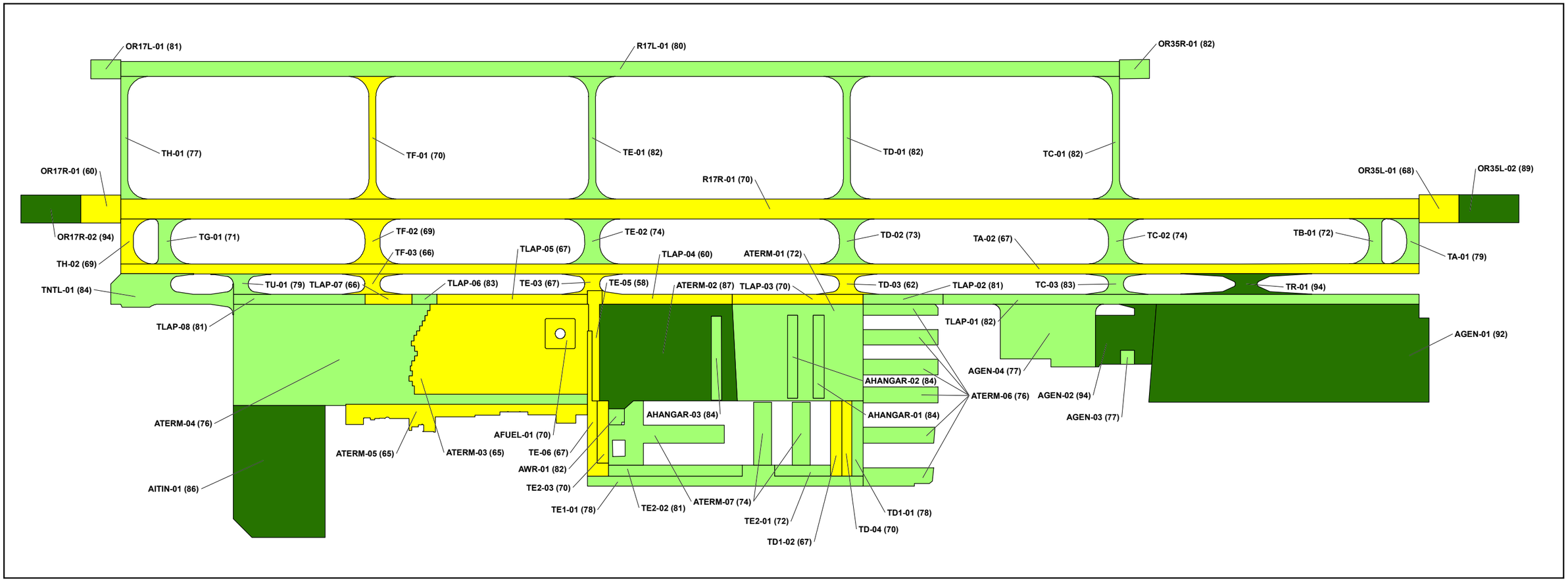
Notes:
N/A = not applicable
lbs. = pounds

2019 AIRFIELD PAVEMENT CONDITION

The 2019 Airfield Pavement Condition Index Report also calculated pavement ratings using Pavement Condition Index (PCI), which is an examination of specific distress type and severity combined with historical PCI data and rehabilitation efforts. PCI uses a rating scale of 0-100 to represent overall pavement condition. As seen in **Figure 1.14**, in 2019, the pavement ratings at the Airport ranged from fair (PCI value of 56-70) to good (PCI value of 86-100) depending on the location.

13 Federal Aviation Administration, Advisory Circular 150/5335-5C, 2014.

Figure 1.14 – *2019 Airport Pavement Condition Index*



LEGEND

- PCI = 86-100 Good
- PCI = 71-85 Satisfactory
- PCI = 56-70 Fair
- PCI = 41-55 Poor
- PCI = 26-40 Very Poor
- PCI = 11-25 Serious
- PCI = 0-10 Failed

BRANCH IDENTIFIER
SECTION IDENTIFIER
TWA-20 (98)
PCI VALUE

0 125 250 500 Feet

Source: Airport Pavement Management Program Services - 2019 Pavement Condition Index Report for Henderson Executive Airport.

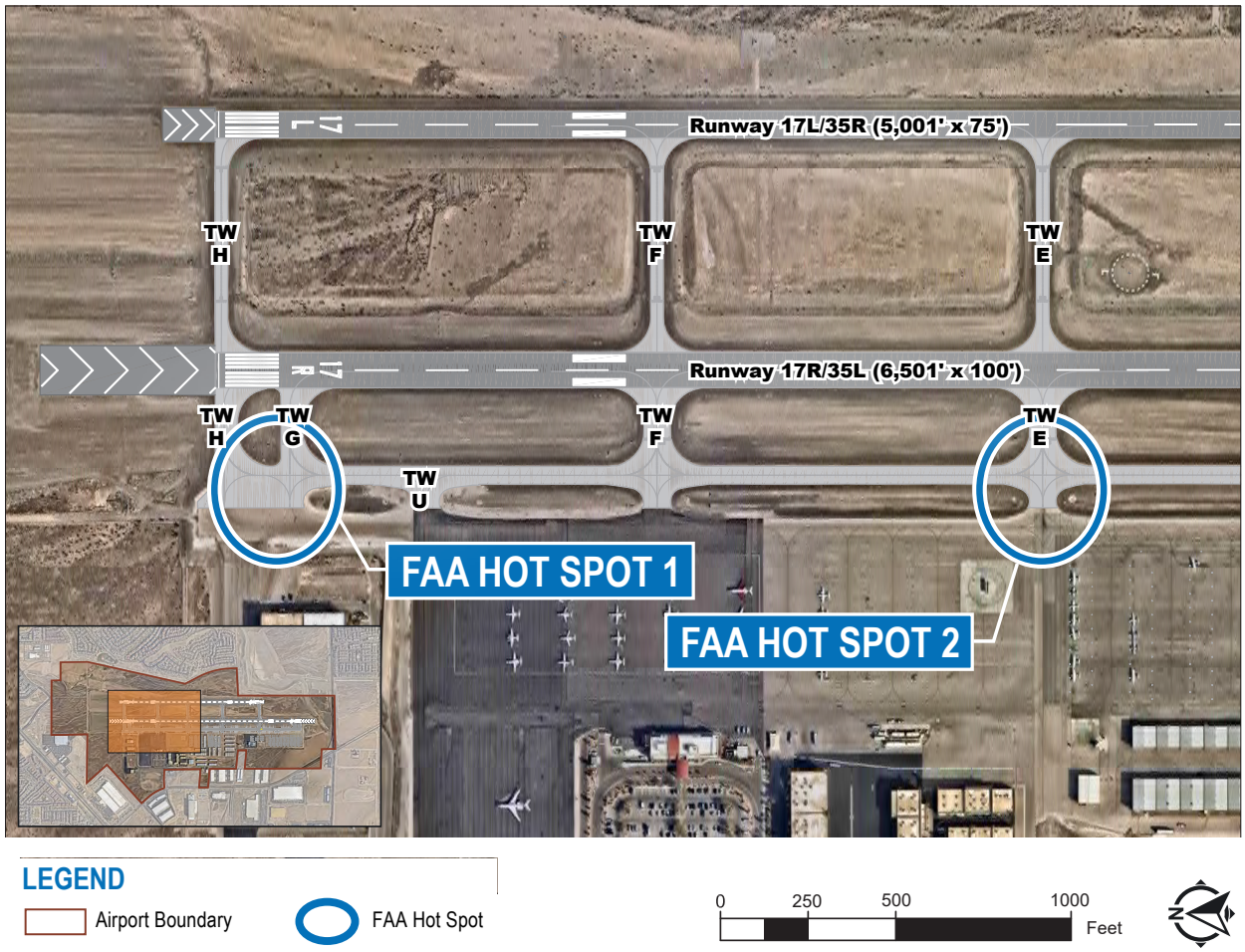
Note: PCI = Pavement Condition Index

1.4.9. Runway Incursion Mitigation

A runway incursion is defined by the FAA as an occurrence at an airport involving the incorrect presence of an aircraft, vehicle, or person on a protected area designated for the landing and takeoff of aircraft. Specific locations on an airport movement area with a history of potential risk of collision or runway incursion, and where heightened attention by pilots and drivers is necessary, are known as hot spots. As depicted in **Figure 1.15**, Henderson Executive Airport has two published hot spots. These hot spots are identified in the FAA's Airport/Facility Directory to make it easier for the Airport's users to plan the safest possible path of movement in and around the airfield.

- Hot Spot 1 encompasses the area around the intersections of Taxiways A, G, and H, and the north ramp near the Quail Air Center. The FAA designated this area a hot spot to notify pilots of frequent jet aircraft taxiing to Runway 17R for departure and to ensure pilots do not mistakenly line up on Taxiway A for departure rather than Runway 17R.
- Hot Spot 2 is located at Taxiway E from the midfield apron to its intersection with Taxiway A. The FAA designated this area a hot spot to notify pilots of frequent arriving and departing aircraft transitioning to/from parking at Taxiways A and E.

Figure 1.15 – *FAA Hot Spots*



Sources:
FAA Aviation Information Analysis and Sharing.
Kimley-Horn, 2020.
Nearmap (accessed March 2020).

1.5. Landside Facilities

Landside facilities accommodate passengers, cargo/freight, and ground transportation vehicles. As used in this Airport Master Plan Update, these facilities include terminal buildings, aircraft and vehicle parking areas, entrance roadways, and other buildings. The following describes the major landside facilities and tenants at Henderson Executive Airport.

1.5.1. Terminal Building

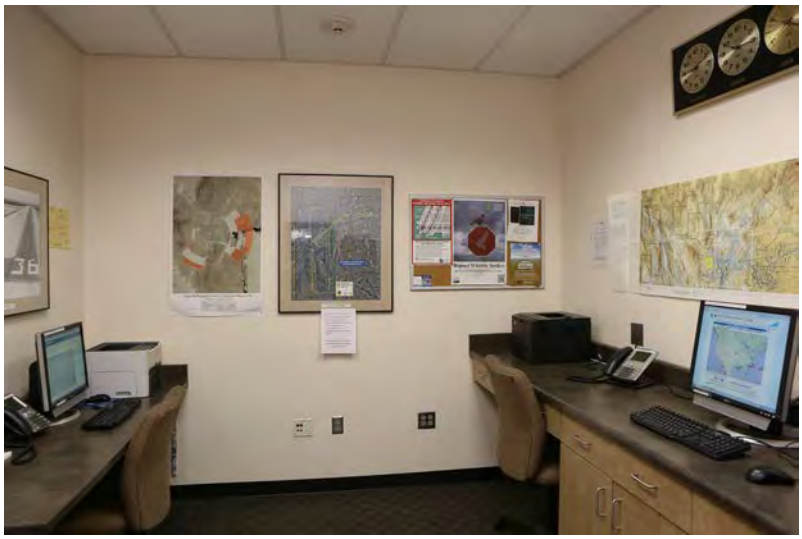
The Airport's terminal building was constructed in 2005 and is located on the northeast side of the property. The two-story, 24,000-square-foot facility is owned and operated by CCDOA and provides passenger and user access to the main ramp area. The terminal building serves as the central hub of the Airport, housing airport administration offices, meeting space, passenger waiting areas, a sit-down restaurant, and the Airport's FBO.

FIXED-BASE OPERATOR

FBOs provide aviation services and other amenities at an airport to based and transient aircraft. FBOs are operated by private companies or the airport owner, and services often include aircraft fueling, maintenance and repair, aircraft rental and/or charter services, pilot lounge and flight planning facilities, and aircraft tie-down and/or hangar storage.

Henderson Executive Airport is served by one FBO—located within the terminal building and operated by CCDOA—that caters to personal, corporate, and charter aircraft. The FBO's pilot amenities include flight planning stations, weather data and Airport information, lounge areas, Wi-Fi, televisions, sleeping quarters, showers, and full-service fueling. Passenger amenities and services include a full-service restaurant, complimentary coffee and newspapers, meeting rooms, Wi-Fi, on-site inflight catering, and planeside limousine service. Rental car reservations also are available at on-site customer counters through Enterprise and Hertz. The FBO provides aircraft storage, after-hours security, and ground handling services such as lavatory and water servicing and ground power units.





1.5.2. General Aviation Tenants

GA tenants occupy various space along the west side of the Airport and provide a variety of services to pilots, passengers, and the public, including air tours, aircraft maintenance, flight instruction, aircraft rental and charter services, commercial leasing services, and catering. As of December 2019, the tenants at Henderson Executive Airport include:

Air Tours
- Maverick Aviation Group

Flight Schools and Aircraft Rental
- Cactus Aviation/Helios Aviation
- All in Aviation

Aircraft Charter
- Thrive Aviation

Rental Cars
- Enterprise
- Hertz

Aircraft Maintenance
- Apex Aviation Services
- Double Down Aviation (opening Q1, 2020)
- King's Avionics

Other GA Tenants
- Ascent Aviation Group
- Crowe Aviation, LLC
- Desert Flying Club
- Sky Combat Ace

Commercial Leasing
- Commercial 912 Aviation
- Henderson Quail Aviation Center - The Ribeiro Companies

During the Inventory collection phase of this Airport Master Plan Update, interviews were conducted with several of the tenants and some key users of Henderson Executive Airport. A summary of information obtained from these interviews is presented below.



- Construction is ongoing for 16 T-hangars, nine box hangars, and a 30,000-square-foot conventional hangar that will support aircraft maintenance. This development is anticipated to be opened in the first quarter of 2020. The hangars are being leased to based aircraft owners and are already fully committed.
- Most tenants and users interviewed are anticipating continued growth, additional based aircraft, and additional hangar needs at the Airport.
- There is a desire for enhanced instrument approach capabilities for training that does not conflict with Class B airspace. Enhancements desired include an instrument landing system, terminal area arrival (for check rides), and VOR test facility.
- Interviewees pointed out disparity in fuel prices at Henderson Executive Airport and lack of competition as compared with other nearby airports. Fuel is less expensive at McCarran International Airport. Several, who cater to the smaller aircraft operators, also noted delays in receiving fuel service. Others indicated a desire to be able to purchase and dispense fuel for their own operations.
- Access for users to/from airside/landside gates from/to aircraft can be challenging. The FBO provided shuttle service is severely relied on, but it can take a long time and often longer than walking to the aircraft. Similarly, some tenants would like to have office space closer to the flight line.

- Several interviewees noted that longer runways would be beneficial at Henderson Executive Airport, particularly during summer months.
- Some interviewees expressed a desire for the addition of a crosswind runway.
- There is a long waiting list for shade hangars and limited hangars for small GA aircraft.
- There is a need for more facilities that accommodate growing corporate aircraft.
- Some would like a better location for the south run-up; away from based aircraft tie-downs.
- There is a desire for a GA customs facility to be located at Henderson Executive Airport.
- Several interviewees commented that the City of Henderson's architectural rules and building codes create challenges for aviation-related development. At times, the requirements are overly burdensome when compared to the actual uses of the facility being developed. Some noted the CCDOA should develop its own standards to help ensure cohesive aesthetics of the Airport.
- Responses were mixed regarding availability and capacity of vehicle parking at the Airport.
- Recent Letters of Agreement between the tower and helicopter operators should help deconflict fixed and rotary wing operations at the Airport.
- At the time the interviews were conducted, several tenants were in the middle of capital and/or maintenance investments in their facilities, indicating strong commitment to developing and maintaining operations at the Airport.



1.6. Ancillary and Support Facilities

Ancillary and support facilities are critical to meeting the needs of aircraft, pilots, and passengers while maintaining a safe, efficient, and customer-friendly commercial service airport. This section describes the support facilities and infrastructure required for the ongoing operation of Henderson Executive Airport, including administration and maintenance, fuel storage, emergency services and security, and numerous utility systems.

1.6.1. Airport Administration and Maintenance

The Airport's administrative offices are housed in the main terminal building. More information on the terminal building and its facilities can be found in **Section 1.5.1 - Terminal Building**.

The Airport's maintenance facilities are currently housed in an approximately 8,000-square-foot building on the west side of Jet Stream Drive, west of the midfield GA apron. This building houses machinery, tools, equipment, and offices for Airport maintenance personnel. As the building is currently located west of Jet Stream Drive, maintenance staff must cross Jet Stream Drive and enter the airfield via access gates.

1.6.2. Fuel Storage

The FBO at Henderson Executive Airport provides Jet A and 100 Low Lead (LL) Aviation Gas (AvGas) for aircraft and unleaded and diesel for nonaeronautical vehicles. The bulk fuel storage area is located just south of the main terminal and a fuel island is located northwest of Taxiway E that contains a self-service station for 100 LL AvGas. Fuel at the Airport is supplied by the World Fuel Services Corporation. Fueling services are available to the public, commercial airlines, and other tenants. Existing fuel storage facilities are summarized below in **Table 1.11**.

Table 1.11 – *Fuel Storage*

Fuel Type	Storage Unit	Capacity (gallons)	Above/Below Ground	Date Installed (Year)
100 LL AvGas	Storage Tank	12,000	Above	2007
Jet A	Storage Tank	20,000	Above	1999
Jet A	Storage Tank	20,000	Above	1999
Jet A	Storage Tank	30,000	Above	2007

Source:
Henderson Executive Airport FBO Staff.

Note:
100 LL AvGas = 100 low lead aviation gas
** = "Capacity" refers to the storage tank's total capacity, as opposed to "usable capacity" which differs depending on a variety of factors, including tank manufacturer, age of facility, and the mechanical system.*

1.6.3. Emergency Services

Pursuant to Title 14 Code of Federal Regulations Part 139 (14 CFR Part 139), airports that serve scheduled or unscheduled air carrier aircraft with more than 30 seats, or those that serve scheduled air carrier aircraft containing 9 to 31 seats, must provide aircraft rescue and firefighting (ARFF) equipment and services during operations.[14] Since Henderson Executive Airport's existing operations do not include the aforementioned services, the Airport is not a Part 139-certificated airport and on-airport ARFF equipment is not required. The Airport has agreements with the Henderson Fire Department for emergency services. The closest Henderson Fire Department station to the Airport is Station 98, located approximately 2.5 miles northeast of the Airport at the intersection of West Horizon Ridge Parkway and Coronado Center Drive. In the event of an emergency, the airport control center is alerted and contacts the Henderson Fire Department, which has a response time of 8 minutes for an incident.

1.6.4. Airport Security

The Airport perimeter is enclosed with a 6-foot-high chain-link fence with barbed wire and has 21 gates along its length—including three gates in the immediate vicinity of the main terminal area, three gates on the south side of the midfield GA apron, and two gates that provide access to the south GA apron. Security gates are either controlled and maintained by CCDOA or controlled by an adjacent tenant and maintained by CCDOA. Access gates are kept closed and secured by chain and lock and are used solely by CCDOA for maintenance or emergency access.

14 Federal Aviation Administration, Airport Safety, 2020, https://www.faa.gov/airports/airport_safety/

1.6.5. Utility Infrastructure

As part of the inventory process, the major area utility systems were discussed from a standpoint of existing conditions and potential needs. The following discussion reflects observations and discussions held with CCDOA personnel familiar with the utility infrastructure at and around Henderson Executive Airport.

WATER

Water is provided by the City of Henderson. The Airport is currently served by three main water supply lines—two 16-inch lines and one 12-inch line. Based on discussions with CCDOA staff, these lines meet the general water service needs of the Airport. However, an additional 16-inch feed would be beneficial for system redundancy, potential southern development, and to provide a complete system loop. There are some pressure issues related to fire flows, and some tenant facilities require pumps to meet fire flow requirements. Further in the master planning process, it may be necessary to engage the City of Henderson as the area around the airport continues to grow and additional demand on the existing system grows.

SEWER

Sanitary sewer is provided by the City of Henderson and the existing sanitary sewer system currently flows to one main line along Executive Terminal Drive, which was identified as being a single point of failure and is a risk for redundancy in the system. On the north side of the Airport, there is an existing sewer lift station located near Quail Air Center and is not maintained by CCDOA, which may need to be relieved.

STORMWATER

Future Airport and tenant-related development will create additional impervious area, leading to additional runoff. A comprehensive assessment of stormwater management may be necessary as the preferred alternative of the master planning process becomes discerned. As of now, the airfield infield areas are being improved with piping to accommodate current ponding issues. An additional identified concern was the open ditch along Jet Stream Drive, which would be better served with pipe.

ELECTRICITY

Electrical service to the Airport is provided by NV Energy, which is a major electrical service provider for a significant portion of the Las Vegas Valley. The CCDOA is currently in the stages of negotiating a 15-year master plan community development agreement with NV Energy to provide additional electrical service to the Airport environs. While the agreement has not yet been fully executed, the negotiated capacity should be sufficient for the 15-year timeframe and the anticipated Airport electrical demand within that period. Backup power is currently provided for the airfield lighting systems via a generator at the electrical vault.

NATURAL GAS

Natural gas service is provided to the Airport by Southwest Gas Corporation. There is currently one natural gas line serving the Airport via Executive Terminal Drive, which was identified as adequate for the Airport's needs. The line does not extend the full length of the Airport, but if necessary, additional areas of service would be provided via tenant- or developer-funded lateral extensions of the main line.

1.7. Land Use and Zoning

Land use planning and zoning regulations near an airport help to ensure that land uses, structures, and activities are compatible with aviation operations. Pursuant to FAA Order 1050.1F, Environmental Impacts: Policies and Procedures, the compatibility of land uses near an airport is focused primarily on noise levels in the community and the safety of persons and property both on the ground and in the air. Under ideal conditions, land uses that are generally considered to be noncompatible with airport operations (e.g., residential, schools, and churches) would be located away from airports and land uses that are more compatible (e.g., industrial, commercial) would be located near airports. [15]

Currently, there are several noise-sensitive land uses, primarily residential, that are located to the east, north, and west of Henderson Executive Airport. The Seven Hills neighborhood located east of the Airport, the residential area and Liberty High School northwest of the Airport, and future residential development represent potential noncompatible land uses due to aircraft noise and the disruption of home life. Future development near the Airport also may be noncompatible with airspace and pose a threat to the Airport's operational safety, efficiency, and capacity.

While the FAA encourages airport owners to seek compatible land uses in the areas surrounding an airport through appropriate positive control (e.g., fee-simple purchase or easement acquisition), coordinated zoning, and municipal planning efforts, the FAA also recognizes that local governments are responsible for administering land use planning and zoning regulations. Since Henderson Executive Airport is owned by Clark County and resides within the City of Henderson, interjurisdictional collaboration is central to ensuring compatible land use in the vicinity of the Airport. This collaborative planning promotes shared objectives, economic development, and optimal land uses that will enhance long-term public benefits.

This section provides an overview of zoning and land uses in the vicinity of Henderson Executive Airport.

The FAA encourages airport owners to seek compatible land uses in the areas surrounding an airport through appropriate positive control (e.g., fee-simple purchase or easement acquisition), coordinated zoning, and municipal

1.7.1. Zoning

Zoning is the division of an area into districts for the primary purpose of regulating the use of land. The property on which the Airport resides is owned by CCDOA and is zoned by the City of Henderson. Generally, the City of Henderson also has zoning control over areas immediately surrounding Henderson Executive Airport. The areas north of Nevada State Route 146/Saint Rose Parkway and west of Interstate 15 are outside the Henderson city limits and, therefore, are zoned by Clark County. The detention basin south of the Airport is owned by the U.S. government, but is subject to zoning by the City of Henderson. Under the City of Henderson Development Code, the Airport is zoned as Public and Semipublic (PS) and the areas immediately north, west, and south of the Airport are currently zoned for industrial and commercial land uses.

An Airport Environs Overlay District (AEOD) was adopted in 1993 by the City of Henderson pursuant to Section 19.4.3 of the City of Henderson Development Code and in conjunction with Section 30.48, Part A of the Clark County Code of Ordinances. The AEOD District was created to regulate land uses near the Airport and to identify specific ranges of land uses that are compatible with airport hazard and noise exposure zones.[16] The AEOD encompasses an area of land characterized by noise levels—specifically within the 60 day-night average sound level (DNL) noise exposure zone and greater. It also outlines the requirements of specific land uses located within the AEOD to be deemed compatible. Residential land uses, for example, must include noise-attenuated construction (e.g., soundproofing) to be permitted within the areas associated with the 65, 70, and 75 DNL noise exposure zones. Similarly, institutional land uses such as schools and churches are only permitted within the 65 and 70 DNL noise exposure zones with noise-attenuated construction. This Airport Master Plan Update will develop new noise contours, which should be incorporated into the City's Development Code, as appropriate.

15 Federal Aviation Administration, Land Use Compatibility and Airports, 1998.
16 City of Henderson Development Code, Revised 2020.

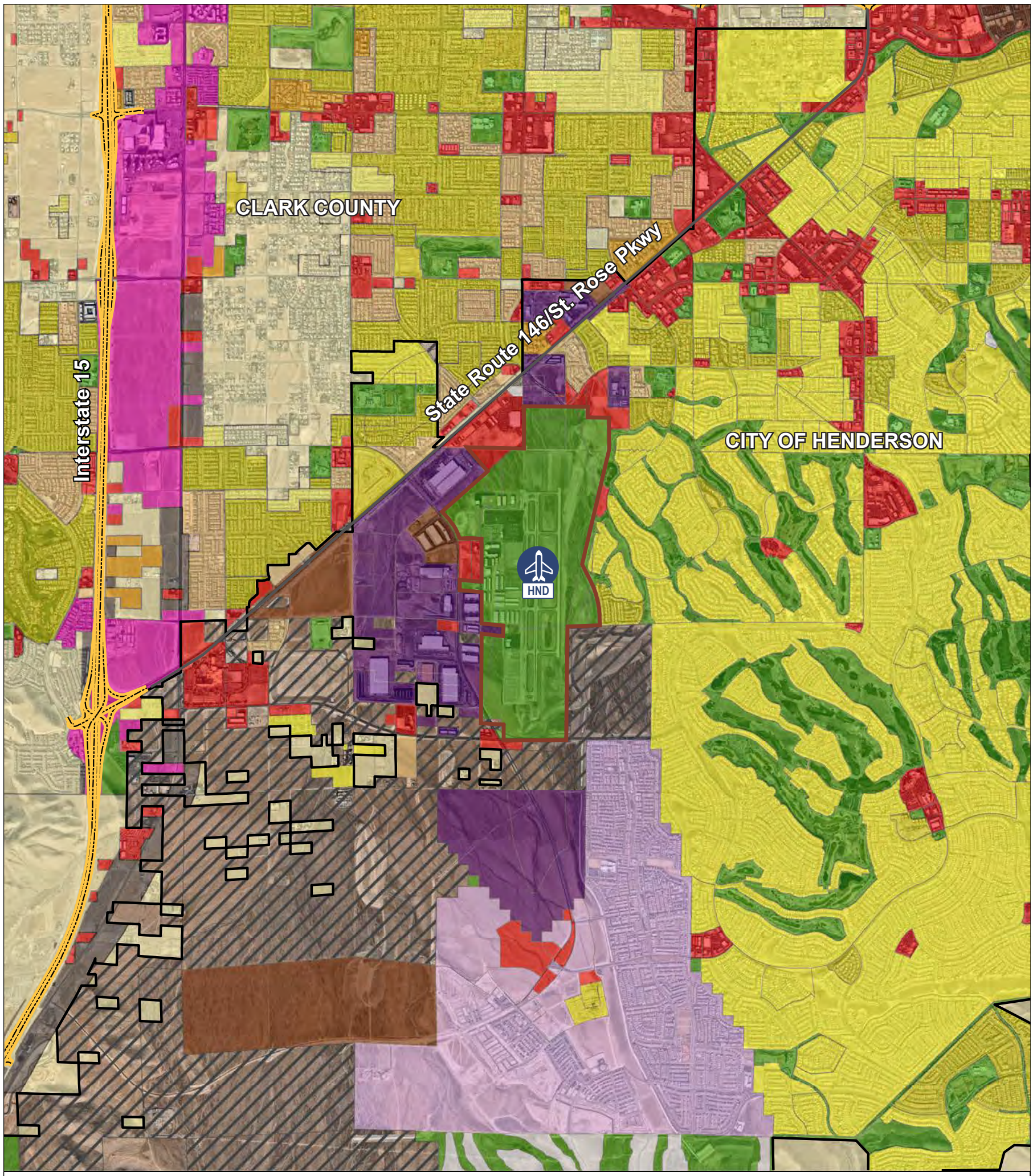
The existing zoning in the vicinity of the Airport is generally compatible with land use plans that have been adopted for the Airport area. However, land east and southeast of the Airport is zoned predominantly for low-density, single-family residential development (up to six dwelling units per acre), medium-density residential (up to 10 dwelling units per acre), or multifamily residential development (up to 16 dwelling units per acre) under the City of Henderson Development Code. Land northwest of the Airport within unincorporated Clark County is predominantly zoned for residential, ranging from a maximum of 2 to 8 dwelling units per acre.

The AEOD encompasses land uses that are traditionally considered to be noncompatible with Airport operations. These land uses include approximately 126 single-family residential units, 370 multifamily residential units, Liberty High School, and Avellino Park. Additionally, there are approximately 740 single-family residential units in unincorporated Clark County that are located within the AEOD. Both the Avelliino Park and Liberty High School are considered compatible land uses within the AEOD under Section 19.4.3 of the City of Henderson Development Code. For residential units to be deemed compatible; however, they must achieve an exterior to interior noise level reduction of 25 decibels. According to Airport staff, approximately 24 homes within the AEOD do not meet these requirements and are, therefore, considered to be noncompatible land uses.

Zoning in Clark County and the City of Henderson for the areas immediately surrounding the Airport are displayed in **Figure 1.16**.



Figure 1.16 – *Zoning Map (Unincorporated Clark County and City of Henderson, 2019)*



Sources: Clark County GIS Management Office (accessed March 2020). City of Henderson GIS Data Portal (accessed March 2020). City of Las Vegas Geocommons (accessed March 2020). Kimley-Horn, 2020. Nearmap (accessed March 2020).

Note: For comparison, Clark County and City of Henderson zoning codes were consolidated into categories based on similar uses.

1.7.2. Land Use Planning

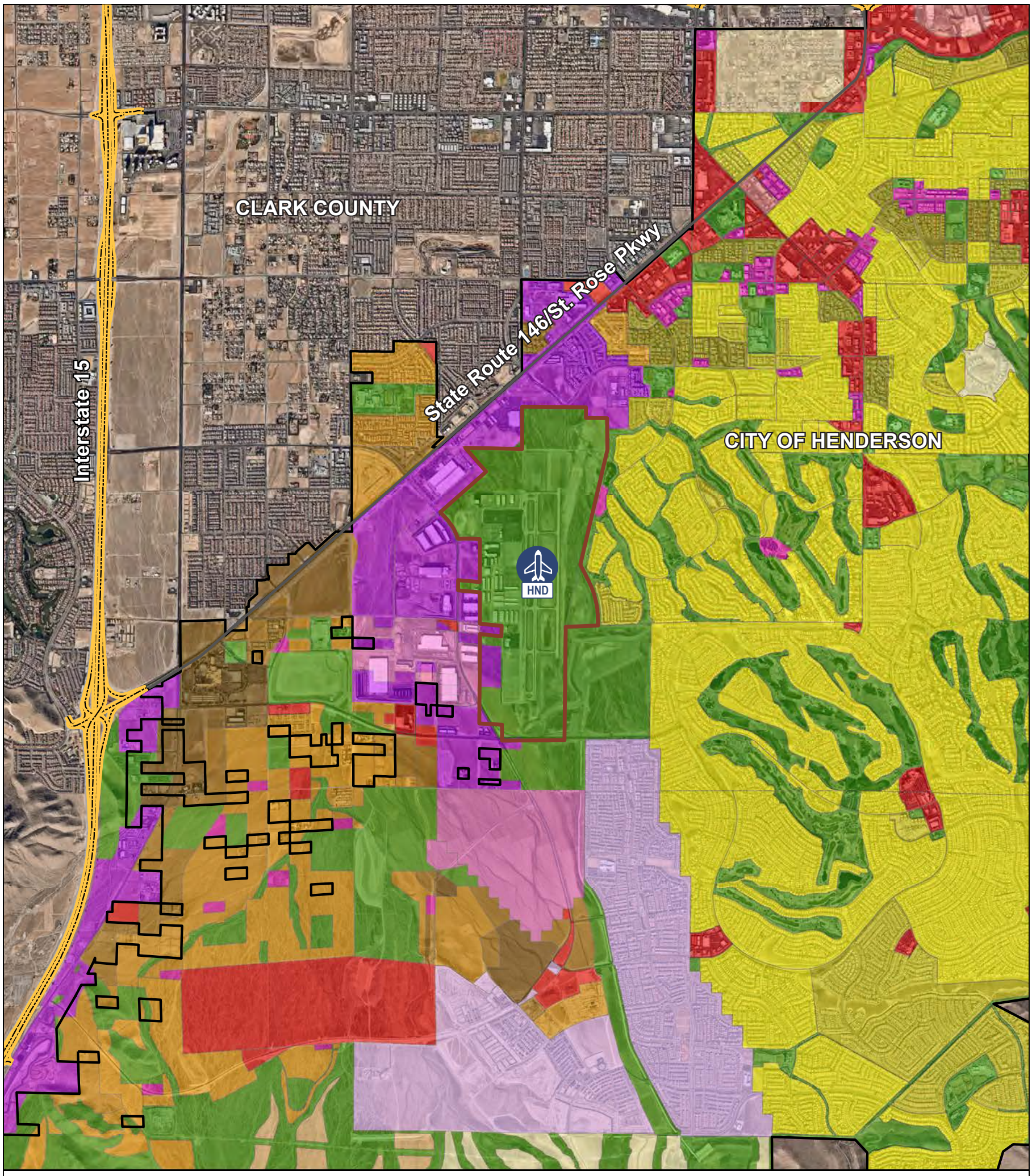
Land use planning at and around an airport ensures that new and existing development is compatible with aviation-related activities in relation to both safety and noise concerns. Henderson Executive Airport is located within the West Henderson Study Area, which is the area generally bounded by Las Vegas Boulevard to the west, State Road 146/Saint Rose Parkway to the north, the master-planned communities of Seven Hills and Anthem to the east, and the Sloan Canyon National Conservation Area to the south. In 2014, the Henderson City Council unanimously approved the West Henderson Land Use Plan, which identifies future land use goals and a preferred development strategy for the area, including improving transportation capacity, discouraging residential development west of the Airport, promoting industrial uses south of the Airport, and protecting Airport operations.

Land use planning at and around an airport ensures that new and existing development is compatible with aviation-related activities in relation to both safety and noise concerns.

The City of Henderson also adopted the Henderson Strong Comprehensive Plan in July 2017. In concert with the West Henderson Land Use Plan, the Henderson Strong Comprehensive Plan communicates the vision, long-term goals, and objectives that guide the physical development and orderly management of growth of the City for the next 20 years. Among its objectives, the Henderson Strong Comprehensive Plan prioritizes the protection of land near the Airport for light industrial and commercial uses to maximize Airport expansion opportunities and ensure compatible economic growth in the expanding community surrounding the Airport.

Planned land uses within the City of Henderson and Clark County for the area immediately surrounding Henderson Executive Airport are displayed in **Figures 1.17** and **1.18.** Portions of the City of Henderson's Land Use Plan extend into unincorporated areas of Clark County and conflicts with the County's Land Use Plan. It is outside of the purview of this Airport Master Plan Update to resolve differences in planned land uses.

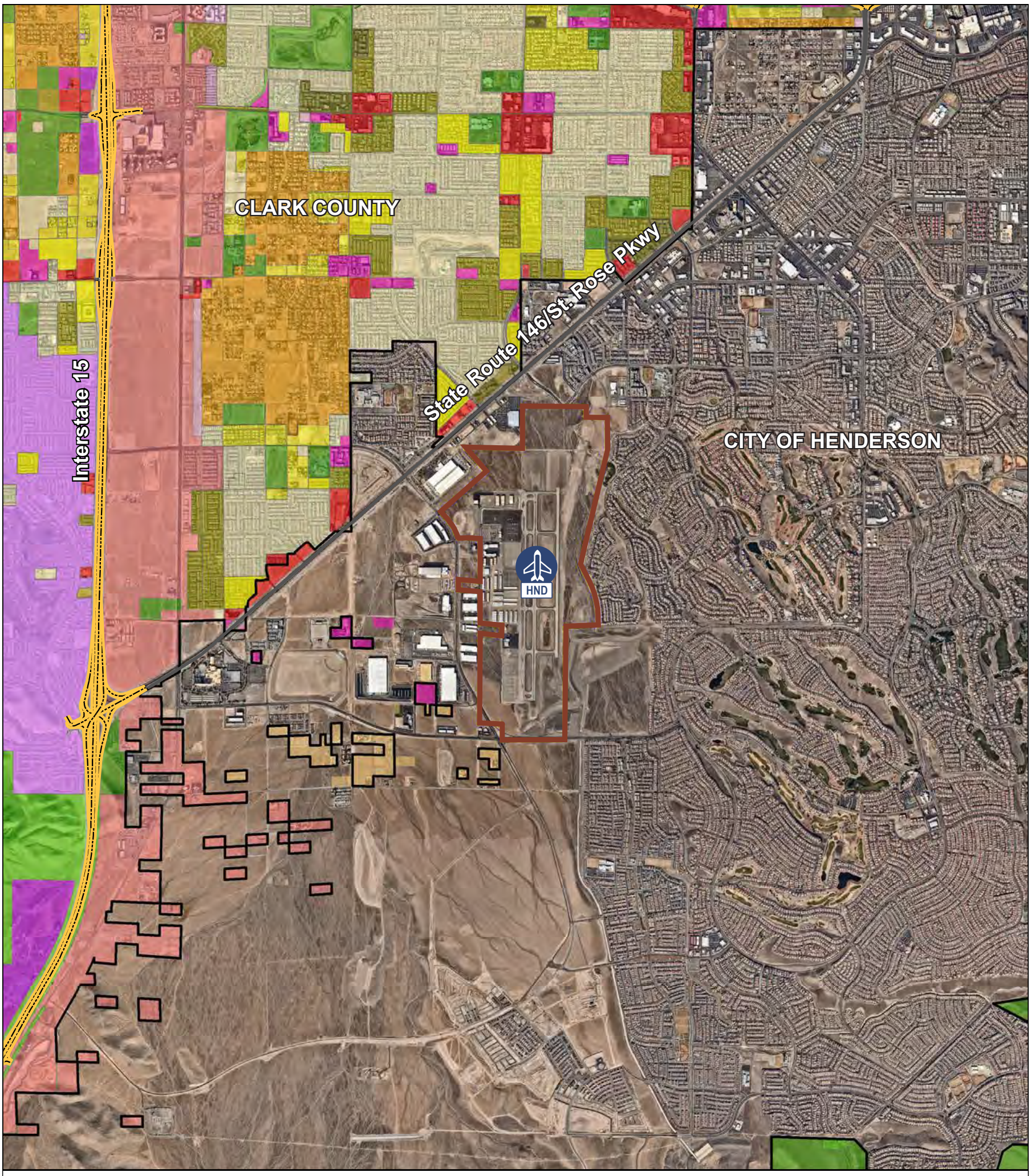
Figure 1.17 – *Future Land Use Map (City of Henderson, 2019)*



Sources: City of Henderson GIS Data Portal (accessed March 2020). City of Las Vegas Geocommons (accessed March 2020). Kimley-Horn, 2020. Nearmap (accessed March 2020).

Note: Due to areas of overlapping planned land use by Clark County and the City of Henderson, the future land use maps for the two jurisdictions have not been combined.

Figure 1.18 – *Future Land Use Map (Unincorporated Clark County, 2019)*



LEGEND

- Airport Boundary
- City/CountyBoundary
- Commercial General
- Commercial Neighborhood
- Commercial Tourist
- Office Professional
- Research Parl
- Major Development
- Public Facilities
- Open Lands
- Residential Suburban
- Residential Low
- Residencial Medium
- Residencial Low
- Residential Neighborhood
- Residential Neighborhood Preservation
- Interstate
- State Highway

N

Sources: Clark County GIS Management Office (accessed March 2020). City of Las Vegas Geocommons (accessed March 2020). Kimley-Horn, 2020. Nearmap (accessed March 2020).

Note: Due to areas of overlapping planned land use by Clark County and the City of Henderson, the future land use maps for the two jurisdictions have not been combined.

0 1 2 3 Miles

1.7.3. Off-Airport Land Uses

The areas immediately east, north, and west of Henderson Executive Airport are heavily developed with residential neighborhoods, schools, parks, and industrial and commercial businesses. The land to the south of the Airport is largely undeveloped with a few residential and commercial properties. Though much of the development consists of residential land uses, the majority of land uses within the AEOD are compatible with airport operations as previously discussed. The following provides additional detail on the existing land uses in the vicinity of the Airport.

- **Northern Airport Vicinity:** There is a combination of commercial, industrial, and residential land uses directly north of Henderson Executive Airport. The Airport is bound to the north by Nevada State Route 146/Saint Rose Parkway. The land uses between the Airport and State Road 146 are primarily industrial, commercial, and residential. A storage facility is located directly north of the Airport and a Costco Wholesale, recently constructed in 2018, is located northwest of Runway 17R/35L. Additionally, new single- and multifamily residential units were constructed between 2017 and 2020 along Sunridge Heights Parkway north of the Airport. The land north of State Route 146 is heavily developed with mostly residential land uses—including the Silverado Ranch neighborhood—with sporadic commercial and institutional uses, including Liberty High School, Elise L. Wolff Elementary, Cactus Valley Retirement Resort, and various commercial businesses.
- **Eastern Airport Vicinity:** East of the Airport, the majority of land use is single-family residential as Henderson Executive Airport is bound to the east by the Seven Hills neighborhood. Two parks (Sonata Park and Vivaldi Park) and two golf courses (Rio Secco Golf Club and The Revere Golf Club) also are located immediately east of the Airport within the residential community. South of the neighborhood and directly east of the Airport is an undeveloped tract of land owned by the U.S. government that is used as a detention basin.
- **Southern Airport Vicinity:** Henderson Executive Airport is bound to the south by Volunteer Boulevard. While the majority of land south of the Airport is undeveloped, land uses that exist in this area include commercial and single-family residential. The aforementioned detention basin owned by the U.S. government extends from the east side of the Airport to directly south of both runways. Additionally, a few single-family residential units sit within enclaves of unincorporated Clark County. Southeast of the Airport, and directly south of the detention basin, is the Inspirada master-planned community consisting of single- and multifamily residential land uses. Inspirada also is expanding south of the Airport along Via Inspirada. Vacant land south of Volunteer Boulevard and within the AEOD may be developed to accommodate residential uses in the future, potentially with the expansion of the Inspirada community, so long the development conforms to noise-attenuated construction standards as set forth in the City of Henderson Development Code.
- **Western Airport Vicinity:** The area between State Road 146 and the Airport—consisting of mostly industrial land uses with some commercial, institutional, and multifamily residential—has experienced a great deal of development over the past decade. The Levi Strauss & Co. distribution center, located immediately northwest of the north apron, and the Lion Habitat Ranch have been Airport neighbors since the late 1990s. The Alper Airport Executive Center (constructed in 2007), the M Resort Spa Casino (constructed between 2008 and 2009), and the FedEx ground facility (constructed in 2013) were the next structures to be added west of the Airport. Between 2017 and 2020, the South 15 Airport Center and various commercial uses have been constructed immediately west of the Airport along Executive Terminal Drive, and new multifamily residential communities have been constructed near the M Resort Spa Casino. The Las Vegas Raiders training and headquarters facility, expected to open in June 2020, is among the continued development in this area. West of State Road 146, land uses primarily consist of single- and multifamily residential and commercial.

As the City of Henderson continues to grow and develop, consideration should be made to accommodate current and forecasted operations and development at the Airport. Land use compatibility is especially important under flight paths and within the RPZs. While noise attenuation can help in maintaining quality of life inside of residences, residents located within the AEOD will still experience noise when outdoors. The FAA encourages the airport owner control through fee simple land within the RPZ and it is desirable to maintain the RPZ clear of all aboveground objects.

1.7.4. Noise Abatement Procedures

While zoning and land use planning are employed by the City of Henderson and Clark County to facilitate land use compatibility in the vicinity of the Airport, noise abatement procedures also are in effect at the Airport to minimize aircraft noise disturbances over the surrounding communities. Though CCDOA cannot control aircraft in the air, the "Fly Safely & Quietly" program at Henderson Executive Airport encourages pilots to adhere to voluntary procedures that address a variety of noise-related public concerns, including late-night activity, engine maintenance, and the altitude of arriving and departing aircraft. The "Fly Safely & Quietly" brochure, which is available on the Airport's website and in **Appendix A** of this Working Paper, is intended to provide best practices for pilots operating out of Henderson Executive Airport to reduce noise impacts to the residential areas east, north, and west of the Airport. Specific program procedures are listed below; however, the Airport's website should be referenced for the latest noise abatement guidance.

Though CCDOA cannot control aircraft in the air, the "Fly Safely & Quietly" program encourages pilots to adhere to voluntary procedures that address a variety of noise-related public concerns.

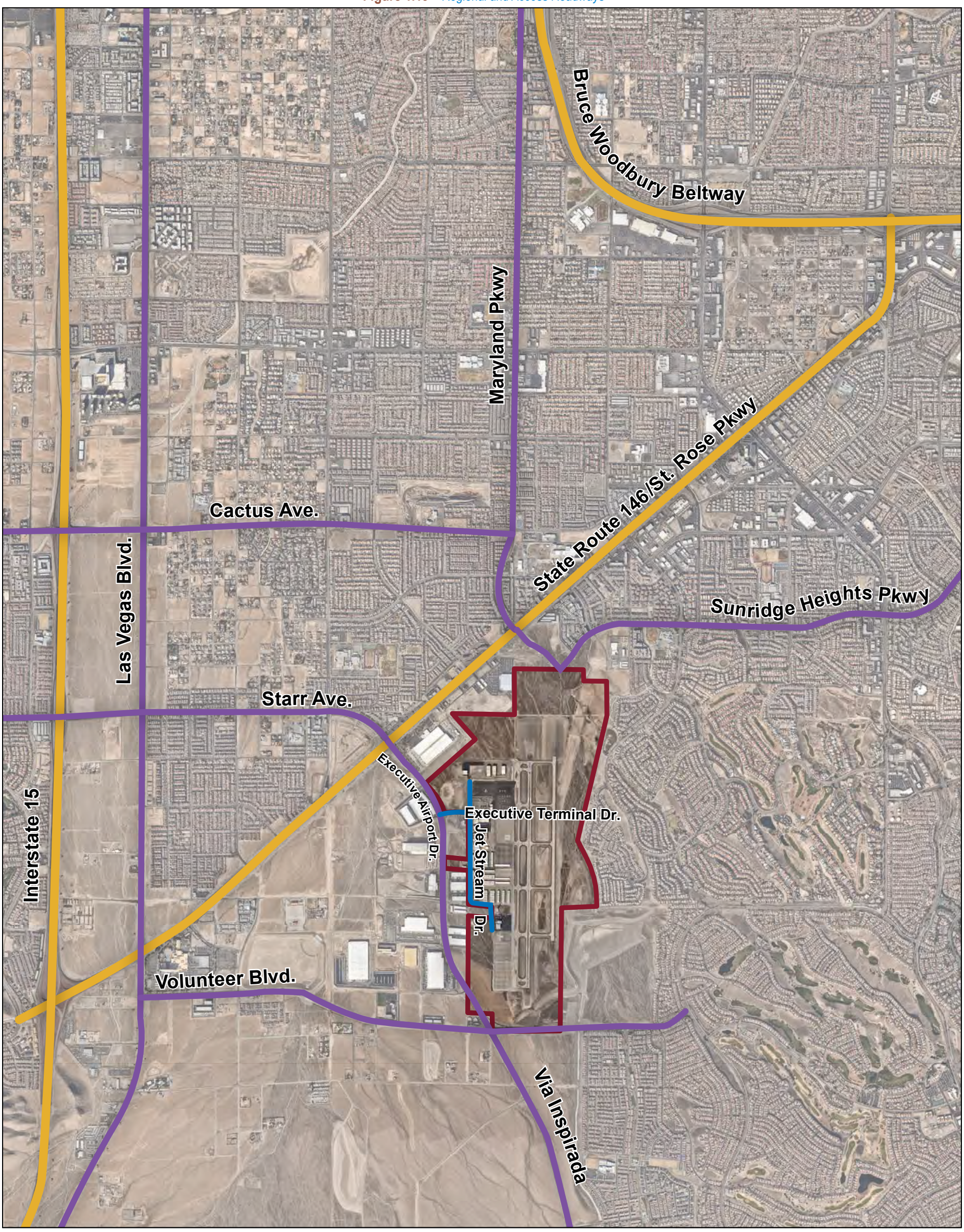
- Pilots are to avoid overflights of nearby residential areas whenever possible except in an emergency or as otherwise directed by ATC.
- Engine run-ups must be performed in designated areas and are not permitted between 11 p.m. and 7 a.m.
- All traffic patterns will remain west of the Airport and clear of the Class B airspace unless otherwise directed by Las Vegas ATC.
- Climb at best rate until reaching 500 feet AGL (weather permitting) before making any turns.
- Stay at or above pattern altitude 3,500 feet MSL. All traffic patterns will be "west traffic" unless otherwise directed by ATC. After-hours traffic will utilize "west traffic" only.

Though noise abatement procedures are important to reducing noise exposure, these measures are not intended to supersede FAA regulations or ATC directions. Controllers at the Airport have indicated that arriving traffic using IFR must fly on the east side of the Airport to account for McCarran International Airport traffic—there is not adequate space on the west side given the airspace constraints. The Airport has received noise complaints from adjacent residential areas due to these east-side operations. ATC personnel have noted that although noise complaints are taken seriously, considerations for pilot safety and restricted airspace continue to keep traffic over the east side of the Airport and the residential areas.

1.8. Surface Transportation

Henderson Executive Airport is surrounded by a ground transportation system that connects the Airport to neighboring communities and the Las Vegas Valley. This system includes a combination of regional, municipal, and local access roadways. The following describes the transportation facilities at and near the Airport, as well as the regional and municipal planning efforts with the potential to impact Henderson Executive Airport. The roadways described within this section are illustrated in **Figure 1.19**.

Figure 1.19 – *Regional and Access Roadways*



Sources: Kimley-Horn, 2020. Nearmap (accessed March 2020).

1.8.1. Regional Roadways

Regional roadways are designed to serve multiple communities and accommodate large volumes of traffic, often through uninterrupted travel. These roadways include freeways, highways, and arterials that provide access to the Airport but are used primarily for nonairport trips. The following describes the main regional roadways providing access to Henderson Executive Airport.

- **Interstate 15:** Interstate 15 is a major north-south Interstate Highway located west of the Airport. The segment of the Interstate that runs through the Las Vegas Valley is designated as the Las Vegas Freeway and is the only major north-south Interstate in the area. According to NDOT's traffic reports (2018), the two-way annual average daily traffic (AADT) volume along the segment of Interstate 15 within Las Vegas ranges between 65,500 and 325,000 vehicles. The AADT on the Interstate is greatest where the highway intersects West Tropicana Avenue and progressively decreases to the north and south. The AADT for the segment closest to the Airport, between West Cactus Avenue and East Starr Avenue, is 73,000 vehicles.
- **Bruce Woodbury Beltway (Interstate 215 and Clark County Route 215):** Located north of the Airport, the Bruce Woodbury Beltway, also known as the Las Vegas Beltway, is a semicircle around the Las Vegas Valley and carries two numerical designations. Beginning at its southern terminus east of Interstate 515/Interstate 11, the highway is designated as Interstate 215 and runs west and northwest toward Interstate 15. Upon its intersection with Interstate 15 southwest of McCarran International Airport, the highway's designation changes to Clark County Route 215. Within Las Vegas, the AADT along the Bruce Woodbury Beltway is between 146,000 and 235,000 vehicles, with a steady increase in vehicles near the Interstate 15 interchange. The AADT for the segment closest to the Airport, between Saint Rose Parkway and South Eastern Avenue, is 146,000 vehicles.
- **State Route 146/Saint Rose Parkway:** State Road 146, designated as Saint Rose Parkway, is an east-west major arterial that runs north of the Airport. State Road 146 begins at the intersection with Interstate 15 near the M Resort Spa Casino, west of Henderson Executive Airport, and runs northwest toward the Pecos Road interchange with Interstate 215. The route varies between six and eight lanes and is eight lanes near the Airport. The AADT along State Road 146 is between 29,500 and 46,000 vehicles. The AADT for the segment recorded closest to the Airport, between Bowes Avenue and Bruner Avenue, is 29,500 vehicles.

1.8.2. Regional Roadway Planning

The Regional Transportation Commission of Southern Nevada (RTC) serves as the transit agency and metropolitan planning organization (MPO) for Clark County. MPOs are federally-mandated agencies that are designated to carry out regional transportation planning. The RTC encompasses the County, its five incorporated cities, and its 20 census-designated places. As one of four MPOs in the State of Nevada, the RTC is responsible for leading regional roadway planning efforts; directing various local, state, and federal funding for transportation-related projects; and developing a regional transportation plan to meet the needs of all roadway users in Southern Nevada. RTC's current regional transportation plan, entitled ACCESS2040 (adopted February 2017), identifies initiatives for regional transportation through 2040 and ensures consistency with the transportation improvement program. ACCESS2040 includes projects to increase roadway capacity, improve public transit, and add bicycle and pedestrian facilities throughout Clark County.

ACCESS2040, the regional transportation plan of Southern Nevada, includes projects to increase roadway capacity, improve public transit, and add bicycle and pedestrian facilities throughout Clark County.

1.8.3. Municipal and Local Roadways

Municipal and local roadways are integral elements of a transportation network. These roadways are designed to provide access and traffic circulation between arterial roadways, community amenities, and residential properties. The following provides a summary of municipal and local roadways in the vicinity of Henderson Executive Airport.



- **Cactus Avenue:** Cactus Avenue is an east-west, two-lane minor arterial north of the Airport. The undivided roadway is designated as East Cactus Avenue east of Las Vegas Boulevard, and West Cactus Avenue west of Las Vegas Boulevard. The road runs from its western terminus at Buffalo Drive in the unincorporated town of Enterprise to Spencer Street in the east. Cactus Avenue serves residential areas and commercial and industrial uses north of the Airport. Cactus Avenue connects State Road 146/Saint Rose Parkway and Interstate 15 and provides access to Interstate 15 with an interchange approximately 2.3 miles northwest of the Airport.
- **Raiders Way:** Raiders Way is a north-south minor arterial that provides access to Executive Terminal Drive and Jet Stream Drive, which lead to the Airport's primary terminal and facilities. The road also serves the commercial and industrial uses west of the Airport. The divided roadway runs parallel to the Airport and varies between four and six lanes. Starr Avenue, the east-west minor arterial west of the Airport, becomes Raiders Way at State Route 146/Saint Rose Parkway. Raiders Way runs south to Volunteer Boulevard, where it becomes Via Inspirada. South of Executive Terminal Drive, Raiders Way contains buffered bicycle lanes on both sides of the road and a sidewalk on its east side. Additionally, starting just north of Bruner Avenue, the road contains sidewalks on both sides that run to Raiders Way's southern terminus at Volunteer Boulevard.
- **Las Vegas Boulevard:** Las Vegas Boulevard is a major north-south arterial located west of the Airport. The road varies between four and six lanes and is a six-lane divided arterial nearest the Airport. Las Vegas Boulevard runs parallel to Interstate 15 and spans the length of Clark County. Famous for the "Las Vegas Strip" portion of the road, Las Vegas Boulevard provides access to Henderson Executive Airport, McCarran International Airport, downtown Las Vegas, commercial businesses, and residential communities.
- **Maryland Parkway:** Maryland Parkway is a major north-south collector located north of the Airport. The road connects the Seven Hills and Silverado Ranch communities to State Route 146/Saint Rose Parkway. Maryland Parkway runs from Windmill Lane in the north to Sunridge Heights Parkway in the south and intersects with State Route 146/Saint Rose Parkway. The majority of Maryland Parkway exists north of State Route 146/Saint Rose Parkway and is a six-lane divided road with sidewalks along both sides. The portion of the road nearest the Airport, south of State Route 146/Saint Rose Parkway, was improved in mid-2019 and now consists of four lanes and conventional bicycle lanes on both sides of the road.
- **Starr Avenue:** Starr Avenue is an east-west, four-lane minor arterial west of the Airport. The undivided roadway is designated as East Cactus Avenue east of Las Vegas Boulevard, and West Cactus Avenue west of Las Vegas Boulevard. The roadway runs from Valley View Boulevard in the west and terminates at State Route 146/Saint Rose Parkway, where it turns into Raiders Way. Prior to 2019, Cactus Avenue's western terminus was located at Las Vegas Boulevard. In mid-2019, the road was extended westward past Las Vegas Boulevard and under Interstate 15 to connect to the Southern Highlands community—the new extension includes conventional bike lanes on both sides of the road. Starr Avenue serves residential areas and west of the Airport and provides access to State Route 146/Saint Rose Parkway and Raiders Way.

- **Sunridge Heights Parkway:** Sunridge Heights Parkway is an east-west major collector located northeast of the Airport. The undivided roadway consists of four lanes, sidewalks on both sides of the road, and a combination of conventional and buffered bicycle lanes. Maryland Parkway turns into Sunridge Heights Parkway just north of the Airport. Sunridge Heights Parkway runs east through the Seven Hills and MacDonald Ranch communities until its western terminus at Sandy Ridge Avenue. The road then curves north and turns into Green Valley Parkway. Prior to 2019, Sunridge Heights Parkway's western terminus was at Alper Center Drive. In 2019, Sunridge Heights Parkway was extended southwest to connect with Maryland Parkway. The ultimate plan for Sunridge Heights Parkway calls for an additional extension, approximately 1 mile southwest of Maryland Parkway, to connect the roadway with Raiders Way.[17]
- **Via Inspirada:** Via Inspirada is a minor arterial located south of the Airport. Via Inspirada varies between a four-lane divided roadway and a two-lane undivided roadway. Raiders Way turns into Via Inspirada at Volunteer Boulevard, and Via Inspirada runs in a north-south orientation parallel to the Inspirada master-planned community. Via Inspirada curves in an east-west orientation at Bicentennial Parkway and runs until its western terminus at Las Vegas Boulevard. In 2018, Via Inspirada was extended from its original southern terminus at Bicentennial Parkway westward to Las Vegas Boulevard. Via Inspirada provides the Inspirada community with access to Las Vegas Boulevard and Interstate 15 to the west and Henderson Executive Airport and State Route 146/Saint Rose Parkway to the north.
- **Volunteer Boulevard:** Volunteer Boulevard is an east-west, four-lane undivided minor arterial located south of the Airport. The road runs from Las Vegas in the west to Sun City Anthem Drive in the east, connecting the Inspirada community and other residential and commercial uses with Raiders Way and Las Vegas Boulevard. Volunteer Boulevard contains sporadic sidewalks and a mix of conventional and buffered bicycle lanes.

1.8.4. Airport Roadways

Henderson Executive Airport's roadways serve as the landside interface between the regional, municipal, and local roadways and the Airport's curb-front facilities (see **Figure 1.18**). The CCDOA owns and maintains Executive Terminal Drive and Jet Stream Drive. Both roadways are located on Airport property and have expanded as the Airport has grown. A summary of the roadways' characteristics is provided below.

- **Executive Terminal Drive:** Executive Terminal Drive is a collector west of the Airport that connects Raiders Way with Jet Stream Drive, the Airport's terminal, and the Airport's main parking lot. West of Jet Stream Drive, Executive Terminal Drive is a four-lane undivided roadway with landscaping and a sidewalk that run along the roadway's southern edge. At the intersection with Jet Stream Drive, Executive Terminal Drive turns into a two-lane undivided roadway with a one-way traffic flow eastward towards the Airport's main terminal. The roadway then curves to the north to run parallel to the Airport's main terminal. Just north of the terminal, Executive Terminal Drive curves west and runs until its terminus at Jet Stream Drive. Executive Terminal Drive provides the only entrance/exit to the Airport as well as access to the Alper Airport Executive Center. In conjunction with the main terminal apron buildout, the roadway is planned to provide access to the expanded apron where it will terminate.
- **Jet Stream Drive:** Running parallel to the Airport, Jet Stream Drive is a north-south road located west of the Airport. The two-lane undivided road is accessed via Executive Terminal Drive and provides local access to all Airport facilities. Jet Stream Drive runs from the Quail Air Center facilities in the north to Maverick Aviation Group in the south. Jet Stream drive is planned to terminate at the main terminal apron upon the apron's western buildout. Future access to the Quail Commercial Air Center will be made available from Sunridge Heights Parkway.

17 City of Henderson, 2019/20-2024/25 Capital Improvement Program, https://www.cityofhenderson.com/docs/default-source/public-works-docs/capital-improvement-plan/transportation/16_tcsummary.pdf

1.8.5. Municipal Roadway Planning

As the RTC develops regional transportation plans for Southern Nevada, the City of Henderson develops municipal plans to optimize the local transportation network. The City's recent planning efforts include the Henderson Strong Comprehensive Plan and the *City of Henderson Capital Improvement Plan (CIP).*

Adopted in July 2017, the Henderson Strong Comprehensive Plan communicates the vision, long-term goals, and objectives that guide the physical development and orderly management of growth of Henderson over a 20-year period.[18] The Plan establishes priority transportation corridors throughout the city where the focus will be on increasing public and multimodal transportation opportunities. Among the Plan's priority transportation corridors are State Route 146/Saint Rose Parkway and Sunridge Heights Parkway. Also included in the Plan's priorities is Raiders Way, which is slated for a transformation into a complete street. Additionally, the Plan prioritizes the protection of freeways, highways, and compatible land uses near the Airport to ensure orderly growth in the community and maximize expansion opportunities at the Airport.

The Henderson Strong Comprehensive Plan prioritizes the protection of freeways, highways, and compatible land uses near the Airport to ensure orderly growth in the community and maximize expansion opportunities at the Airport.



18 City of Henderson, Henderson Strong Comprehensive Plan, 2017.

In accordance with the vision and policies of the Henderson Strong Comprehensive Plan, the City of Henderson CIP identifies specific projects to improve the local transportation system. The 2019 CIP, which summarizes all major capital investment projects for July 2020 through July 2025, appropriates approximately 28 percent of capital funds to transportation projects. **Table 1.12** highlights transportation projects in the CIP near the Airport.

Table 1.12 – *CIP Transportation Projects Near Henderson Executive Airport*

Location	Project Number	Project Description
Sunridge Heights – Raiders Way to Seven Hills Drive	ST-042	Construct four-lane roadway along Sunridge Heights between Executive Airport and Seven Hills Drive, with traffic and drainage appurtenances per RTC standards.
Bermuda Road – Volunteer Boulevard to State Route 146/ Saint Rose Parkway	ST-062	Construct to six travel lanes.
Seven Hills Drive – Grand Hills Drive to State Route 146/ Saint Rose Parkway	ST-245	Construction of new roadway surface, ADA improvements, traffic signal modifications, and pedestrian enhancements as appropriate.
Via Nobila – Las Vegas Boulevard to Via Inspirada	ST-263	Construction of new roadway surface, ADA improvements, traffic signal modifications, and pedestrian and bike lane enhancements as appropriate
.	ST-291	Construction of a new trail along Via Inspirada.
Via Inspirada – Las Vegas Boulevard to Raiders Way/ Volunteer Boulevard	ST-291	Construction of a new trail along Via Inspirada.
State Route 146/Saint Rose Parkway at Raiders Way	ST-306	Design capacity improvements along the corridor. Improvements may include lane adjustments, median islands, turn pockets, curb, gutter, sidewalk, traffic signal, signing, striping, and pavement rehabilitation.
Maryland Parkway/Sunridge Heights Parkway	TC-115	Install traffic signal at intersection.
Sunridge Heights Parkway/Raiders Way	TC-121	Install traffic signal at intersection.

Source:
City of Henderson Capital Improvement Plan (CIP), 2020-2025.

Note:
RTC = Regional Transportation Commission of Southern Nevada
ADA = Americans with Disabilities Act

1.8.6. Automobile Parking

Automobile parking for the public, employees, and tenants at the Airport are dispersed among the various buildings and hangars along the west side of the Airport and are all accessible via Executive Terminal Drive. The Airport's parking facilities are summarized below in **Table 1.13**.

Table 1.13 – *Airport Parking Facilities*

Parking Lot	Standard Spaces	Accessible Spaces	Motorcycle Spaces	Total Vehicle Parking Spaces
Main Terminal	474	12	8	494
Main Terminal Apron	16	0	0	16
Quail Air Center	70	0	0	70
Quail Commercial Air Center	99	11	0	110
Airport Maintenance Facility	21	2	0	23
Airport Traffic Control Tower	14	1	0	15
Maverick Aviation Group	90	5	0	95
Total	784	31	8	823

Sources:
NearMap.
Kimley-Horn, 2020.

Note:
Data collected in December 2019.

1.9. Sustainability

Sustainability is the responsible management of the environment while maintaining a viable economy and providing for the social well-being of the community. As the long-term road map for airport development, master plans incorporate sustainability to help reduce environmental impacts, increase operational efficiency, and improve community relations while realizing high, stable levels of economic growth. An evaluation of possible sustainability initiatives at Henderson Executive Airport are included in later chapters of this Airport Master Plan Update.

The CCDOA has adopted departmentwide sustainable practices, approaches, and goals that are implemented throughout the Clark County airport system. The CCDOA Sustainability Team is tasked with maintaining and enhancing community quality of life by reviewing and implementing all sustainability initiatives at the County's airports. At Henderson Executive Airport, a pending change in customer base, brought on by new corporate traffic and the Las Vegas Raiders training and headquarters facility; an increased demand for private hangars and FBO services; and the planned development of adjacent land are the impetus for the CCDOA to demonstrate that the Airport is an efficiently operating facility, a responsible neighbor, and valuable civic partner.

Sustainable practices and features currently in place at the Airport, as described in the Henderson Executive Airport Sustainability Practices and Potential Opportunities brochure, are depicted below in **Figure 1.20**.

Figure 1.20 – *Current Sustainability Practices at Henderson Executive Airport*



ENVIRONMENTAL

Sustainability Practice/Features	Benefits
Noise mitigation: "Fly Safely & Quietly" program	Reduce aircraft noise and avoid overflights of adjacent residential areas; see Section 1.7.4 - Noise Abatement for more information
In-terminal, on-airfield, and centralized hangar recycling	Reduces trash hauling; CCDOA receives rebates on paper, plastic, and cans
LED lighting retrofits: main terminal parking lot, airfield apron, south terminal apron	Reduces cost, maintenance, and energy consumption
Solar power on certain tenant hangars	Reduces cost and energy consumption
CCDOA Environmental Management System (includes stormwater pollution prevention plans [SWPPP], Spill Prevention Control & Countermeasures plans, and environmental guidelines)	Ensures the further advancement and expansion of all Airport facilities through detailed guidance in relation to environmental systems and procedures
HAZMAT disposal and cleanup	Reduces air, water, and soil pollution associated with HAZMAT activities
Asphalt millings repurposing	Runway millings for dust control; reduces water use; eliminates hauling offsite
Drought-tolerant xeriscaping landscape and lower-flow fixtures	Increases water conservation
Waste oil and battery disposal	Reduces the consumption of raw materials; reduces the volume of waste materials that must be treated and disposed of; reduces air, water, and soil pollution associated with HAZMAT activities
Airport Collaborative Decision Making (A-CDM) tool	Reduces fuel consumption and air emissions by reducing delays, increasing the predictability of flight operations, and optimizing the utilization of resources
Dry washing rental cars and aircraft	Reduces water consumption and SWPPP issues
Recycle anti-icing fluid drums	Reduces trash hauling; reduces the consumption of raw materials



SOCIAL RESPONSIBILITY AND COMMUNITY INVOLVEMENT

Sustainability Practice/Features	Benefits
Hosted "Girls in Aviation Day"	Nonprofit dedicated to encouraging/advancing women in aviation-related careers and fields
Sponsor "Young Eagles" program	Gives youth ages 8-17 first airplane ride to introduce/inspire kids in the world of aviation
Sponsor "Eyes Above the Horizon"	Outreach/education program to foster interest in aerospace careers among minority youth
Civil Air Patrol (CAP)	CAP Squadron earned Squadron of Merit Award
CCDOA employees trained in Human Trafficking Awareness	Help CCDOA employees identify and prevent human trafficking



ECONOMIC VITALITY AND CUSTOMER SERVICE

Sustainability Practice/Features	Benefits
Henderson Executive Airport Newsletter	Consistent communication between tenants, lessees, and CCDOA
New pressure hot/cold washer unit at airfield wash rack	Accommodating customer needs
Rental cars and limousine services; electric car charging stations; on-site fuel sales	Accommodating customer needs
Airport Collaborative Decision Making (A-CDM) tool	Reduces customer wait times by reducing delays, increasing the predictability of flight operations, and optimizing the utilization of resources
Water bottle filling stations	Reduces waste and trash hauling

Source:
CCDOA – Henderson Executive Airport Sustainability Practices and Potential Opportunities.

Notes:
LED = light-emitting diode
HAZMAT = hazardous material
CCDOA = Clark County Department of Aviation
Information presented in this table was procured in December 2019.

1.10. Environmental Considerations

This section provides an inventory of existing environmental conditions at and near Henderson Executive Airport. The information was gathered via a review of environmental documents, agency databases, and previous studies. Additionally, this section provides an overview of the local jurisdictional authorities and environmental factors that could potentially be affected by future Airport development. These environmental conditions will be considered in later phases of the Airport Master Plan Update when alternatives are being developed to accommodate forecasted demand.

1.10.1. Water Resources

Airport operations and development can impact local water resources due to stormwater runoff and potential pollutants associated with operations, maintenance, and construction. Water quality standards and guidelines are set forth in Section 401 of the Clean Water Act (33 U.S.C. 1251, et seq.), and the National Pollutant Discharge Elimination System (NPDES) provides regulations that govern the quality of nonagricultural stormwater discharges. To ensure compliance with federal and state regulations, airports must evaluate how projects may impact local water resources and implement appropriate measures to reduce or eliminate adverse impacts.

STORMWATER MANAGEMENT

The Nevada Division of Environmental Protection and the U.S. Environmental Protection Agency (EPA) regulate the runoff, discharge, and treatment of stormwater in Nevada under the National Pollutant Discharge Elimination System. At the local level, representatives from Clark County, the Clark County Regional Flood Control District, and the Cities of Las Vegas, Henderson, and North Las Vegas make up the Stormwater Quality Management Committee, which manages stormwater runoff and pollution in the Las Vegas Valley through the administration of NPDES permits.

Henderson Executive Airport lies within the Las Vegas Wash drainage basin and the Pittman Watershed. As detailed in the Clark County Regional Flood Control District's 2018 Flood Control Master Plan Update, the Nevada Division of Environmental Protection issued a stormwater discharge permit to members of the Stormwater Quality Management Committee that authorizes stormwater discharge from the Las Vegas Valley to the Las Vegas Wash and ultimately into Lake Mead. Stormwater runoff in the Pittman Watershed is conveyed into the Pittman Wash and discharged into the adjacent Duck Creek Wash prior to the confluence with the Las Vegas Wash. Stormwater runoff at the Airport generally flows from the south to the north into an off-site detention basin and into the Pittman Wash.

The U.S. EPA's Environmental Justice Screening and Mapping tool (EJSCREEN) identifies one stream near the Airport that is listed in Section 303(d), Impaired Waters List, Clean Water Act. This impaired stream, or a stream with excess pollutants that are not clean enough to support recreational uses, is part of the Duck Creek Wash and is located approximately 3 miles north of the Airport. The nearest body of water included on the U.S. EPA's Impaired Waters List is the Colorado River, located approximately 22 miles east of the Airport.

FLOODPLAINS

Floodplains are defined by the Federal Emergency Management Agency (FEMA) in Executive Order 11988, Floodplain Management as "lowland and relatively flat areas adjoining inland and coastal waters subject to a 1 percent or greater chance of flooding in any given year." Floodplains are identified on FEMA's Flood Insurance Rate Maps (FIRM) to support the U.S. National Flood Insurance Program. Henderson Executive Airport is located on FEMA Flood Insurance Rate Map number 32003C2910F, dated November 16, 2011, and is displayed in **Appendix B** of this chapter. The FIRM indicates that the majority of the Airport's property and its immediate surroundings are not within a flood hazard area (less than 0.2 percent chance of an annual flood). However, small portions of the Airport's property toward its eastern and southeastern boundaries are impacted by the 100-year floodplain associated with the Pittman East Detention Basin.

WETLANDS

The U.S. EPA defines wetlands as areas where water covers the soil or is present either at or near the surface of the soil year-round or seasonally. Wetlands may support both aquatic and terrestrial species. Wetlands and jurisdictional "Waters of the U.S." are protected under Sections 401 and 404 of the Clean Water Act (33 U.S.C. 1251, et seq.) and Executive Order 11990, Protection of Wetlands. Federal mandates require that agencies avoid impacts to wetlands to the greatest extent possible. If impacts are unavoidable, the agencies must explain that no practical alternative exists and provide measures to mitigate the proposed development's unavoidable impacts.

According to the U.S. Fish and Wildlife Service's (USFWS) National Wetlands Inventory Map, multiple wetlands intersect the Airport's property. These wetlands are part of the Pittman Wash and are classified as R4SBC, meaning they are riverine systems and intermittent streams that may be seasonally flooded. No other wetlands are located on Airport property.

1.10.2. Endangered and Threatened Species

The Endangered Species Act (16 U.S.C. 1531-1544, 87 Stat. 884) and the Fish and Wildlife Coordination Act (16 U.S.C. 661-667e, 48 Stat. 401) require that agencies' actions do not jeopardize the existence of endangered or threatened species or their habitats. The U.S. Fish and Wildlife Service has jurisdiction over federally endangered and threatened species in Nevada. Locally, the Nevada Department of Wildlife is the state agency responsible for the restoration and management of fish and wildlife resources and has jurisdiction over Nevada state threatened and endangered species as well as other protected terrestrial, aquatic, plant, and animal species. Additionally, the Nevada Natural Heritage Program is tasked with tracking and collecting information on Nevada's at-risk species and biological communities.

Figure 1.21 – *Endangered, Threatened, and Protected Species within Airport Environs*

Endangered

- **Southwestern Willow Flycatcher** – *Empidonax traillii extimus*
- **Yuma Clapper Rail** – *Rallus longirostris yumanensis*
- **Pahrump Poolfish** – *Empetrichthys latos*

Threatened

- **Desert Tortoise** – *Empetrichthys latos*

Birds of Concern

- **Bendire's Thrasher** – *Toxostoma bendirei*
- **Costa's Hummingbird** – *Calypte costae*
- **Burrowing Owl** – *Athene cunicularia*
- **Golden Eagle** – *Aquila chrysaetos*
- **Clark's Grebe** – *Aechmophorus clarkii*
- **Rufous Hummingbird** – *Selasphorus rufus*

Sources:
U.S. Fish and Wildlife Service Information for Planning and Consultation tool (accessed December 2019).
Kimley-Horn, 2020.

According to the Nevada Natural Heritage Program's July 2018 At-Risk Plant and Animal Tracking Report, Nevada is home to 283 state-listed, at-risk (rare, threatened, or endangered) plant species. Additionally, the U.S. Fish and Wildlife Service's Information for Planning and Consulting tool identifies 12 federally-listed threatened or endangered species and eight critical habitats (specific geographic areas that contain features essential to the conservation of an endangered or threatened species) in Clark County. Within the general vicinity of the Airport (approximately a 2-mile radius), there are an estimated four endangered species and six migratory birds of concern. These species are listed below in **Figure 1.21**.

It should be noted that Henderson Executive Airport currently does not have a Wildlife Hazard Management Plan. However, Airport management has indicated that a wildlife assessment and program implementation is anticipated for 2021 and 2022.

1.10.3. Noise Exposure

As previously discussed, the compatibility of existing and planned land uses in the vicinity of an airport is generally attributed to the noise impacts on adjacent communities related to airport operations. Title 14 CFR Part 150 provides procedures, standards, and guidance for controlling planning for aviation noise compatibility in an airport's environs. These procedures and standards are used to prepare noise exposure maps and noise compatibility programs, which help communities plan for compatible land use around airports to minimize impacts for noise exposure.

In anticipation of the construction of Runway 17R/35L, potential aircraft noise and subsequent impacts to the surrounding environs were evaluated as part of a 1998 environmental assessment. Official noise exposure maps were developed and applied to the AEOD.[19] As discussed in Section 1.7.1 - Zoning, though the areas surrounding the Airport have experienced substantial growth in residential development, most land uses within the AEOD are compatible with airport operations. Additionally, voluntary noise abatement procedures, as discussed in Section 1.7.4 - Noise Abatement, have been established to minimize aircraft noise disturbances over the surrounding communities. Updated noise exposure maps based on historical and forecasted operations will be developed as part of this Airport Master Plan Update and will be detailed in a later section.

1.10.4. Sections 4(f) and 6(f) Resources

Section 4(f) of the U.S. DOT Act of 1966 specifies that U.S. Department of Transportation agencies cannot approve the use of land from publicly owned parks, recreational areas, wildlife and waterfowl refuges, or public and private historical sites unless there is no feasible alternative that would avoid such use and the applied program includes all possible planning efforts to minimize resultant harm.[20] Section 6(f) of the Land and Water Conservation Fund Act prohibits the conversion of lands purchased with Land and Water Conservation Fund Act funds to nonrecreational uses without the explicit approval of the Secretary of the Department of the Interior through the National Park Service and the replacement of those lands with a reasonable equivalent.[21]

There are several public parks and recreation areas surrounding Henderson Executive Airport, including:

- Allegro Park – northeast of the Airport, along Seven Hills Drive
- Avellino Park – northwest of the Airport, between African Sunset Street and Chaperral Road
- Puccini Park – northeast of the Airport, along Seven Hills Drive
- Solista Park – southeast of the Airport, along Via Firenza
- Sonata Park – east of the Airport, along Seven Hills Drive
- Vivaldi Park – east of the Airport, along Seven Hills Drive

Although additional research is needed to determine if any Land and Water Conservation Fund Act funds were used in the development of these recreational facilities, future Airport development must consider the potential for direct or indirect impacts to any local Section 4(f) or Section 6(f) resources.

19 Clark County Department of Aviation, Final Environmental Assessment Master Plan Report Recommendations for Henderson Executive Airport, 1998.

20 U.S. Department of Transportation – Federal High Administration, 2020.

21 U.S. National Park Service, Land and Water Conservation Fun, 2020.

1.10.5. Air Quality

Air quality is measured by the amount of pollution in the air at a given time. The federal Clean Air Act (42 U.S.C. Sections 7401-7671q) established National Ambient Air Quality Standards for six criteria air pollutants: carbon monoxide (CO), lead, nitrogen dioxide, ozone (O3), particulate matter (PM10 and PM2.5), and sulfur dioxide. Geographic areas where air pollutant standards are not met are designated as "nonattainment areas," defined by the Clean Air Act as locations where air pollution levels persistently exceed the National Ambient Air Quality Standards or contribute to ambient air quality in a nearby area that fails to meet standards.

In accordance with the Nevada Revised Statute 445B.500 of 2017, and by direction of the Clark County Board of County Commissioners, the Clark County Department of Air Quality has been delegated the authority to monitor air quality and implement and enforce an air pollution control program. According to the U.S. EPA Nonattainment/Maintenance Status Report and the Clark County Department of Air Quality's 2019 Annual Network Report, the Las Vegas Valley is designated as a marginal nonattainment area for O3 and attainment/unclassifiable for all other criteria pollutants. Additionally, portions of Clark County, including the Las Vegas Valley, are subject to maintenance plans for PM10, CO, and O3.

1.10.6. Hazardous Materials

Various statutes govern FAA and airport actions as they relate to the use, storage, and disposal of hazardous materials and the environmental threats caused by mishandling these materials. Federal guidance and regulations for hazardous materials are provided by the Resource Conservation and Recovery Act (42 U.S.C. Section 6901, et seq.), the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S.C. Section 9601), and the Community Environmental Response Facilitation Act (Public Law 102-426).

Businesses or other entities in Nevada that handle hazardous materials are required to comply with the Nevada Revised Statutes Chapter 459, *Hazardous Materials*. The Nevada Bureau of Sustainable Materials Management, through the Nevada Division of Environmental Protection, regulates permitting and compliance with hazardous materials programs in the state.

Hazardous substances regularly used at Henderson Executive Airport include aircraft and vehicle fuels. Smaller amounts of hazardous substances also commonly used at airports include lubricants and solvents, used oils, filters, cleaning residues, spent batteries, herbicides, fertilizers, and paints. In the general vicinity of the Airport, there are no Superfund (federal program to cleanup uncontrolled hazardous waste) or Brownfield (land that may contain a hazardous substance, pollutant, or contaminant) sites within 5 miles of the Airport according to the U.S. EPA's Environmental Justice Screening and Mapping tool.

2. AVIATION ACTIVITY FORECASTS



Projections of future aviation activity at an airport provide a foundation for effective decision-making in planning and development. These forecasts are used to determine the type, size, and timing of new or expanded airport facilities to meet anticipated needs. They also are used to justify the financial investment required for those improvements.

The forecasts presented in this chapter represent a 20-year outlook of aviation-related activity at Henderson Executive Airport (the Airport). The Federal Aviation Administration (FAA) three letter identifier for Henderson Executive Airport is HND. The projections use 2019 as the base year and 2039 as the ultimate planning horizon. These forecasts are unconstrained, meaning they assume that necessary facilities will be developed to accommodate all aviation activity demand over the forecasted period. Specific facility needs based on forecast demand are presented in the subsequent chapter.

It is essential to note that these forecasts were submitted to the FAA for review and approval in December 2020. On March 11, 2020, the World Health Organization (WHO) declared the outbreak of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2 and more commonly referred to as COVID-19) as a global pandemic, which had major worldwide economic impacts that affected nearly every industry, including aviation. In response to the pandemic, the U.S. government issued restrictions on international travel to and from the U.S., and most states announced temporary “shelter-in-place” orders that required people to stay in their homes except for activities deemed “essential.” As nationwide COVID-19 cases began to wane by May 2020, shelter-in-place orders were gradually lifted and local economies slowly reopened. However, a second surge in cases, especially in southern and western states including Nevada, which prompted the temporary reversal of many reopening plans and brought further uncertainty to the future of the virus and the country’s long-term economic health. As of December 2020, nationwide COVID-19 cases and virus-related deaths began to rapidly increase, although multiple pharmaceutical companies had identified positive trial results of vaccines, which were projected to be available for widespread distribution in 2021.

The statewide economy of Nevada, and the Las Vegas Metropolitan Area (including Henderson) were significantly impacted by COVID-19, as gaming was halted throughout the State for 78 days beginning March 18, 2020. Gaming restrictions combined with postponements and cancellations of large conventions and conferences resulted in an approximate 55 percent decline of visitor volume in Las Vegas through September 2020 according to the Las Vegas Convention and Visitors Authority.

As noted in subsequent sections of this chapter, a significant portion of aviation activity at Henderson Executive Airport is generated by itinerant users that utilize the Airport as a gateway to Las Vegas. As such, it is unsurprising that the Airport also experienced a reduction in operational activity in 2020. According to the FAA’s Air Traffic Activity Data System (ATADS), through October 2020, total operations declined approximately 27 percent from 2019 levels, though local operations increased 24 percent during the same time period. Tour operator enplanement data for 2020 were not available; however, CCDOA staff noted that passenger activity had also declined from 2019.

Though forecasts are typically based on historical data through the most recent calendar year, it is important to acknowledge existing (real) conditions. Despite a significant decline in operational activity at the Airport because of the COVID-19 pandemic, monthly operations in 2020 increased July through October and there had not been any tenant closures, relocations, or lease defaults that would indicate that long-term forecasts presented in this chapter could not be realized, though they may not be realized in the planning period as projected in this forecast. Activity at Henderson Executive Airport is closely tied to the economy of the

Las Vegas Metropolitan Area, and it is anticipated that once a vaccine for COVID-19 becomes widely available to the public, travel patterns locally will return to pre-pandemic levels after an adjustment period because the underlying economic demand drivers have not been removed.

2.1. Introduction

This chapter is a critical component of the Airport Master Plan Update because forecasts of aviation activity have direct impacts on airfield capacity, existing and future facility needs, and funding for capital improvements. Forecasts are one of two components of a master plan (the other being the Airport Layout Plan) that is reviewed and approved by the FAA.

This chapter presents an overview of historical aviation activity, previous forecasts, assumptions used in the current forecast analysis, and the methodologies used to project future aviation demand at the Henderson Executive Airport. Forecasts were developed for aircraft operations and based aircraft as well as aircraft fleet mix, military operations, peak operations, and passenger enplanements. An analysis that identified the Airport's existing and future design aircraft (the most demanding aircraft that conducts 500 annual operations) also is presented.

This forecast analysis considered historical aviation trends at the Airport, within the Las Vegas metropolitan region, and nationwide. Local historical data were collected from Airport management (Clark County), FAA sources including the Terminal Area Forecast (TAF), the ATADS database, Traffic Flow Management System Counts (TFMSC) database, the 5010-1 Airport Master Record, and airport traffic control tower (ATCT) personnel. In addition, socioeconomic data for the Las Vegas Metropolitan Statistical Area (MSA), the State of Nevada, and Clark County were examined to discern local and regional trends and conditions that could impact aviation demand.

As the aviation activity forecasts presented here form the foundation of recommended improvements described later in this Airport Master Plan Update, they require approval from the FAA. Therefore, the selected forecasts are compared against the FAA's forecasts as detailed in the TAF. Substantial differences between master plan forecasts and the TAF must be adequately justified and resolved. For all classes of airports, forecasts are considered consistent with the TAF if they differ by less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period. As shown in **Figure 2.1**, the 5-year based aircraft forecast exceeds the 10 percent criteria, which is attributed to using 2019 data reported by the Airport instead of the TAF. Adjusting the TAF data to reflect current based aircraft counts results in a selected forecast that is considered consistent. The forecasts of total aircraft operations presented in this Airport Master Plan Update satisfy the criteria for approval at the FAA's Airports District Office (ADO) level.

Definitions:

Based Aircraft – An aircraft that is operational and airworthy, which is typically based at a facility for a majority of the year.

Operation – A takeoff or landing at the airport. A touch and go counts as two operations.

Enplaned Passenger – A passenger that enplanes or boards an aircraft at the Airport.

Key Abbreviations:

TAF – Terminal Area Forecast

ATADS – Air Traffic Activity Data System

TFMSC – Traffic Flow Management System Counts

ATCT – Airport Traffic Control Tower

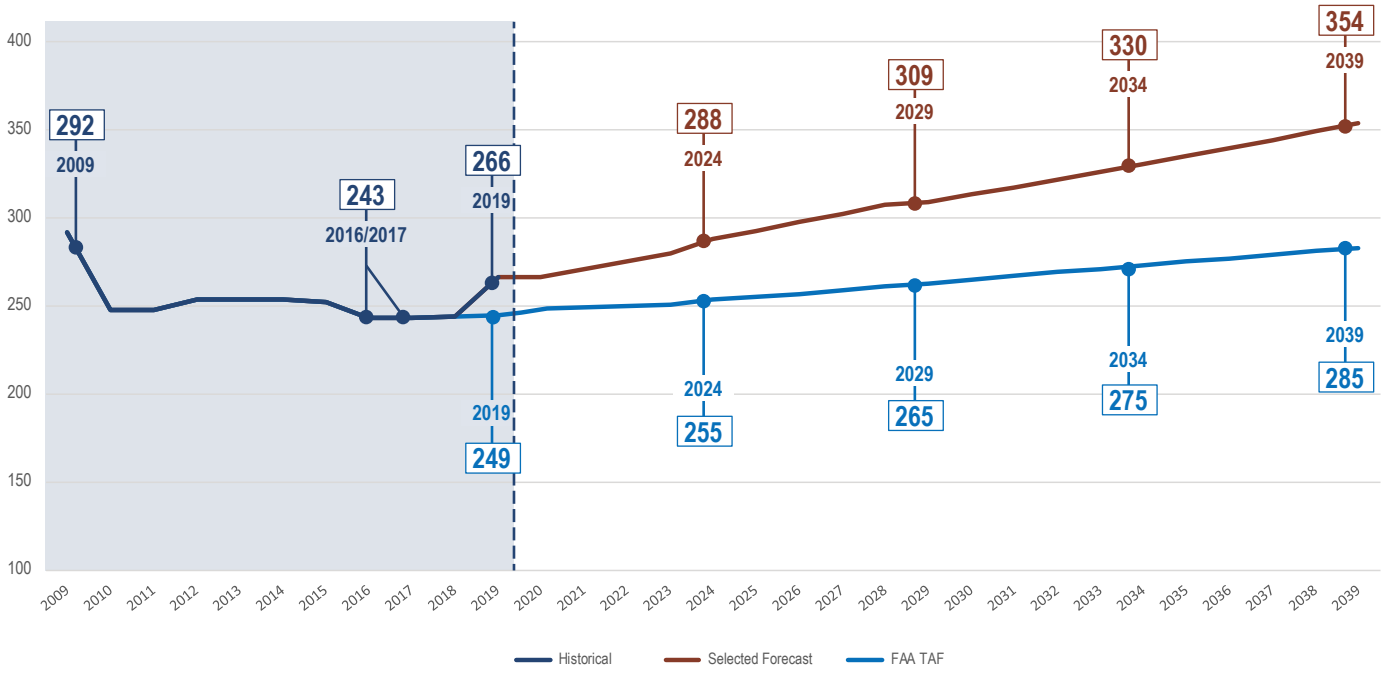
MSA – Metropolitan Statistical Area

AAGR – Average Annual Growth Rate

The analysis conducted for this Airport Master Plan Update resulted in the following forecasts for Henderson Executive Airport as summarized here and discussed in further detail in this chapter.

The selected forecasts reflect 20-year growth in based aircraft from 266 to 354; an increase in operations from 72,225 to 109,200 (see **Figure 2.2**); and an increase in enplanements from 56,662 to 72,150.

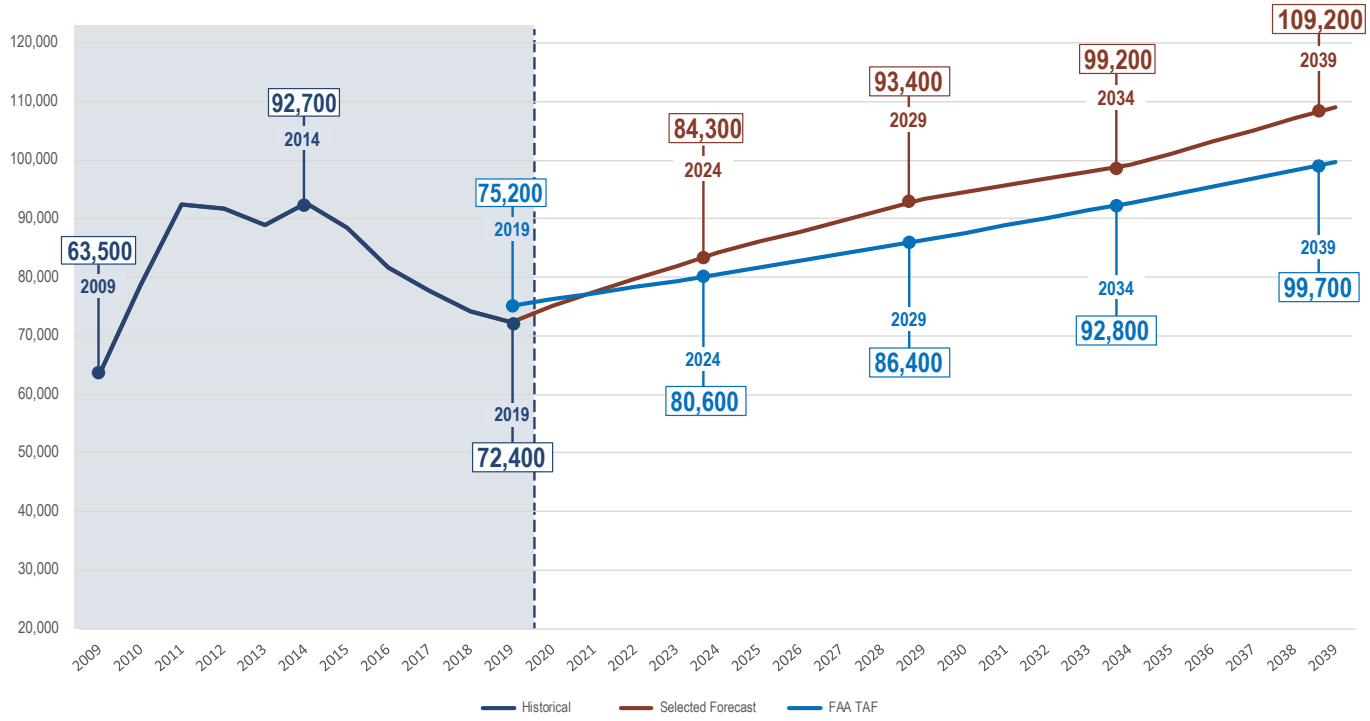
Figure 2.1 – *Historical and Forecast Based Aircraft*



Sources:
FAA Terminal Area Forecast, issued December 2019.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.



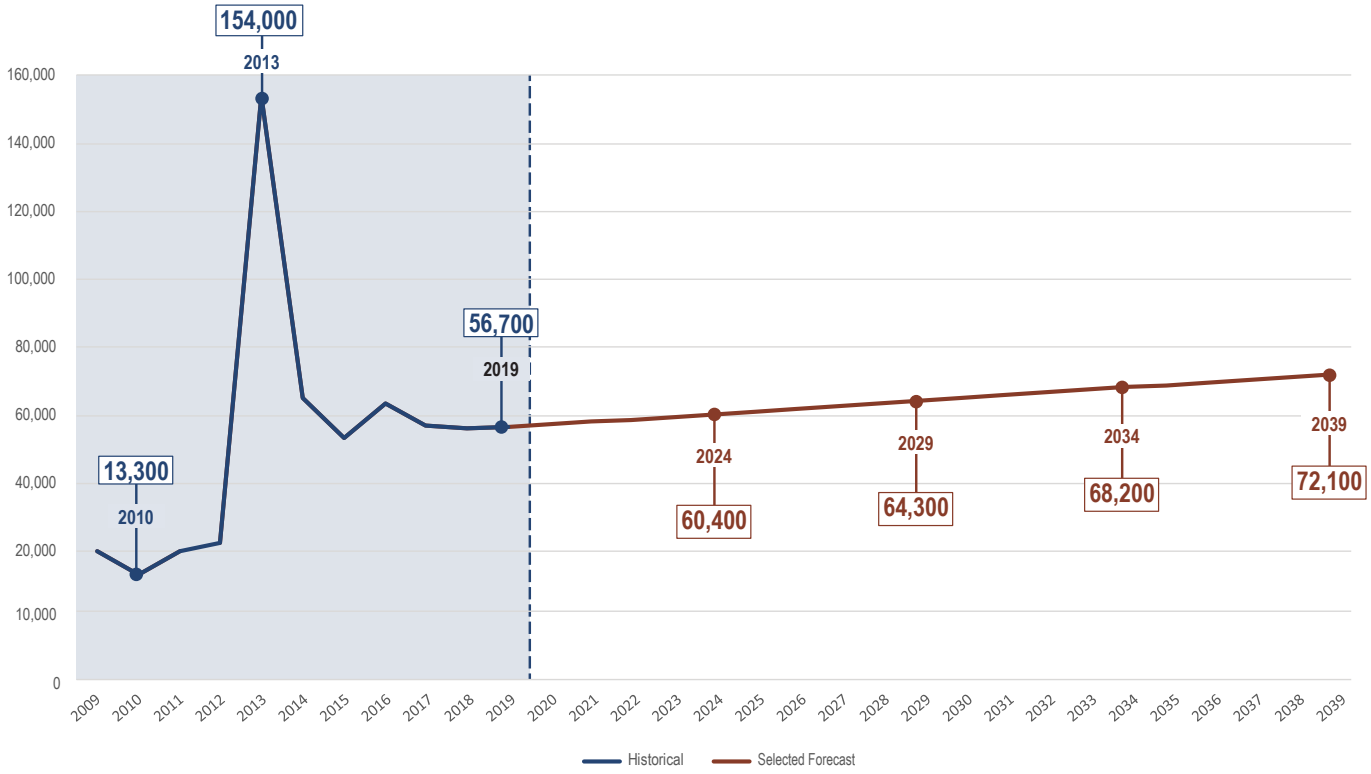
Figure 2.2 – *Historical and Forecast General Aviation Operations*



Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

The selected forecasts project steady growth in based aircraft, total operations, and passenger enplanements as shown in **Figure 2.3**. In addition, based on historical activity and projected trends at the Airport, there is an anticipated continued shift in the based aircraft fleet mix from a higher proportion of single-piston aircraft towards larger turbo-prop and jet aircraft. This trend in the fleet mix is true of both the based aircraft and the operational fleet at the Airport. The forecasts also indicate a change in the Airport Reference Code (ARC) from C-II (existing) to D-III (future). Similarly, the Airport's future design aircraft was determined to be the Gulfstream G650, compared to the current design aircraft of the Challenger 300/350.

Figure 2.3 – *Historical and Forecast Enplanements*



Sources:
FAA Passenger Boarding and All-Cargo and All-Cargo Data for U.S. Airports.
Las Vegas Convention and Visitors Authority.
Kimley-Horn, 2020.¬

Figure 2.4 – *Henderson Executive Airport Aviation Activity Forecasts*

Henderson Executive Airport Aviation Activity Forecasts

YEAR	Total Operations	Passenger Enplanements	Based Aircraft
2019	72,644	56,662	266
2024	84,597	60,391	288
2029	93,632	64,302	309
2034	99,491	68,214	330
2039	109,429	72,126	354
AAGR 2019-2039	2.53%	1.36%	1.65%

Sources: FAA Air Traffic Activity Data System. FAA Traffic Flow Management System Count Database. FAA National Based Aircraft Inventory Program. FAA Passenger Boarding and All-Cargo and All-Cargo Data for U.S. Airports. Kimley-Horn, 2020.

Note: AAGR = average annual growth rate

It is important to recognize that there can be short-term fluctuations in an airport's activity due to a variety of unforeseen factors that can be difficult to anticipate. This is especially important to consider at a facility such as Henderson Executive Airport, where growing demand for development and a shift in the Airport's based and itinerant aircraft fleet is likely to continue in the future. The forecasts developed for this Airport Master Plan Update are intended to consider the routine ebb and flow in aviation activity levels while projecting what the long-term trend of activity will most likely be.

2.2. Historical Activity

At general aviation (GA) airports such as Henderson Executive Airport, the two primary indicators of activity are based aircraft and aircraft operations. A based aircraft is defined as an aircraft that is considered airworthy and is stored at an airport for the majority of the year. An aircraft operation represents either a takeoff or landing conducted by an aircraft; as a result, a takeoff and a landing—including those that occur with flight training "touch-and-go" practice flights—count as two operations.

There are multiple data sources that provide based aircraft and aircraft operations information for the Airport. Three sources were consulted to identify historical aircraft operations at the Airport:

» The TAF is the official FAA forecast of aviation activity for U.S. airports and it contains historical data and projections for active airports in the National Plan of Integrated Systems (NPIAS). The TAF is updated annually and reports data based on the FAA's fiscal year (October 1 through September 30).

- The FAA's ATADS database publishes calendar year aircraft operations data as reported by an airport's airport traffic control tower (ATCT). Overflights are removed from the report, and the database is updated monthly.
- The FAA's TFMSC database reports operations by aircraft type, weight class, date, approach and design category, and user class. However, it does not always contain this data for every operation conducted at an airport because it is usually derived from filed flight plans that do not always include all actual aircraft operations. This source was used to identify the Airport's ARC and design aircraft but is not shown in **Table 2.1**.

It should be noted that the Airport also experiences passenger enplanement activity, which is generated by tenants that provide sight-seeing and transport services. Therefore, a forecast of passenger enplanements is presented in this chapter even though these enplanements are not reported in the FAA TAF.

Historical annual general aviation operations by data source and average annual growth rates (AAGR) are presented in **Table 2.1**. Because ATADS data reflect operations reported by the Airport's ATCT, it is the recommended source for forecasting purposes.

Table 2.1 – *Historical General Aviation Operations*

Year	Air Traffic Activity Data System	FAA Terminal Area Forecast
2009	63,516	60,502
2010	78,576	76,383
2011	92,534	89,151
2012	91,682	93,648
2013	88,981	89,505
2014	92,686	91,388
2015	88,547	88,560
2016	81,709	82,666
2017	77,680	78,694
2018	74,155	75,093
2019	72,370	75,225
AAGR 2009-2019	*1.31%*	*1.42%*

Sources:
FAA Air Traffic Activity Data System accessed November 2019.
FAA Terminal Area Forecast, issued February 2019.

Notes:
AAGR = average annual growth rate
Table does not include military operations.
Year 2019 Terminal Area Forecast operations are estimated.

Airport Staff conducted a thorough inventory in December 2019 that identified 266 based aircraft. These aircraft were uploaded into the National Based Aircraft Inventory Program (sometimes referred to by its website, www.basedaircraft.com), which validated 205 based aircraft, meaning that there were 61 aircraft that were reported at other airports. Based on coordination with staff at the FAA's Phoenix ADO, it was concluded that because the Airport already provides facilities such as apron and hangar space to accommodate the 266 documented aircraft, this number should be used as the base figure to develop based aircraft forecasts. Historical based aircraft is presented in **Table 2.2**. Historical based aircraft as reported by the FAA TAF are shown for years 2009 through 2018, and the 266 figure uploaded to the National Based Aircraft Inventory Program is shown for year 2019.

Table 2.2 – *Historical Based Aircraft*

Year	Based Aircraft
2009	292
2010	248
2011	248
2012	254
2013	254
2014	254
2015	252
2016	243
2017	243
2018	244
2019	266
AAGR 2009-2019	*-1.7%*

Sources:
FAA Terminal Area Forecast, issued February 2019 (years 2009 through 2018).
National Based Aircraft Inventory Program (2019).

Notes:
AAGR = average annual growth rate
205 of the 266 based aircraft identified in the National Based Aircraft Inventory Program were "validated" at Henderson Executive Airport.

2.3. Forecasting Assumptions

The number of based aircraft and annual aircraft operations have declined gradually at the Airport over the past several years, as shown in the previous section. However, it is important to note that the operational fleet mix of the Airport also has changed during this time. The Airport accommodates various tenants and types of aviation activity, but recently the Airport has experienced a greater proportion of corporate/business activity than in the past.

The volume and type of aviation activity that occurs at a particular airport is typically driven by controllable factors (hangar rents, services provided, maintenance of facilities, etc.) and noncontrollable factors (local/national economic conditions, availability of funding, location, etc.). To account for shifts in activity type and volume that will likely occur over the 20-year planning horizon, the following assumptions have been identified as they pertain to forecast development:

- The Airport will continue to be a general aviation airport and not serve scheduled air carrier activity.
- Socioeconomic data provided by Woods & Poole Economics, Inc. and the Las Vegas Convention and Visitors Authority are indicative of existing and future conditions at the state and local level.
- The FAA will continue to include the Airport in the NPIAS, meaning it will be eligible to receive grants under the Airport Improvement Program (AIP).
- The Airport Sponsor will continue to maintain an active capital improvement program and pursue funding for necessary improvements as demand dictates.
- Though the Airport is located in an area of rapid residential and commercial growth, future nearby development will not constrain the functionality of the Airport or restrict operational activity.

2.4. Previous Forecasts

Previous forecasts of based aircraft and operations were examined for validity and as a baseline comparison for the forecasts developed in this Airport Master Plan Update. Two sources were examined: the FAA TAF and forecasts developed as part of an Airport Land Use Plan completed in 2004.

Previous based aircraft and operations forecasts, by source, are shown in **Table 2.3**. Based aircraft forecasts are reported in the FAA TAF and the 2004 Land Use Plan, but the 2004 Land Use Plan did not forecast based aircraft beyond 2020. Though operations forecasts were developed for the TAF and the 2004 Land Use Plan, only the FAA TAF projects activity through the 20-year Airport Master Plan Update study period. Since previous forecasts other than the FAA TAF are not available for the study period, updated forecasts are necessary as a component of this Airport Master Plan Update.

Table 2.3 – *Previous Henderson Executive Airport Forecasts*

Year	FAA Terminal Area Forecast		2004 Land Use Plan	
	Operations	Based Aircraft	Operations	Based Aircraft
2019	75,516	245	--	--
2020	76,551	249	169,150	278
2021	77,603	250	--	--
2022	78,671	251	--	--
2023	79,758	254	--	--
2024	80,866	255	--	--
2025	81,995	257	--	--
2026	83,140	259	--	--
2027	84,305	261	--	--
2028	85,487	263	--	--
2029	86,690	265	--	--
2030	87,918	267	--	--
2031	89,166	269	--	--
2032	90,435	271	--	--
2033	91,729	273	--	--
2034	93,043	275	--	--
2035	94,380	277	--	--
2036	95,744	279	--	--
2037	97,131	281	--	--
2038	98,543	283	--	--
2039	99,978	285	--	--

Sources:
FAA Terminal Area Forecast, issued February 2019.
2004 Airport Land Use Plan.

Notes:
Year 2019 FAA Terminal Area Forecast based aircraft and operations are estimated. 2004 Land Use Plan used 2000 as a base year. 2020 operations and based aircraft are forecasts of activity.

It should be noted that operations forecasts developed for the ongoing Las Vegas Metroplex EA were also consulted, but the EA study only examined instrument flight rule (IFR) operations at the Airport, and, therefore, these forecasts are not included in **Table 2.3**.

2.5. Socioeconomic Background

Forecasts of based aircraft and operations presented in this chapter use historical and projected socioeconomic data as well as other indicators to identify expected aviation demand. Depending on an airport's role within the regional and national system and the demands of the population and user base that it serves, socioeconomic conditions of the local community can often influence existing and future aviation-related activity. The geographical areas that were examined for this forecast analysis included the Las Vegas MSA and the State of Nevada. The Las Vegas MSA comprises greater Las Vegas including the communities of Henderson, Paradise, North Las Vegas, and Boulder City (see **Figure 2.5**).

This analysis examined historical trends and future projections of population, employment, and per capita personal income. Socioeconomic data were obtained from Woods & Poole Economics, Inc., an independent firm that specializes in long-term economic and demographic projections. Additionally, historical annual Clark County visitor volume and gaming revenue data were obtained from the Las Vegas Convention and Visitors Authority (LVCVA) and included in the socioeconomic analysis.

Historical socioeconomic data from 2009 to 2019 were analyzed to identify possible links to aviation activity at the Airport. **Table 2.4** presents a summary of historical and projected population, employment, and per capita personal income for the Las Vegas MSA and the State of Nevada as well as historical and projected Clark County visitor volume and gaming revenues. Forecast visitor volume and gaming revenues were developed using a linear regression of historical data from 2009 to 2019. Further analysis of this data is discussed below.

Figure 2.5 – *Las Vegas Metropolitan Statistical Area Map*

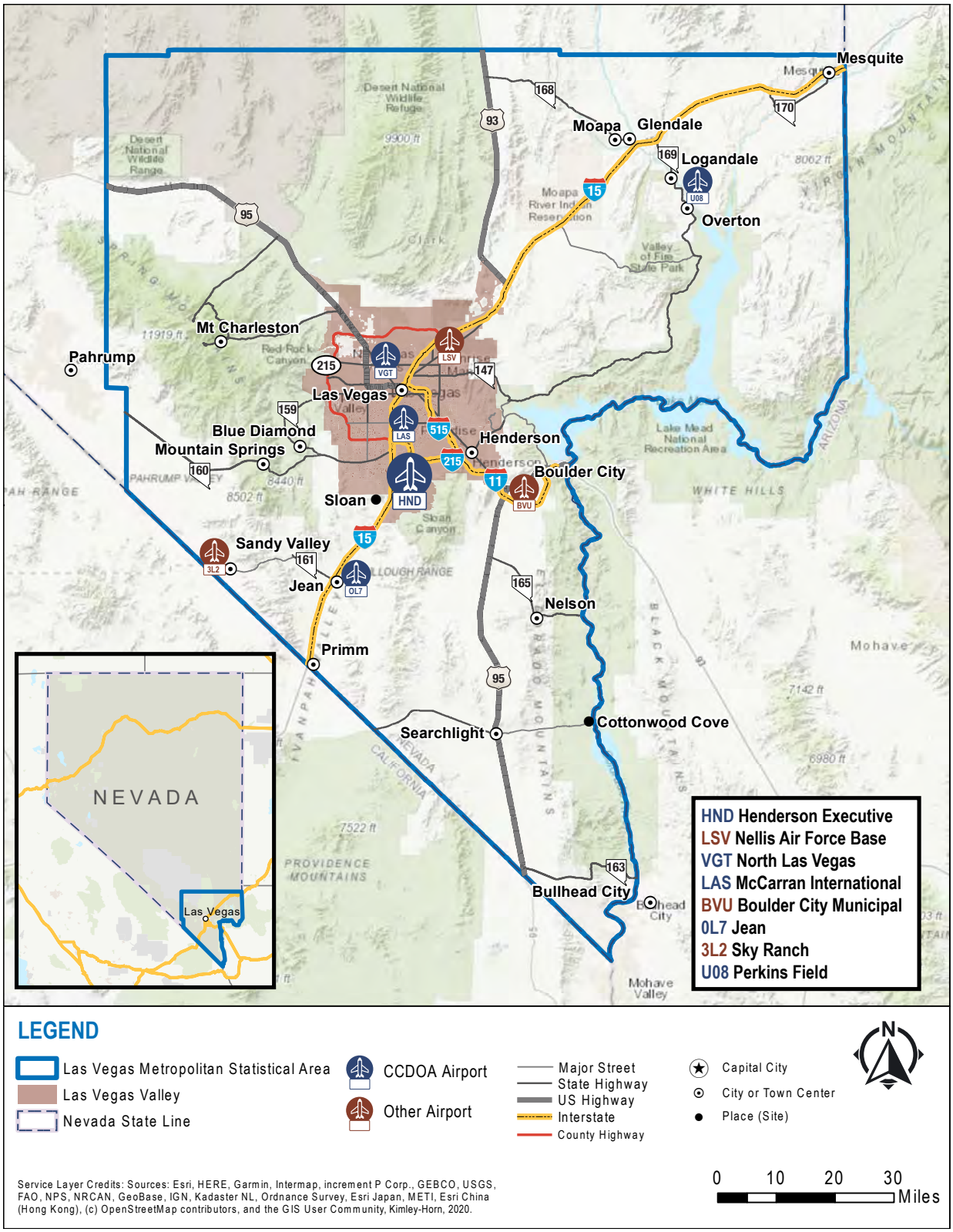


Table 2.4 – *Historical and Forecast Socioeconomic Indicators*

Year	Population		Employment		Per Capita Personal Income		Clark County	
	Las Vegas MSA	Nevada	Las Vegas MSA	Nevada	Las Vegas MSA	Nevada	Visitors	Gaming Revenue
Historical								
2009	1,939,407	2,684,665	1,086,009	1,524,074	$43,276	$44,199	36,351,469	$8,838,261,000
2010	1,953,263	2,703,493	1,057,759	1,483,883	$42,452	$43,464	37,335,436	$8,908,574,000
2011	1,967,159	2,718,586	1,078,835	1,508,401	$41,929	$43,373	38,928,708	$9,222,677,000
2012	1,998,646	2,755,245	1,093,543	1,524,033	$43,659	$44,475	39,727,022	$9,399,845,000
2013	2,029,316	2,791,494	1,126,440	1,566,458	$42,379	$43,638	39,668,221	$9,674,404,000
2014	2,069,681	2,839,099	1,166,051	1,614,815	$43,365	$44,691	41,126,512	$9,553,864,000
2015	2,102,944	2,881,692	1,192,415	1,649,513	$44,217	$45,452	42,312,216	$9,617,671,000
2016	2,138,330	2,927,109	1,218,744	1,684,094	$45,001	$46,208	42,936,100	$9,713,930,000
2017	2,174,305	2,973,250	1,244,998	1,718,459	$45,782	$46,962	42,214,200	$9,978,503,000
2018	2,210,842	3,020,068	1,271,269	1,752,773	$46,576	$47,724	42,116,800	$10,249,964,000
2019	2,247,962	3,067,597	1,297,792	1,787,339	$47,386	$48,502	42,507,200	$10,337,453,333
Forecast								
2024	2,441,978	3,315,367	1,433,823	1,963,710	$51,580	$52,505	46,731,511	$11,017,780,273
2029	2,648,743	3,578,140	1,572,590	2,142,199	$55,709	$56,400	49,859,817	$11,731,436,485
2034	2,863,272	3,849,074	1,710,001	2,317,930	$59,402	$59,832	52,988,124	$12,445,092,697
2039	3,080,771	4,121,702	1,849,846	2,495,335	$63,122	$63,256	56,116,430	$13,158,748,909
AAGR								
2009-2019	1.59%	1.43%	1.95%	1.73%	0.95%	0.97%	1.69%	1.70%
2019-2039	1.85%	1.72%	2.13%	1.98%	1.66%	1.52%	1.60%	1.36%

Sources:
Woods & Poole Economics, Inc.
Las Vegas Convention and Visitors Authority.

Notes:
MSA = Metropolitan Statistical Area
AAGR = average annual growth rate
All monetary values are presented in 2019 dollars to adjust for inflation. Forecasts of Clark County visitor volume and gaming revenue were developed using linear regression of 2009-2019 data.

2.5.1. Population

As shown in **Table 2.4**, the Las Vegas MSA and the State of Nevada experienced strong population growth between 2009 and 2019 with AAGRs of 1.59 percent and 1.43 percent, respectively. The populations of both areas are anticipated to increase at higher rates between 2019 and 2039 with an AAGR of 1.85 percent for the Las Vegas MSA and 1.72 percent for Nevada.

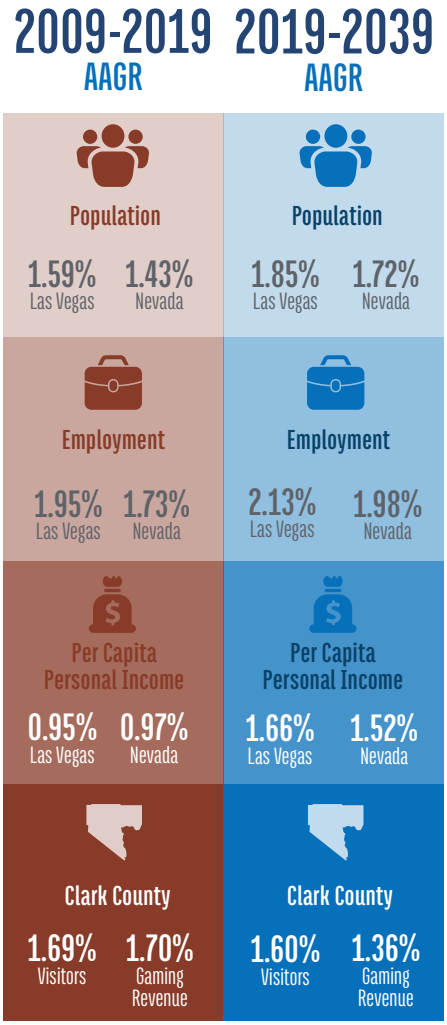
2.5.2. Employment

Historical employment (number of employed persons) in both the Las Vegas MSA and Nevada outpaced population growth between 2009 and 2019 with AAGRs of 1.95 percent and 1.73 percent, respectively. Employment growth is projected to continue to be strong throughout the 20-year planning period and outperform population growth (2.13 percent AAGR for the Las Vegas MSA and 1.98 percent AAGR for the State of Nevada).

2.5.3. Per Capita Personal Income

Per capita personal income is another way to measure the economic growth of an area and provides a broad measure of individual economic well-being. Per capita personal income is a composite measure of market potential and indicates the general ability of persons to purchase products and services (e.g., aircraft ownership or propensity toward corporate travel). The per capita personal income growth rates for both the Las Vegas MSA (0.95 percent) and the State of Nevada (0.97 percent) from 2009 to 2019 were slightly lower than other socioeconomic variables considered for this analysis. The lower growth was likely attributed to a recovering economy following the 2007-2009 Great Recession.

Per capita personal income for both the Las Vegas MSA and State of Nevada are projected to increase at a significantly higher rate between 2019 and 2039, with AAGRs of 1.66 percent and 1.52 percent, respectively.



Sources:
Woods & Poole Economics, Inc.
Las Vegas Convention and Visitors Authority.
Kimley-Horn, 2020.

2.5.4. Visitor Volume and Gaming Revenue

Due to Clark County's unique role as a tourism and gaming destination, historical visitor and gaming revenue data for the County also were analyzed to identify potential links to aviation activity at the Airport. Historical data were obtained from the LVCVA, and forecasts were developed using a linear regression of annual totals between 2009 and 2019. As shown in **Table 2.4**, annual visitors to Clark County increased from 36.4 million in 2009 to 42.5 million in 2019, representing an AAGR of 1.69 percent. The regression analysis projected an AAGR of 1.60 percent through 2039, resulting in 56.1 million visitors that year.

Clark County gaming revenue increased from $8.8 billion in 2009 to $10.3 billion in 2019, reflecting an AAGR of 1.70 percent. Using a linear regression, County gaming revenues were anticipated to increase 1.36 percent annually through the 20-year projection period, resulting in $13.2 billion in revenues in 2039.

2.6. Based Aircraft Forecasts

Forecasts of based aircraft influence the planning and development of required hangar space, aircraft parking apron, and other related facilities. Fluctuations in based aircraft activity at the Airport in recent years is primarily attributed to the relocation of a flight school tenant to a different airport and turnover in the Airport's fleet mix. As a result, the overall approach to forecast development was based on analysis of existing activity and identification of trends that will most likely impact activity in the future, rather than relying on historical data. As previously noted, based aircraft are defined by the FAA as those considered airworthy and stored at an airport for the majority of the year (in hangars or on tie-down spaces). In coordination with the FAA, a baseline of 266 based aircraft was established as the base figure for 2019. Based aircraft at the Airport during the planning horizon from 2019 to 2039 were forecasted using several methodologies culminating with a recommended methodology and forecast.

2.6.1. Based Aircraft – Socioeconomic Variable Forecast

Historical and forecast socioeconomic data were provided by Woods & Poole Economics, Inc. and the LVCVA, and were previously discussed in Section 2.5 and depicted in **Table 2.4**. Socioeconomic forecasts for based aircraft assumed that the change in the number of based aircraft at the Airport (beyond 2019) would mimic population, employment, per capita personal income, Clark County visitor volume, and Clark County gaming revenue growth projections through 2039 for the compared geographic areas through 2039. The resultant based aircraft forecasts that applied this methodology using each socioeconomic variable are depicted in **Table 2.5**.

Table 2.5 – *Based Aircraft – Socioeconomic Variable Forecast*

Year	Population		Employment		Per Capita Personal Income		Clark County	
	Las Vegas MSA	Nevada	Las Vegas MSA	Nevada	Las Vegas MSA	Nevada	Visitors	Gaming Revenue
2019	266	266	266	266	266	266	266	266
2024	289	287	294	292	290	288	292	284
2029	313	310	322	319	313	309	312	302
2034	339	334	350	345	333	328	332	320
2039	365	357	379	371	354	347	351	339
AAGR 2019-2039	*1.85%*	*1.72%*	*2.13%*	*1.98%*	*1.66%*	*1.52%*	*1.60%*	*1.36%*

Sources:
Woods & Poole Economics, Inc.
Las Vegas Convention and Visitors Authority.
Kimley-Horn, 2020.

Notes:
MSA = Metropolitan Statistical Area
AAGR = average annual growth rate
Forecasts of Clark County visitor volume and gaming revenue were developed using linear regression of 2009-2019 data.

As shown in **Table 2.5**, based aircraft forecasts predicated on socioeconomic projections indicate that based aircraft at the Airport could range from 339 to 379 by 2039. This range reflects AAGRs of 1.36 percent to 2.13 percent during the planning horizon.

2.6.2. Based Aircraft – Regional Market Share Forecast

Market share forecasts look at an individual airport's share of a certain aviation component (i.e., based aircraft) within the context of a larger market. A market share analysis for based aircraft was developed using FAA TAF projections of based aircraft at five non-military airports within a 50-mile radius of the Airport that serve the greater Las Vegas area: Jean Airport, Boulder City Municipal Airport, Perkins Field Airport, North Las Vegas Airport, and McCarran International Airport.

The purpose of examining forecasts of neighboring airport activity is to account for variables that may impact the regional airport system or to identify factors that could affect based aircraft trends at the Airport compared with peer airports (e.g., differences in airport facilities, services, rates etc.). Historical based aircraft from the TAF at these neighboring facilities and Henderson Executive Airport's corresponding regional market share are shown in **Table 2.6** and **Figure 2.6**.

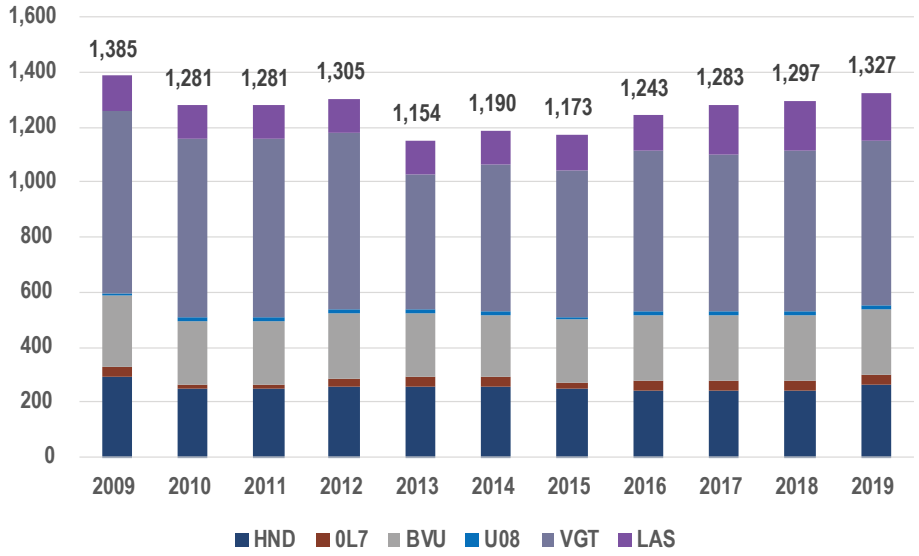
Table 2.6 – *Historical Market Share of Based Aircraft*

Year	Henderson Executive Airport	Jean Airport	Boulder City Municipal Airport	Perkins Field Airport	North Las Vegas Airport	McCarran International Airport	Total	% Henderson Executive Airport
2009	292	40	253	13	659	128	1,385	21.1%
2010	248	19	231	13	644	126	1,281	19.4%
2011	248	19	231	13	644	126	1,281	19.4%
2012	254	32	234	15	644	126	1,305	19.5%
2013	254	36	234	15	489	126	1,154	22.0%
2014	254	36	226	13	536	125	1,190	21.3%
2015	252	20	227	11	530	133	1,173	21.5%
2016	243	35	239	12	582	132	1,243	19.5%
2017	243	34	240	12	574	180	1,283	18.9%
2018	244	35	240	12	586	180	1,297	18.8%
2019	266	35	240	12	594	180	1,327	20.0%
AAGR 2009-2019	*-0.89%*	*-1.25%*	*-0.51%*	*-0.77%*	*-0.99%*	*4.06%*	*-0.42%*	--

Sources:
National Based Aircraft Inventory Program (2019 Henderson Executive Airport Based Aircraft data).
FAA Terminal Area Forecast, issued February 2019 (all other based aircraft data).

Notes:
AAGR = average annual growth rate
2019 Terminal Area Forecast data are estimates. 2019 Henderson Executive Airport based aircraft figure was obtained from FAA National Based Aircraft Inventory Program, 2009-2018 utilized FAA Terminal Area Forecast.

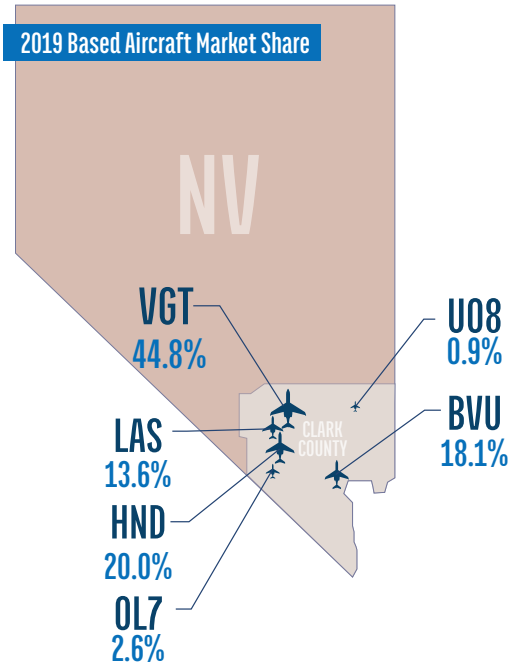
Figure 2.6 – *Regional Market – Historical Based Aircraft*



Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA National Based Aircraft Inventory Program.

The FAA TAF forecasts of based aircraft at other airports within the region were used as the basis for analysis (see **Table 2.7**). As shown previously in **Table 2.6**, the Airport's regional market share of based aircraft has decreased slightly since 2009, a trend that has also occurred at other nearby general aviation airports as McCarran International Airport has experienced growth during this timeframe.

The regional market share forecast of based aircraft included low-, medium-, and high-growth scenarios. The low-growth scenario assumed that the Airport's 2019 market share of 20.0 percent of total based aircraft in the region would remain constant throughout the planning horizon. This market share was applied to FAA TAF forecasts of based aircraft at other airports within the region and resulted in 315 based aircraft at the Airport by 2039, which represents an AAGR of 0.92 percent.



Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Table 2.7 – *Based Aircraft – Regional Market Share Forecast*

Year	Regional Based Aircraft	Low		Medium		High	
		Forecast Based Aircraft	Market Share	Forecast Based Aircraft	Market Share	Forecast Based Aircraft	Market Share
2019	1,327	266	20.0%	266	20.0%	266	20.0%
2024	1,370	275	20.0%	288	21.0%	301	22.0%
2029	1,435	288	20.0%	309	21.5%	330	23.0%
2034	1,500	301	20.0%	330	22.0%	360	24.0%
2039	1,570	315	20.0%	354	22.5%	393	25.0%
AAGR 2019-2039	*0.92%*	*0.92%*	–	*1.65%*	–	*2.38%*	–

Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

The high-growth scenario assumed that the Airport's market share of regional based aircraft would increase to 25.0 percent by the end of the 20-year planning horizon; a level reflective of increased demand generated by growth in the corporate/business aviation sector and anticipated existing and potential new tenant expansions. This methodology projected 393 based aircraft by 2039 and an AAGR of 2.38 percent.

The medium-growth scenario was developed by averaging the market shares assumed in the high- and low-growth scenarios. This resulted in 354 based aircraft in 2039 and an AAGR of 1.65 percent.

2.6.3. Based Aircraft – Linear Regression Forecast

Linear regression can be an effective methodology to project future activity based solely on historical performance. The Airport has experienced significant fluctuation in based aircraft since 2009, as a decrease in smaller single-engine and multi-engine piston aircraft has gradually been supplanted by an increase in larger turbo-prop and jet aircraft.

The Linear regression forecast analyzed historical growth in based aircraft from 2015 to 2019 and projected this growth through the 20-year planning horizon. Years 2009 through 2014 were discounted from the analysis as based aircraft at the Airport waned following the relocation of a flight school to another airport and fallout from the 2007-2008 Great Recession. As shown in **Table 2.8**, the linear regression forecast projected 313 based aircraft by 2039 and an AAGR of 0.89 percent.

Table 2.8 – *Based Aircraft – Linear Regression Forecast*

Year	Based Aircraft
Historical	
2015	252
2016	243
2017	243
2018	244
2019	266
Forecast	
2024	270
2029	284
2034	299
2039	313
AAGR 2019-2039	*0.89%*

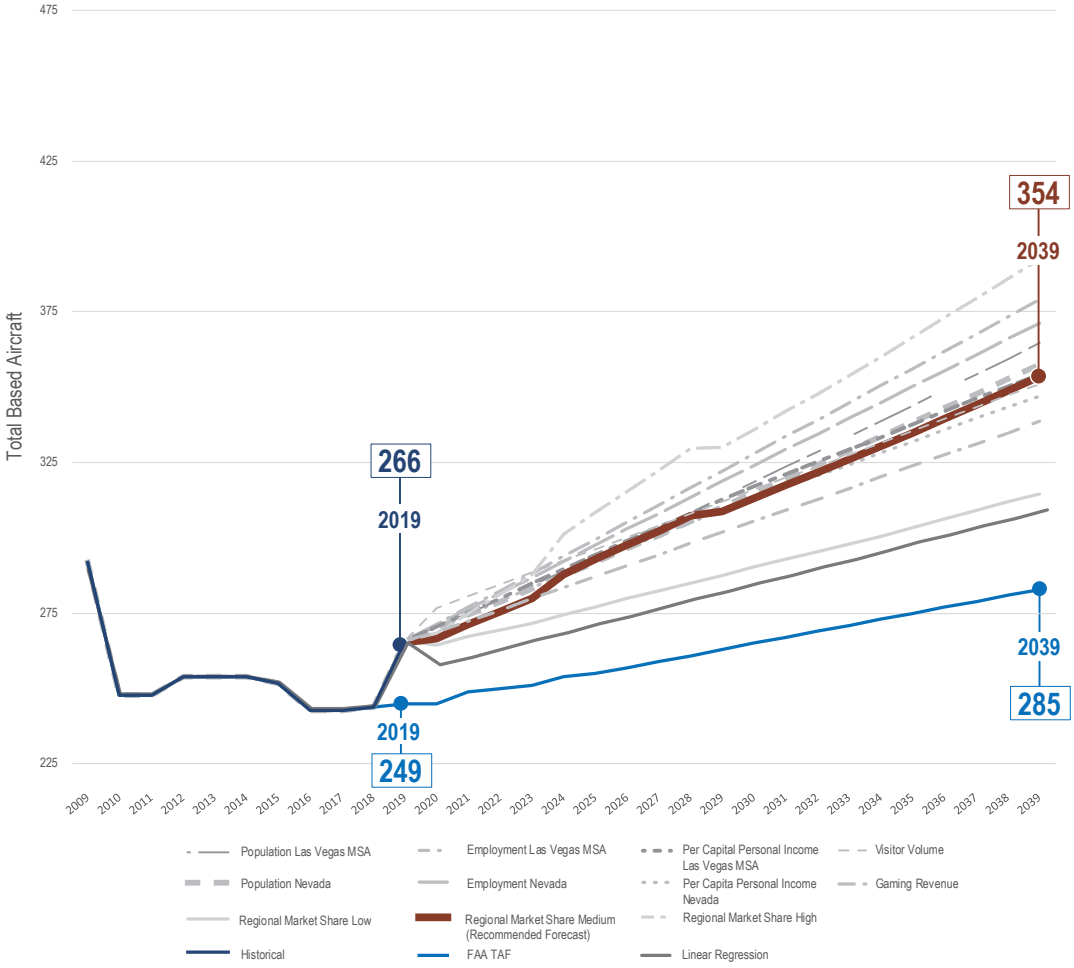
Sources:
FAA Terminal Area Forecast, issued February 2019 (years 2015 through 2018).
National Based Aircraft Inventory Program (2019).
Kimley-Horn, 2020.

Notes:
AAGR = average annual growth rate
2019 Henderson Executive Airport based aircraft figure was obtained from FAA National Based Aircraft Inventory Program, 2015-2018 utilized FAA Terminal Area Forecast.

2.6.4. Based Aircraft – Recommended Methodology

The Airport has experienced an increase in corporate activity in recent years, attributed to rapid socioeconomic growth in the Las Vegas metropolitan area and the City of Henderson, a diverse and business-savvy tenant base, investments made by Clark County to establish Henderson Executive Airport as a premier corporate aviation gateway to the area, and other factors. As the Airport's tenant base continues to evolve, it is anticipated that growth in based aircraft will be significant, though somewhat measured considering that larger corporate aircraft including turbo-props and jets will supplant a proportion of smaller piston-powered type aircraft over time. As such, the recommended forecast for based aircraft is the regional market share medium growth scenario, which projected 354 based aircraft by 2039 and an AAGR of 1.65 percent. A summary of the methodologies used to forecast based aircraft is depicted in **Figure 2.7**.

Figure 2.7 – *Based Aircraft Forecast Methodology Summary*



Sources:
Woods & Poole Economics, Inc.
Las Vegas Convention and Visitors Authority.
FAA Terminal Area Forecast, issued February 2019.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Note:
MSA = Metropolitan Statistical Area

2.6.5. Based Aircraft – Fleet Mix Forecast

An airport's fleet mix impacts pavement strength needs as well as other facilities including the size and type of aircraft storage hangars, aircraft tie-downs, and parking aprons. As with many general aviation airports, the based aircraft fleet at the Airport is currently composed primarily of single-engine piston aircraft. According to the inventory conducted by Airport staff and uploaded into the NPIAS in 2019, the Airport had 177 single-engine piston aircraft, 23 multi-engine piston aircraft, 26 turbo-prop aircraft, 37 jet aircraft, and 3 helicopters. It should be noted that there are other operators with leases at the Airport that are not accounted for in this inventory. For instance, Maverick Helicopter Tours maintains a fleet of helicopters at the Airport that are not accounted for in this evaluation.

The Airport's fleet mix forecast was informed by industry trends identified in FAA Aerospace Forecasts 2019-2039, input from County staff, an assessment of existing hangar waitlists at the Airport, and general assumptions regarding existing and potential future tenants and the types of aviation-related activity they may generate. These assumptions incorporated local and national trends that describe growth in corporate turbo-prop and jet aircraft and declines in smaller piston-powered aircraft. It should be noted that the significant projected increase in the proportion of rotorcraft reflected existing tour operator activity at the Airport.

The existing and forecast based aircraft fleet mix is presented in **Table 2.9** and in **Figure 2.8**. As shown, the proportion of single-engine piston aircraft was projected to decrease from 67 percent in 2019 to 47 percent in 2039. Multi-engine piston aircraft were projected to increase from 9 percent of the overall fleet to 12 percent, turbo-prop aircraft were projected to increase from 10 percent of the overall fleet to 15 percent, jet aircraft from 14 percent to 23 percent, and helicopters (rotorcraft) were projected to increase from 1 percent to 3 percent.

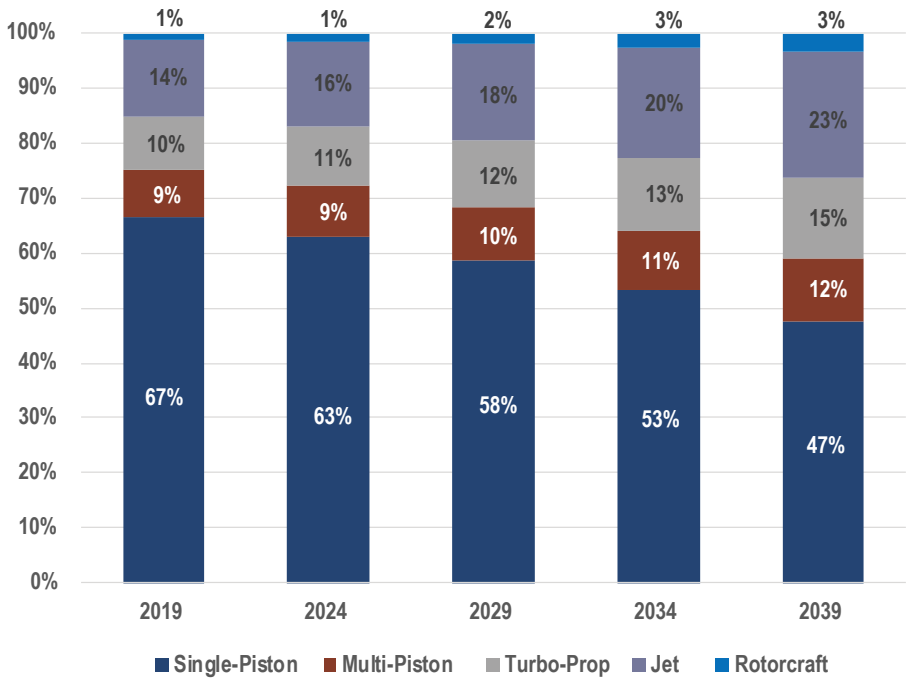
Table 2.9 – *Based Aircraft Fleet Mix Forecast*

Year	Single-Piston	%	Multi-Piston	%	Turbo-Prop	%	Jet	%	Rotor-craft	%
2019	177	67%	23	9%	26	10%	37	14%	3	1%
2024	181	63%	27	9%	31	11%	45	16%	4	1%
2029	181	58%	31	10%	37	12%	55	18%	6	2%
2034	176	53%	36	11%	44	13%	67	20%	8	3%
2039	168	47%	42	12%	52	15%	81	23%	12	3%
AAGR 2019-2039	*-0.30%*	–	*4.00%*	–	*5.00%*	–	*6.00%*	–	*14.40%*	–

Sources:
FAA Aerospace Forecast FY 2019-2039.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

Figure 2.8 – *Based Aircraft Fleet Mix Forecast*



AAGR 2019–2039

Single-Piston	Multi-Piston	Turbo-Prop	Jet	Rotorcraft
-0.3%	4.0%	5.0%	6.0%	14.4%

Sources:
FAA Aerospace Forecast FY 2019-2039.
FAA National Based Aircraft Inventory Program.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

2.7. Aircraft Operations Forecasts

Annual aircraft operations forecasts are used to determine funding needs and establish airfield design criteria at airports as well as evaluate airfield capacity. At airports with ATCTs, aircraft operations are tracked and reported in various FAA databases. Operations reported in the FAA's ATADS database were used to develop forecasts because the ATADS database reflects actual activity as reported by the ATCT. The Airport also experiences a small amount of military activity, forecasts of which are described later in this section.

Several factors influence the levels of aircraft operations that occur at a particular airport, including the number of based aircraft, local demographics, existing tenants, national economic and aviation-related trends, proximity to other airports, and the capability and condition of facilities. General aviation operations forecasts were developed using several methodologies including socioeconomic variable comparison, regional market share, and operations per based aircraft.

2.7.1. General Aviation Operations – Socioeconomic Variable Forecast

Forecasts of general aviation operations were developed using the same socioeconomic methodologies utilized for the based aircraft forecasts presented in the previous section. The forecasts used a socioeconomic comparison approach for population, employment, and per capital personal income for the Las Vegas MSA and the State of Nevada as well as Clark County visitor volume and gaming revenue data. Socioeconomic data were shown previously in **Table 2.4**. This methodology assumed that annual general aviation operations would change at the same rate as the comparison socioeconomic indicators. The results of this forecast methodology are shown in **Table 2.10**.

Table 2.10 – *General Aviation Operations – Socioeconomic Variable Forecast*

Year	Population		Employment		Per Capita Personal Income		Clark County	
	Las Vegas MSA	Nevada	Las Vegas MSA	Nevada	Las Vegas MSA	Nevada	Visitors	Gaming Revenue
2019	72,370	72,370	72,370	72,370	72,370	72,370	72,370	72,370
2024	78,616	78,215	79,956	79,511	78,775	78,343	79,562	77,133
2029	85,273	84,415	87,694	86,738	85,081	84,156	84,888	82,129
2034	92,179	90,806	95,356	93,854	90,721	89,276	90,214	87,125
2039	99,181	97,238	103,155	101,037	96,402	94,385	95,540	92,121
AAGR 2019-2039	*1.85%*	*1.72%*	*2.13%*	*1.98%*	*1.66%*	*1.52%*	*1.60%*	*1.36%*
Correlation Coefficient 2009-2019	-0.22	-0.08	-0.13	-0.16	-0.32	-0.28	0.31	0.10

Sources:
Woods & Poole Economics, Inc.
Las Vegas Convention and Visitors Authority.
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Notes:
MSA = Metropolitan Statistical Area
AAGR = average annual growth rate
Forecasts of Clark County visitor volume and gaming revenue were developed using linear regression of 2009-2019 data.

As shown in the table, this methodology resulted in a range of 92,121 to 103,155 annual general aviation operations by 2039, reflecting AAGRs between 1.36 percent and 2.13 percent.

To further examine the relationship between socioeconomic variables and operational activity at the Airport, a correlation analysis was conducted for the indicators presented in **Table 2.10** for the years 2009 through 2019. This analysis looked at the historical correlation between the different socioeconomic variables and Airport operations. Correlation coefficients of 0.50 or higher are considered to have a moderate positive relationship to a dependent variable, and coefficients of 0.70 or greater are considered to have a strong positive relationship.

As shown in **Table 2.10**, Clark County visitor volume between 2009 and 2019 had the highest correlation coefficient of the socioeconomic indicators (0.31), though it was not strong enough to be considered statistically significant. This correlation analysis identified that each of the socioeconomic variables examined had some correlation with operational activity at the Airport, but none of the socioeconomic variables could individually be considered an overwhelming indicator or driver of operational activity.

2.7.2. General Aviation Operations – Regional Market Share Forecast

The regional market share methodology compared the Airport's aircraft operations to general aviation operations at the five non-military airports within a 50-mile radius of the Airport that serve the greater Las Vegas area, as described in the previous section. Like the regional market share forecast for based aircraft, this methodology compared activity at the Airport with FAA TAF forecasts of general aviation operations at regional airports (see **Table 2.11** and **Figure 2.9**).

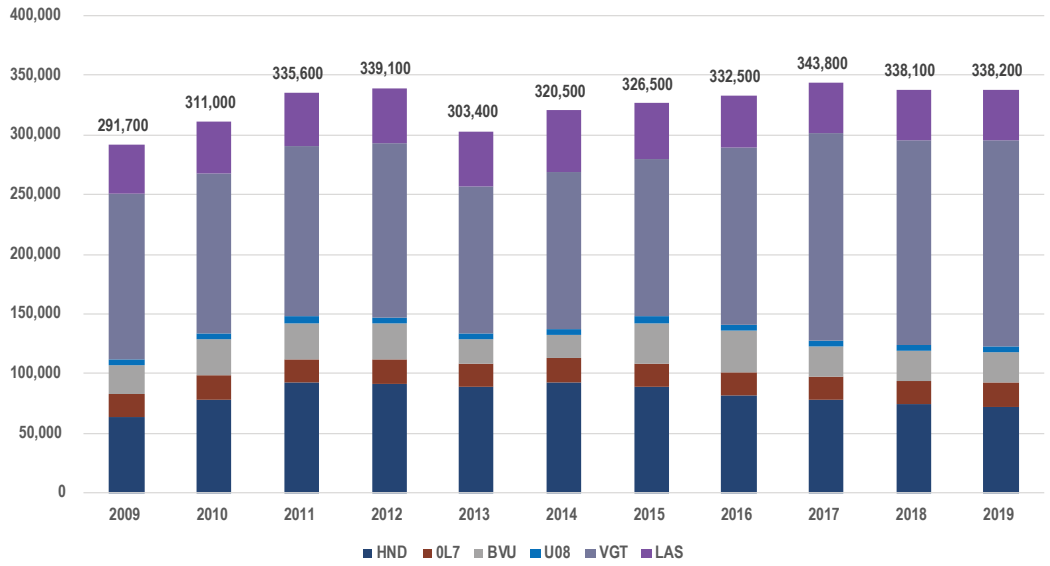
Table 2.11 – *Historical Market Share of General Aviation Operations*

Year	Henderson Executive Airport	Jean Airport	Boulder City Municipal Airport	Perkins Field Airport	North Las Vegas Airport	McCarran International Airport	Total	% Henderson Executive Airport
2009	63,516	20,000	23,500	5,200	138,764	40,670	291,650	21.8%
2010	78,576	20,000	30,000	5,200	133,822	43,427	311,025	25.3%
2011	92,534	20,000	30,000	5,200	142,965	44,913	335,612	27.6%
2012	91,682	20,000	30,000	5,200	146,735	45,475	339,092	27.0%
2013	88,981	20,000	20,000	5,200	122,952	46,230	303,363	29.3%
2014	92,686	20,000	20,000	5,200	130,660	51,931	320,477	28.9%
2015	88,547	20,000	33,970	5,200	132,069	46,713	326,499	27.1%
2016	81,709	20,000	33,970	5,200	148,441	43,227	332,547	24.6%
2017	77,680	20,000	25,210	5,200	172,939	42,788	343,817	22.6%
2018	74,155	20,000	25,210	5,200	170,731	42,802	338,098	21.9%
2019	72,370	20,000	25,210	5,200	172,761	42,654	338,195	21.4%
AAGR 2009-2019	*1.39%*	*0.00%*	*0.73%*	*0.00%*	*2.45%*	*0.49%*	*1.60%*	--

Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA Air Traffic Activity Data System.

Notes:
AAGR = average annual growth rate
Operations for McCarran International Airport do not include Commuter/Air Taxi. Henderson Executive Airport operations data were obtained from ATADS database; all other airports utilized the FAA TAF.

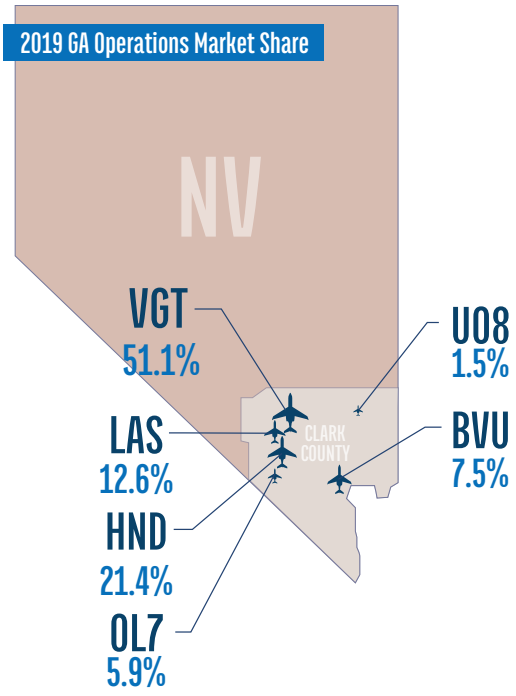
Figure 2.9 – *Historical General Aviation Operations*



Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA Air Traffic Activity Data System.

Three regional market share forecasts were developed for aircraft operations. The low-growth scenario assumed that the Airport's market share of 21.4 percent of total general aviation operations in the region would remain constant throughout the planning horizon. This figure was applied to FAA TAF forecasts of general aviation operations at airports within the region and resulted in 79,993 general aviation operations in 2039, which represents an AAGR of 0.53 percent (see **Table 2.12**). The high-growth scenario assumed that the Airport's market share of regional general aviation operations would increase to 37.0 percent by the end of the 20-year planning horizon; an aggressive forecast scenario that incorporates significant impacts of potential new users at the Airport and expansion of existing tenants. This methodology projected 138,312 general aviation operations by 2039 and an AAGR of 4.56 percent.

The medium-growth scenario was developed by averaging the product of the high- and low-growth scenarios, which resulted in 109,153 general aviation operations in 2039 and an AAGR of 2.54 percent.



Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Table 2.12 – *General Aviation Operations – Regional Market Share Forecast*

Year	Regional GA Operations	Low		Medium		High	
		HND Operations	HND Market Share	HND Operations	HND Market Share	HND Operations	HND Market Share
2019	338,195	72,370	21.4%	72,370	21.4%	72,370	21.4%
2024	348,440	74,562	21.4%	84,321	24.2%	94,079	27.0%
2029	356,329	76,250	21.4%	93,356	26.2%	110,462	31.0%
2034	364,770	78,057	21.4%	99,215	27.2%	120,374	33.0%
2039	373,817	79,993	21.4%	109,153	29.2%	138,312	37.0%
AAGR 2019-2039	*0.53%*	*0.53%*	–	*2.54%*	–	*4.56%*	–

Sources:
FAA Terminal Area Forecast, issued February 2019.
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

2.7.3. General Aviation Operations – Operations per Based Aircraft Forecast

Another methodology to forecast general aviation operations used a ratio of operations per based aircraft to estimate future demand. Because the Airport has experienced a decline in training operations since 2009, the operations per based aircraft methodology assumed that the ratio of general aviation operations to based aircraft in base year 2019 (272) would remain constant throughout the 20-year forecast horizon (see **Table 2.13**). This ratio was applied to the recommended based aircraft forecast described in the previous section. As shown, this methodology resulted in 96,204 general aviation operations by 2039 and an AAGR of 1.65 percent.

Table 2.13 – *General Aviation Operations – Operations per Based Aircraft Forecast*

Year	Recommended Forecast – Based Aircraft	General Aviation Operations	Operations per Based Aircraft
2019	266	72,370	272
2024	288	78,358	272
2029	309	84,028	272
2034	330	89,875	272
2039	354	96,204	272
AAGR 2019-2039	*1.65%*		–

Sources:
FAA National Based Aircraft Inventory Program.
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

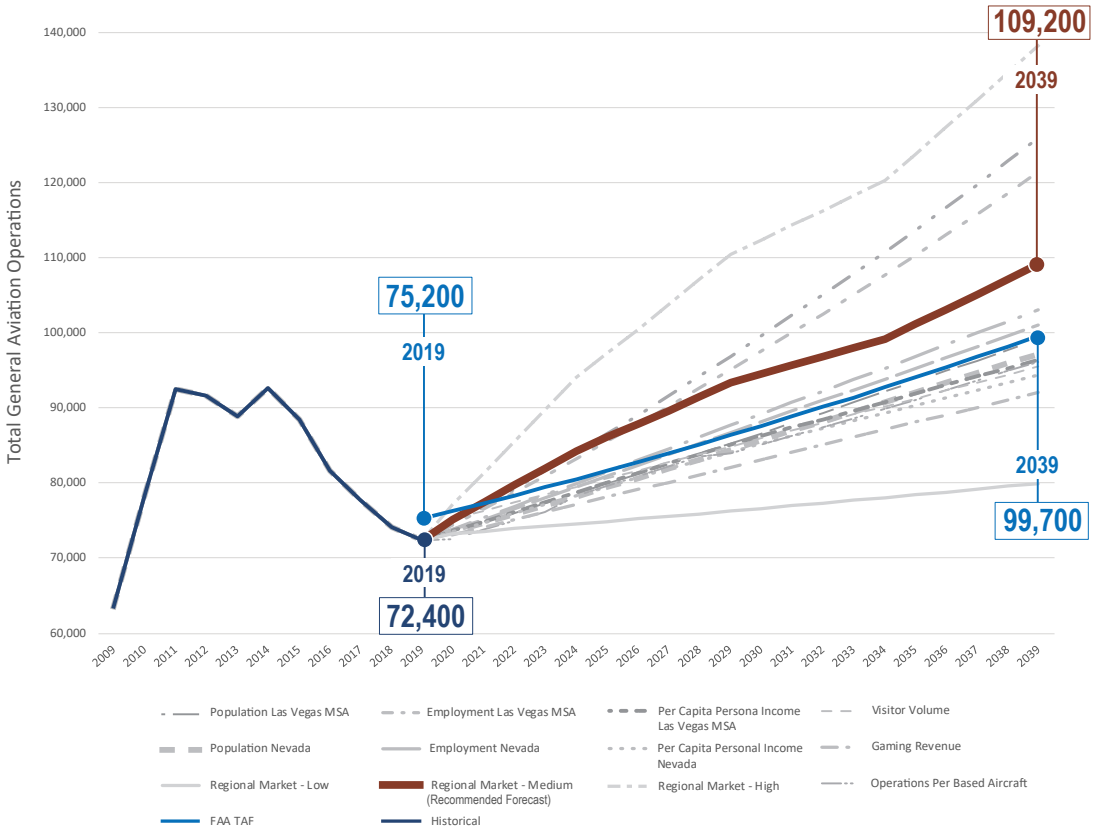
Note:
AAGR = average annual growth rate

2.7.4. General Aviation Operations – Recommended Methodology

General aviation operations at the Airport have declined slightly in recent years as the operational fleet mix has continued a shift from a greater proportion of local/training activity to corporate/itinerant activity. However, based on discussions with Airport management, CCDOA staff, and existing Airport tenants, it is evident that there is a strong demand for hangar development and other facilities; demand that is not anticipated to taper in the near term as strong socioeconomic growth in the Las Vegas metropolitan area should continue into the future and as new tenants continue to target the Airport as a preferred location to base their aircraft.

Though the socioeconomic variable forecast analysis identified a moderate positive relationship between historical Clark County gaming revenues and operational activity at the Airport, the correlation was not significant enough to represent anticipated future activity. Similarly, operations per based aircraft at the Airport has fluctuated in recent years, as a significant portion of flight training activity has relocated to other airports. The based aircraft fleet mix identified strong growth in turbo-prop and jet aircraft over the 20-year planning horizon; a trend that reflects FAA forecasts in terms of the future composition of the overall U.S. general aviation fleet. Similarly, it was anticipated that strong growth in based aircraft would result in commensurate growth in operations. Bolstered by likely influences from ongoing and expected near-term tenant development, and the impacts of the Las Vegas Raiders and other activity that will likely directly benefit from the Airport, a somewhat aggressive operations forecast was selected to best reflect this growing and changing demand. The recommended methodology for general aviation operations to be used for long-range planning is the regional market share – medium-growth scenario, which projected 109,153 operations by 2039 and an AAGR of 2.54 percent. A summary of the methodologies used to forecast general aviation operations is depicted in **Figure 2.10**.

Figure 2.10 – *General Aviation Operations Forecast Methodology Summary*



Sources:
Woods & Poole Economics, Inc.
Las Vegas Convention and Visitors Authority.
FAA Terminal Area Forecast, issued February 2019.
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Note:
MSA = Metropolitan Statistical Area

2.7.5. Military Operations Forecast

As noted, the Airport experiences a limited amount of military operations. Historically, military activity has accounted for less than 1.0 percent of annual operations at the Airport. According to the FAA's ATADS database, the Airport experienced 252 itinerant and 22 local military operations in 2019.

Military operations at public-use airports can be difficult to predict as activity is typically not tied to the same drivers that impact general aviation. As such, the FAA's TAF forecast is the preferred methodology for military operations at the Airport, which projects 10 local, 266 itinerant, and 276 total military operations annually between 2019 and 2039 (see **Table 2.14**). The following subsections present various forecasts of total operations (general aviation plus military).

Table 2.14 – *Military Operations Forecast*

Year	Itinerant Military Operations	Local Itinerant Operations	Total Military Operations
2019	252	22	274
2024	266	10	276
2029	266	10	276
2034	266	10	276
2039	266	10	276
AAGR 2019-2039	*0.28%*	*-2.73%*	*0.04%*

Sources:
FAA Air Traffic Activity Data System.
FAA Terminal Area Forecast, issued February 2019.

Note:
AAGR = average annual growth rate

2.7.6. Local/Itinerant Operations Forecast

Aircraft operations are classified as local or itinerant. Local operations are those conducted by aircraft that remain within a 20-mile radius of an airport and include touch-and-go and most training activity. Itinerant operations are performed by an aircraft that lands at an airport, arriving from outside the airport area, or departs an airport and leaves the airport's 20-mile radius prior to its return.

Between 2009 and 2019, the proportion of local operations at the Airport declined from approximately 24 percent to 14 percent. It was anticipated that the Airport will continue to support a wide range of tenants and aviation activity types that generate local operations; however, through facility development, staffing, and other avenues, Henderson Executive Airport has positioned itself as the corporate aviation gateway to Las Vegas, lending itself to a shift over time towards more itinerant activity.

As evidenced by the based aircraft fleet mix forecast, non-corporate type aircraft are projected to maintain a presence at the Airport, though more significant investment to accommodate corporate type users has been identified as a point of emphasis by CCDOA in recent years as demand for development has increased. It is anticipated that the proportion of local operations at the Airport will decrease linearly from 14 percent of total operations in 2019 to 10 percent by 2039. As shown in **Table 2.15**, the Airport is projected to experience 98,503 itinerant operations and 10,926 local operations by 2039.

Table 2.15 – *Local/Itinerant Operations Forecast*

Year	Total Operations	Local Operations	% Local	Itinerant Operations	% Itinerant
2019	72,644	10,345	14.2%	62,299	85.8%
2024	84,597	11,124	13.2%	73,473	86.8%
2029	93,632	11,325	21.1%	82,307	87.9%
2034	99,491	10,983	11.1%	88,508	88.9%
2039	109,429	10,925	10.0%	98,503	90.0%
AAGR 2019-2039	*2.53%*	*0.28%*	–	*2.91%*	–

Sources:
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

2.7.7. Daytime/Evening Operations Forecast

Another component examined for this analysis was forecasts of daytime and evening operations. This is an important element to include in the planning process because noise impacts created by aircraft arriving or departing at night are greater than during the day. The FAA defines nighttime operations as those that are conducted between 10:00 p.m. and 7:00 a.m.

According to the FAA's TFMSC distributed operational network database, which creates a summary of traffic by day and hour based on the departure and arrival message times received by the FAA Air Traffic Airspace lab, 93.0 percent of operations at the Airport in 2019 were conducted during daytime hours. This figure decreased gradually by approximately half a percent between 2009 and 2019. It was assumed that this figure would continue to decrease linearly to 92.0 percent throughout the projection period and was applied to forecast annual operations (see **Table 2.16**).

Table 2.16 – *Daytime/Evening Operations Forecast*

Year	Total Operations	Daytime Operations	% Daytime	Evening Operations	% Evening
2019	72,644	67,539	92.9%	5,105	7.1%
2024	84,597	78,506	92.8%	6,091	7.2%
2029	93,632	86,657	92.6%	6,976	7.5%
2034	99,491	91,831	92.3%	7,661	7.7%
2039	109,429	100,674	92.0%	8,754	8.0%
AAGR 2019-2039	*2.53%*	*2.45%*	–	*2.31%*	–

Sources:
FAA Traffic Flow Management System Count Database.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

2.7.8. Instrument Operations Forecast

An instrument operation is a takeoff or a landing conducted during IFR conditions or operations aboard aircraft that enter Class A airspace during a flight (18,000 feet above mean sea level). Aircraft that can operate in Class A airspace are typically commercial or corporate-type turbo-props and jets. Instrument operations are reported in the FAA's ATADS database. Between 2009 and 2019, the proportion of instrument operations at the Airport increased from 17.4 percent to 20.9 percent. To forecast instrument operations, a linear regression methodology was used that projected 2009-2019 instrument operations through 2039. As shown in **Table 2.17**, this methodology projected that instrument operations would compose 24.8 percent of total operations by the end of the planning period resulting in 27,123 operations.

Table 2.17 – *Instrument Operations Forecast*

Year	Total Operations	Instrument Operations	% Instrument Operations	Visual Operations	% Visual
2019	72,644	15,179	20.9%	57,465	79.1%
2024	84,597	15,550	18.4%	69,046	81.6%
2029	93,632	19,210	20.5%	74,422	79.5%
2034	99,491	22,536	22.7%	76,955	77.3%
2039	109,429	27,123	24.8%	82,306	75.2%
AAGR 2019-2039	*2.53%*	*3.93%*	--	*2.13%*	--

Sources:
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

2.7.9. Touch-and-Go Operations Forecast

A touch-and-go operation is conducted by an aircraft that lands and departs on a runway without stopping or exiting. This type of operation is typically associated with flight training. Touch-and-go operations forecasts are important to identify because they impact airfield capacity, analysis for which is presented in the subsequent chapter. It was assumed that in 2019, touch-and-go operations comprised 75 percent of local operations at the Airport. This figure was applied to forecast local operations and held constant throughout the projection period. As shown in **Table 2.18**, the Airport is anticipated to experience 8,194 touch-and-go operations by 2039.

Table 2.18 – *Touch-and-Go Operations Forecast*

Year	Total Operations	Local Operations	Touch-and-Go Operations
2019	72,644	10,345	7,759
2024	84,597	11,124	8,343
2029	93,632	11,325	8,494
2034	99,491	10,983	8,238
2039	109,429	10,925	8,194
AAGR 2019-2039	*2.53%*	*0.28%*	*0.28%*

Sources:
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

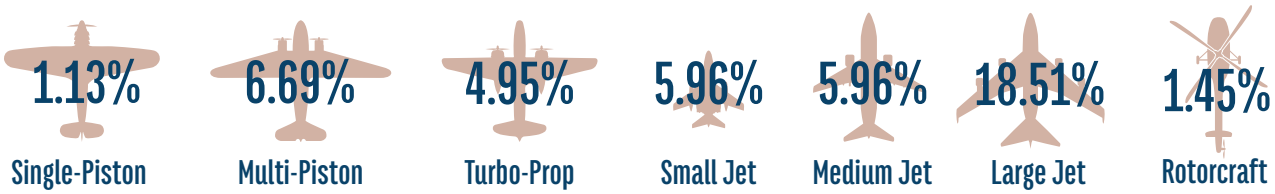
2.7.10. Operational Fleet Mix Forecast

An airport's operational fleet mix impacts design standards, airfield capacity, pavement strength needs, and other facilities, and also informs the development of noise contours. The operational fleet mix for base year 2019 was informed by the FAA's TFMSC database and the based aircraft fleet mix identified by Airport staff. Forecast fixed wing operations by type were primarily reflective of growth rates described for the recommended based aircraft fleet mix forecast, while forecast rotorcraft operations were predicated on passenger enplanements (as sight-seeing operators at the Airport primarily use rotorcraft). Existing and forecast operations by aircraft class are depicted in **Table 2.19**.

Table 2.19 – *Operational Fleet Mix Forecast*

Year	Total Operations	Single-Piston	Multi- Piston	Turbo-Prop	Small Jet	Medium Jet	Large Jet	Rotorcraft
2019	72,644	42,553	5,529	3,577	7,814	2,840	161	10,170
2024	84,597	48,962	7,203	4,248	9,507	3,455	310	10,911
2029	93,632	51,832	8,872	5,046	11,567	4,204	459	11,653
2034	99,491	50,965	10,374	5,993	14,073	5,115	608	12,364
2039	109,429	52,168	12,926	7,117	17,121	6,223	757	13,115
AAGR 2019-2039	*2.53%*	*1.13%*	*6.69%*	*4.95%*	*5.96%*	*5.96%*	*18.51%*	*1.45%*

AAGR 2019–2039



Sources:
FAA Traffic Flow Management System Count Database.
Kimley-Horn, 2020.

Notes:
AAGR = average annual growth rate
Small jets weigh less than 30,000 lbs., medium jets weigh 30,000 lbs. to 90,000 lbs., large jets weigh more than 90,000 lbs.

2.8. Peak Operations Forecasts

Forecasts of peak activity (operations) are used to identify airfield capacity issues, itinerant aircraft parking needs, and other facility requirements. Identification of peak periods that occur on a regular basis is essential to ensure that facilities are not underutilized or over-planned. Historically, Henderson Executive Airport is unique in that it does not experience a disproportionate level of monthly or seasonal peaking; however, the Airport regularly sees heightened levels of daily and hourly activity attributed to holiday travel and numerous special events in the Las Vegas metropolitan area. Forecasts of peak activity presented in this section are considered relatively aggressive compared with annual operational growth for several factors including strong demand for on-Airport development from existing and potential future tenants, robust socioeconomic growth and continued diversification of the local economy, and direct and indirect activity attributed to special events including conventions and professional sporting and entertainment events.

The periods used in the capacity analysis and facility requirements are as follows:

- Peak Month – Calendar month when peak activity occurs.
- Design Day – Representative day that best reflects elevated levels of activity that occurs on a regular basis.
- Design Hour – Representative hour that best reflects elevated levels of activity that occurs on a regular basis.

To identify peak month forecasts, monthly operational data for years 2009 through 2019 were obtained from the FAA's ATADS database. Historically, March or October represented the Airport's peak month in terms of operations; however, except for a slight semi-regular decrease in winter months, there has not been a significant variation in overall activity by month or season.

In 2019, the peak month (October) represented 9.2 percent of annual operations. It was assumed that this figure would increase linearly to 10.2 percent by 2039. Peak month percentages were applied to total forecast annual operations and are depicted in **Table 2.20**.

Table 2.20 – *Peak Operations Forecast*

Year	Total Operations	Peak Month %	Peak Month Operations	Design Day Operations	Design Hour Operations
2019	72,644	9.2%	6,717	285	63
2024	84,597	9.5%	8,020	332	75
2029	93,632	9.7%	9,100	367	85
2034	99,491	10.0%	9,914	390	93
2039	109,429	10.2%	11,180	429	105
AAGR 2019-2039	*2.53%*	--	*3.32%*	*2.53%*	*3.32%*

Sources:
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

Base year 2019 design day activity was determined to be the average of the 30 busiest days that occurred at the Airport. It was assumed that design day activity would grow commensurate with total operations throughout the 20-year forecast horizon. Base year design hour operations were determined to be the average of the 50 busiest hours that occurred in 2019. It was assumed that design hour operations would increase at the same rate as forecast peak month activity.

2.9. Passenger Enplanement Forecasts

As noted, the Airport experiences passenger enplanement activity associated with tenants that provide sight-seeing and transport services. This is particularly important because FAA entitlement funding allocation is based on passenger enplanements. It is important to emphasize that the Airport will continue to cater to existing tenants who generate passenger enplanements; however, it is not anticipated that the Airport will provide scheduled air carrier commercial service at any point in the 20-year planning horizon.

Because passenger activity at the Airport is not tied to typical factors that drive enplanements at other airports with scheduled commercial service, examining factors such as market share, catchment area leakage, macroeconomic forecasts, and others are not necessarily indicative of actual activity.

Historical socioeconomic data presented previously in **Table 2.4** were analyzed to examine the relationship between local historical conditions and passenger activity at the Airport. All socioeconomic indicators had a positive relationship with passenger enplanements based on a correlation analysis for years 2009 to 2019. The indicator with the highest correlation coefficient (0.45) was historical Clark County gaming revenue. Forecast passenger enplanements assumed that growth in activity would increase at the same rate as projected Clark County gaming revenues through the planning horizon. As shown in **Table 2.21**, this methodology projects 72,126 passenger enplanements by 2039, and an AAGR of 1.36 percent. This is the recommended passenger enplanement forecast for long-term planning at the Airport.

Table 2.21 – *Passenger Enplanements – Socioeconomic Variable Forecast*

Year	Clark County Gaming Revenue	Passenger Enplanements
2019	$10,337,453,333	56,662
2024	$11,017,780,273	60,391
2029	$11,731,436,485	64,302
2034	$12,445,092,697	68,214
2039	$13,158,748,909	72,126
AAGR 2019-2039	*1.36%*	

Sources:
FAA Passenger Boarding and All-Cargo and All-Cargo Data for U.S. Airports.
Las Vegas Convention and Visitors Authority.
Kimley-Horn, 2020.

Notes:
AAGR = average annual growth rate
Clark County gaming revenues are presented in 2019 dollars to adjust for inflation. 2019 passenger enplanements were estimated.

2.10. Design Aircraft

Each airport has a 'critical' or 'design' aircraft that represents the most demanding aircraft or grouping of aircraft with similar characteristics currently using or anticipated to use an airport on a 'regular basis', defined as 500 annual operations, excluding touch-and-go operations. The future design aircraft at the Airport is the Gulfstream G650.

The FAA has established airport design criteria and guidance for airport facility planning based on the operational and physical characteristics of aircraft that operate at an airport. This design criteria – as described in FAA Advisory Circular 150/5300-13A, Change 1, Airport Design – includes runway and taxiway dimensions, separation distances between aircraft and various objects, and airspace protection requirements. In support of these requirements, the FAA classifies and groups aircraft with similar approach speeds and sizes into an ARC. Furthermore, each airport has a 'critical' or 'design' aircraft – as designated by its ARC – that represents the most demanding aircraft or grouping of aircraft with similar characteristics currently using or anticipated to use an airport on a 'regular basis', defined as 500 annual operations, excluding touch-and-go operations.

There are two components that comprise the ARC. The first is the aircraft approach category (AAC), which relates to the approach speed of an aircraft and consists of grouping aircraft based on final approach speed at the maximum certificated landing weight and is depicted as a letter. Approach categories and corresponding approach speed thresholds are depicted in **Table 2.22**.

Table 2.22 – *Aircraft Approach Category Criteria*

Aircraft Approach 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

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

The second component of the ARC, represented by a Roman numeral, is the airplane design group (ADG), which relates to the physical size of the aircraft, namely its wingspan and tail height. Dimensional standards of aircraft affect airfield geometry design including separation criteria for runways, taxiways, and aircraft parking areas. ADG categories and corresponding aircraft tail height and wingspan thresholds are depicted in **Table 2.23**.

Table 2.23 – *Airplane Design Group Criteria*

Airplane Design Group	Aircraft Tail Height (feet)	Aircraft Wingspan (feet)
I	Less than 20'	Less than 49'
II	20' but less than 30'	49' but less than 79'
III	30' but less than 45'	79' but less than 118'
IV	45' but less than 60'	118' but less than 171'
V	60' but less than 66'	171' but less than 214'
VI	66' but less than 80'	214' but less than 262'

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

The AAC and ADG collectively identify the ARC, which is used to classify both airports and aircraft. A lower ARC typically represents smaller, slower aircraft used for recreation or training activity. Higher ARCs usually indicate larger commercial or military aircraft. ARC designations in the middle categories usually include turbo-props and corporate jets. It should be noted that an airport's ARC is used for planning and design only and does not mean that aircraft outside of the established ARC may not be able to operate safely at an airport.

Historical operational data by ARC for the year 2019 were obtained from the FAA's TFMSC database. Data showed there were 1,343 operations conducted by aircraft with an AAC/ADG of C-II, which was the most demanding designation whose activity exceeded the 500 operations threshold. As such, the historical operational activity indicates that the Airport's existing ARC is C-II.

To determine the Airport's future ARC, actual annual historical operations data by ARC from 2015 through 2019 were collected, and forecast through 2039 using a simple linear regression methodology. This analysis identified a future ARC of D-III, and that the change from C-II to D-III would occur in the year 2033. Historical and forecast operations by ARC are depicted in **Table 2.24**.

Table 2.24 – *Historical and Forecast Operations by Airport Reference Code*

Year	B-III	C-I	C-II	C-III	C-IV	D-I	D-II	D-III
Historical								
2015	78	980	935	93	8	63	305	189
2016	42	776	1,403	62	6	77	358	164
2017	36	808	1,515	124	0	83	221	248
2018	22	906	1,494	101	0	52	332	210
2019	47	930	1,343	106	1	31	380	260
Forecast								
2024	0	901	1,973	142	0	0	407	346
2029	0	916	2,426	174	0	0	469	441
2034	0	931	2,879	206	0	0	531	535
2039	0	946	3,332	238	0	0	594	630

Sources:
FAA Traffic Flow Management System Count Database.
Kimley-Horn, 2020.

Notes:
2019 operations data extrapolated for November and December.
Operations conducted by Airport Reference Code (ARC) B-II and smaller aircraft are not depicted.

To identify the Airport's existing design aircraft, TFMSC data for base year 2019 were also examined for operations by aircraft model. Of the 1,343 operations conducted by aircraft with ARCs of C-II, 628 operations were conducted by the Bombardier Challenger 300/350. With more than 500 operations in 2019, the Bombardier Challenger 300/350 represents Henderson Executive Airport's existing design aircraft.

Similar to identification of the future ARC, a linear regression was conducted for individual aircraft types with ARCs of C-II and higher that currently operate at the Airport, which included the Bombardier Challenger 300/350, Gulfstream G-IV, G500, and G650. The analysis examined operational data from 2015 through 2019 and projected activity through 2039. Consistent with operations data by ARC presented in **Table 2.24**, it was identified that a combination of the Gulfstream G500 and G650 would exceed 500 operations by 2033, and individually, the Gulfstream G650 would exceed this threshold by 2038. As such, the Airport's future design aircraft was determined to be the Gulfstream G650. It should be noted that operational activity could trigger this change sooner based on existing and potential future tenant demand. Regardless, applicable recommended improvements presented in subsequent portions of this Airport Master Plan Update were based on a future D-III ARC and Gulfstream G650 design aircraft.

Table 2.25 – *Historical and Forecast Design Aircraft Operations*

Year	Bombardier Challenger 300/350	Gulfstream G-IV	Gulfstream G500	Gulfstream G650	G500 & G650
Historical					
2015	270	305	165	24	189
2016	574	358	86	52	138
2017	638	221	111	137	248
2018	660	332	90	120	210
2019	628	380	154	106	260
Forecast					
2024	1,115	407	167	180	346
2029	1,516	469	164	277	441
2034	1,917	531	139	396	535
2039	2,318	594	94	535	630

Sources:
FAA Traffic Flow Management System Count Database.
Kimley-Horn, 2020.

Notes:
ARC = Airport Reference Code
2019 operations data extrapolated for November and December. Operations conducted by ARC B-II and smaller aircraft are not depicted.

Characteristics of the existing and future design aircraft are presented in **Table 2.26**.

Table 2.26 – *Existing and Future Design Aircraft Characteristics*

Aircraft Type	2019 Operations	2039 Operations	ARC	Taxiway Design Group	Wingspan (feet)	Tail Height (feet)	Approach Speed (knots)	Typical Seats
Bombardier Challenger 300/350 (existing)	628	2,318	C-II	1B	69.00	20.00	125	9
Gulfstream G500	154	94	D-III	2	86.33	25.50	150	16
Gulfstream G650 (future)	106	535	D-III	2	95.00	25.25	145	19

Sources:
FAA Traffic Flow Management System Count Database.
FAA Aircraft Characteristics Database.

Notes:
ARC = Airport Reference Code
2019 operations data extrapolated for November and December.

2.11. Forecast Summary

Table 2.27 and **Figure 2.11** presents a summary of recommended forecasts developed in this chapter. As noted, significant socioeconomic growth in the Las Vegas metropolitan area, continued growth in visitor volume and spending, development demand from existing and potential future tenants, and the County's investment in the Airport as a premiere corporate gateway to the region are all anticipated to continue to propel operations, passenger activity, and based aircraft growth throughout the 20-year planning horizon. The forecasts presented in this chapter are used to steer facility needs presented in **Chapter 3**, Facility Requirements.

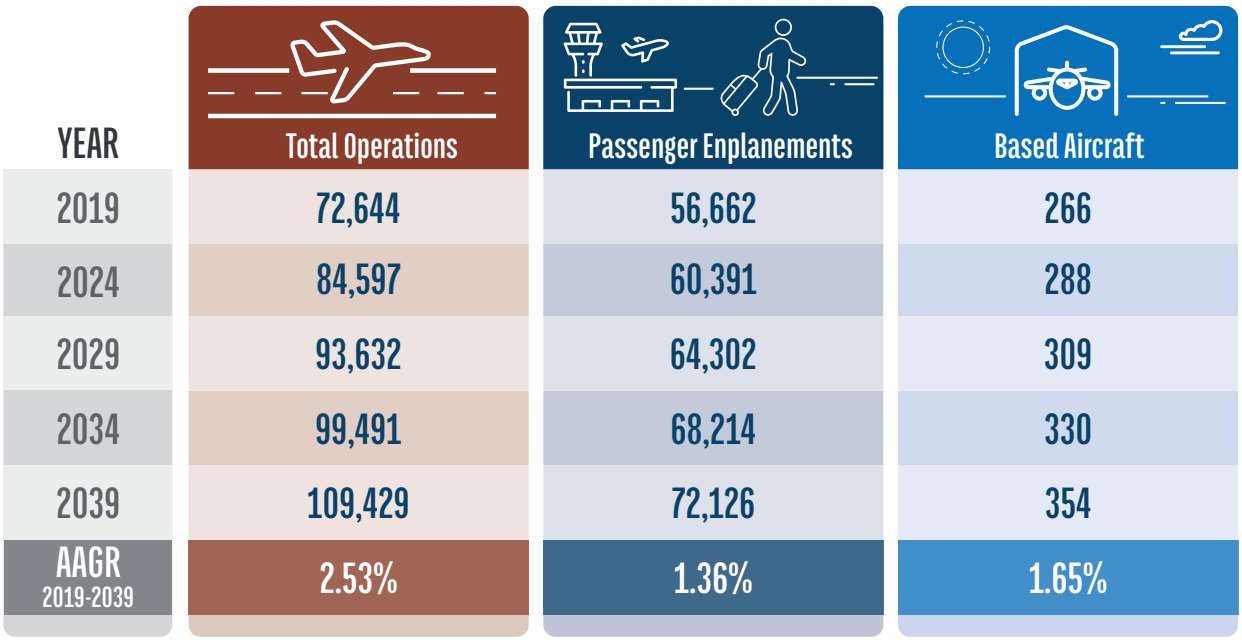
Table 2.27 – *Aviation Activity Forecast Summary*

Year	Total Operations	Passenger Enplanements	Based Aircraft
2019	72,644	56,662	266
2024	84,597	60,391	288
2029	93,632	64,302	309
2034	99,491	68,214	330
2039	109,429	72,126	354
AAGR 2019-2039	*2.53%*	*1.36%*	*1.65%*

Sources:
FAA Air Traffic Activity Data System.
FAA National Based Aircraft Inventory Program.
FAA Passenger Boarding and All-Cargo and All-Cargo Data for U.S. Airports.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

Figure 2.11 – *Executive Airport Aviation Activity Forecasts*



Sources:
FAA Air Traffic Activity Data System. FAA National Based Aircraft Inventory Program. FAA Passenger Boarding and All-Cargo and All-Cargo Data for U.S. Airports. Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

2.12. Federal Aviation Administration Forecast Review and Approval

FAA ADOs or Regional Airports Divisions are responsible for review and approval of forecasts developed for most master plans at federally-sponsored airports. When reviewing a sponsor's forecast, the FAA must ensure the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate methodologies. Additional discussion on assumptions and methodologies can be found in the FAA Aviation Policy and Plans Office (APO) report, Forecasting Aviation Activity by Airport. After a thorough review of the forecast, the FAA then determines if the forecast is consistent with the TAF.

For all classes of airports, forecasts are considered consistent with the TAF if they meet the following criterion: Forecasts differ by less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period. If the forecast is not consistent with the TAF, differences must be resolved if the forecast is to be used in FAA decision-making. This may involve revisions to the airport sponsor's submitted forecasts, adjustments to the TAF, or both.

The FAA-template tables below present a 15-year comparison of recommended forecasts developed in this chapter and forecasts identified in the FAA TAF issued February 2019 (see **Figure 2.12** and **Figure 2.13**). The tables were obtained from Appendix B and Appendix C of "Forecasting Aviation Activity by Airport" prepared for the FAA's Office of Aviation Policy and Plans Statistics and Forecast Branch.

As shown in the Appendix C table, forecasts of total aircraft operations presented in this Airport Master Plan Update satisfy the criteria for approval at the ADO level. Forecasts of based aircraft are inconsistent with the TAF, as base year 2019 data were obtained from an inventory conducted by Airport Staff that was uploaded into the FAA's National Based Aircraft Inventory Program, rather than the 245 based aircraft reported in the TAF.

Representatives from the FAA's Phoenix ADO confirmed in January 2020 that the 266 based aircraft identified by Airport staff were acceptable to use for forecasting purposes and that forecasts of based aircraft could be reviewed by the ADO despite being inconsistent with the FAA TAF issued in February 2019. It should be noted that because passenger activity at the Airport is not associated with scheduled airline activity, enplanement forecasts are not subject to FAA review and approval and are, therefore, not included in the tables.

Figure 2.12 – *FAA Template for Comparing Airport Planning and TAF Forecasts*

Appendix C
Template for Comparing Airport Planning and TAF Forecasts (1)

Based Aircraft	Year	HND Forecast	TAF	HND/TAF % Difference
Base yr.	2019	266	245	8.6%
Base yr. + 5yrs.	2024	288	255	12.9%
Base yr. + 10yrs.	2029	309	265	16.5%
Base yr. + 15yrs.	2034	330	275	20.1%
Itinerant GA Operations				
Base yr.	2019	62,047	64,003	-3.1%
Base yr. + 5yrs.	2024	73,207	69,268	5.7%
Base yr. + 10yrs.	2029	82,041	75,007	9.4%
Base yr. + 15yrs.	2034	88,242	81,275	8.6%
Local GA Operations				
Base yr.	2019	10,323	11,222	-8.0%
Base yr. + 5yrs.	2024	11,114	11,307	-1.7%
Base yr. + 10yrs.	2029	11,315	11,392	-0.7%
Base yr. + 15yrs.	2034	10,973	11,477	-4.4%
Total GA Operations				
Base yr.	2019	72,370	75,225	-3.8%
Base yr. + 5yrs.	2024	84,321	80,575	4.6%
Base yr. + 10yrs.	2029	93,356	86,399	8.1%
Base yr. + 15yrs.	2034	99,215	92,752	7.0%

Notes: TAF data is on a U.S. government fiscal year basis (October through September).

(1) Table is developed from Appendix C in the FAA Report, "Forecasting Aviation Activity By Airport."

Figure 2.13 – *Template for Summarizing and Documenting Airport Planning Forecasts*

Appendix B
Template for Summarizing and Documenting Airport Planning Forecasts (1)

A. Forecast Levels and Growth Rates

Airport Name: Henderson Executive Airport (HND) — 2019

	2019	2024	2029	2034	Average Annual Growth Rates		
	Base Yr. Level	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.	Base Yr. to +5	Base Yr. to +10	Base Yr. to +15
Operations							
Itinerant							
General aviation	62,047	73,207	82,041	88,242	8.4%	3.2%	2.8%
Military	252	266	266	266	1.1%	0.6%	0.4%
Local							
General aviation	10,323	11,114	11,315	10,973	1.3%	1.0%	0.4%
Military	22	10	10	10	-10.9%	-5.5%	-3.6%
TOTAL OPERATIONS	72,644	84,597	93,632	99,491	7.4%	2.9%	2.5%
Instrument Operations	15,179	15,550	19,210	22,536	9.7%	2.7%	3.2%
Peak Hour Operations	63	75	85	93	9.5%	3.5%	3.2%
Based Aircraft							
Single Engine (Nonjet)	177	181	181	176	-0.1%	0.2%	0.0%
Multi Engine (Nonjet)	23	27	31	36	11.2%	3.4%	3.7%
Turbo-Prop	26	31	37	44	13.5%	4.1%	4.5%
Jet Engine	37	45	55	67	16.0%	4.8%	5.3%
Helicopter	3	4	6	8	35.2%	9.7%	11.7%
Other	0	0	0	0	0.0%	0.0%	0.0%
TOTAL	266	288	309	330	4.8%	1.6%	1.6%

B. Operational Factors

	Base Yr. Level	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.
GA operations per based aircraft	272	293	302	300

(1) Table is developed from Appendix B in the FAA Report, "Forecasting Aviation Activity By Airport."

3. FACILITY REQUIREMENTS

As documented in **Chapter 2**, it is projected that Henderson Executive Airport (the Airport) could experience significant growth in aircraft operations, enplaned passengers, and based aircraft over the 20-year planning horizon. To accommodate this growth, this chapter identifies infrastructure and facilities needed at the Airport based on forecast demand.

3.1. Introduction

Capacity and demand analyses were completed for airside, landside, general aviation (GA), and support facilities to evaluate existing infrastructure against forecast demand. These analyses were then used to develop facility requirements for the base year (2019), near-term (2024), mid-term (2029), and long-term (2039) timeframes. These planning milestones will allow Clark County Department of Aviation (CCDOA) to make informed decisions regarding the timing of development and expansion. While the forecast and facility needs are tied to specific planning years in this Airport Master Plan Update, should actual demand deviate from the forecasts, the facility needs would need to be adjusted a corresponding amount.

A summary of based aircraft and operations forecasts is presented in **Figure 3.1**. Design hour operations reported in **Chapter 2** reflect an average of 50 highest peak hours annually. Peak hour operations forecasts were developed for this chapter to calculate annual service volume and are based on the average of the highest 31 peak hour operations in the peak month (October). Growth rate for peak hour operations was assumed to be commensurate with peak month operations. The purpose of developing a second peak operations forecast was to provide a more accurate representation of elevated levels of airfield demand that regularly occur on the airfield and more accurately reflect the airfield's actual annual service volume.

Figure 3.1 *– Forecast Summary – Medium Growth Scenario*

YEAR	Based Aircraft	Passenger Enplanements	Annual Operations	Peak Month Operations	Design Day Operations	Design Hour Operations	Peak Hour Operations
2019	266	56,662	72,644	6,717	285	63	47
2024	288	60,391	84,597	8,020	332	75	56
2029	309	64,302	93,632	9,100	367	85	64
2034	330	68,214	99,491	9,914	390	93	69
2039	354	72,126	109,429	11,180	429	105	78
AAGR 2019-2039	1.65%	1.36%	2.53%	3.32%	2.53%	3.32%	3.32%

Sources:
FAA National Based Aircraft Inventory Program.
FAA Terminal Area Forecast, issued February 2019.
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Notes:
AAGR = Average annual growth rate

The recommendations in this chapter incorporate forecast operational data from **Chapter 2** as well as feedback from airport personnel, tenants, and other stakeholders obtained during Technical Advisory Committee (TAC) and Planning Advisory Committee (PAC) meetings, interviews, and public meetings.

3.2. Airfield Demand and Capacity

The analysis presented in this section reflects the airfield's anticipated ability to accommodate forecast levels of demand presented in **Chapter 2**. The methodologies used in this Airport Master Plan Update to determine capacity and potential aircraft delays are described in Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5060-5, Airport Capacity and Delay.

3.2.1. Airfield Capacity

Airfield capacity, also referred to as throughput capacity, is a measure of the maximum number of aircraft operations an airfield can accommodate in a specified time period (i.e., hourly or annually) without incurring substantial delay. As operations or demand approach and potentially exceed the capacity of the airfield, individual aircraft delay will increase.

Airfield capacity evaluation is used in long-range planning to help identify and justify any capacity-related airfield improvements that may be needed over the planning horizon. The analysis also determines the average amount of aircraft delay that could be expected during peak periods of activity. Strategies to mitigate aircraft delay and enhance airfield capacity typically require significant lead time; therefore, it is important to identify potential capacity constraints well in advance of actual needs. The estimated airfield capacity and delay at Henderson Executive Airport can be expressed in the following measurements:

- **Hourly Capacity** is the maximum number of aircraft operations the airfield can safely accommodate under continuous demand in a 1-hour period.
- **Annual Service Volume** is the maximum number of aircraft operations the airfield can accommodate in a 1-year period without excessive delay.
- **Delay** is the time difference between an unconstrained operation (no interference from other aircraft) and the actual amount of time required to conduct an operation. Delay is typically presented in terms of minutes.

Airfield Capacity Analysis

Airfield capacity can be affected with or without physical construction occurring at the airport. There are several factors that impact airfield capacity, including runway configuration and usage, location of exit taxiways, meteorological conditions, percentage of touch and go operations, airspace constraints, operational aircraft fleet mix, and others. These factors are further described in **Section A.1.1** of **Appendix A**. Based on factors impacting airfield capacity at the Airport, application of methodologies and guidance reported in FAA AC 150/5060-5 were used to determine peak hour capacity and annual service volume. Peak hour capacity is determined for both visual flight rule (VFR) and instrument flight rule (IFR) conditions and is a measurement of the maximum number of operations that an airfield can accommodate in a 1-hour period. Annual service volume reflects total annual operations that an airfield configuration can accommodate (accounting for the identified capacity calculation factors) without incurring significant delay on a regular basis.

The appropriate configuration and fleet mix for the Airport results in an unconstrained VFR hourly capacity of 197 operations, an IFR hourly capacity of 59 operations, and an annual service volume of 355,000 operations.

As detailed in **Section A.1.2** of **Appendix A** and summarized in **Table 3.1**, the Airport's VFR and IFR hourly capacities are anticipated to remain constant throughout the 20-year planning horizon at 177 and 59, respectively. Annual Service Volume is expected to decrease slightly through 2039, which is attributed to a higher proportion of business jet operations and more pronounced peak periods of activity.

Table 3.1 – *Airfield Capacity Summary*

Item	2019 (existing)	2024	2029	2034	2039
Annual Operations	72,644	84,597	93,632	99,491	109,429
Peak Month Operations	6,717	8,020	9,100	9,914	11,180
Peak Month Average Day Operations	217	259	294	320	361
Peak Hour Operations	47	56	64	69	78
Touch-and-Go Factor (T)	1	1	1	1	1
Visual Flight Rule Taxiway Exit Factor (E)	0.9	0.9	0.9	0.9	0.9
Instrument Flight Rule Taxiway Exit Factor (E)	1	1	1	1	1
Annual Demand/Average Daily Demand	2,554	22			Text
Ratio (D)	335.3	327.0	319.0	311.1	303.4
Average Daily Demand/Peak Month Average Day Ratio (H)	4.6	4.6	4.6	4.6	4.6
Weighted Hourly Visual Flight Rule Capacity (Cw)	**177**	**177**	**177**	**177**	**177**
Weighted Hourly Instrument Flight Rule Capacity (Cw)	**59**	**59**	**59**	**59**	**59**
Annual Service Volume (Cw*D*H)	**275,120**	**268,344**	**261,735**	**255,288**	**249,001**

Sources:
FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2020.

Aircraft Delay

FAA AC 150/5060-5 provides guidance to calculate annual aircraft delay in terms of minutes per aircraft operation. This is an important component because it highlights impacts of potential airfield constraints compared with expected activity and identifies if capacity enhancing improvements may be needed. Delay is calculated based on the ratio of existing and forecast operations to annual service volume. **Section A.1.3** of **Appendix A** presents additional details on the calculation of expected aircraft delay, and **Table 3.2** shows the forecast annual operations, expected average aircraft delay (minutes per operation), and total annual aircraft delay (hours). As shown, it is anticipated that the Airport will incur approximately 620 hours of total aircraft delay by 2039.



Table 3.2 – *Annual Service Volume, Capacity, and Annual Aircraft Delay*

Year	Annual Operations	Annual Service Volume	Ratio of Operations to Annual Service Volume	Delay per Aircraft Operation (minutes)	Total Annual Delay (hours)
2019	72,644	275,120	26%	0.15	182
2024	84,597	268,344	32%	0.21	296
2029	93,632	261,735	37%	0.27	421
2034	99,491	255,288	39%	0.29	481
2039	109,429	249,001	44%	0.34	620

Sources:
FAA AC 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2020.

Airfield Demand-Capacity Summary

The FAA recommends that an Airport Sponsor should begin planning for airfield capacity enhancements (such as additional exit taxiways, additional runways, etc.) when the ratio of annual demand to annual service volume reaches 60 percent and that implementation of such improvements should occur when that ratio reaches 80 percent. As shown in **Table 3.2**, the Airport is not anticipated to reach the 60 percent planning threshold within the 20-year planning horizon. As such, it is expected the Airport will not require planning for or implementation of capacity-enhancing projects within 20 years. However, significant changes to the Airport's fleet mix or volume of operations that exceed forecast levels of activity may trigger the need to re-examine capacity.

The runway length analysis presented in a subsequent section recommends an extension to Runway 17R/35L to accommodate the existing and forecasted critical design aircraft. Development alternatives presented in the next chapter of the Airport Master Plan examine options to obtain necessary runway length and achieve FAA-recommended separation standards for Airport Reference Code (ARC) D-III aircraft; alternatives that include potential relocation of Runway 17R/35L. In the event CCDOA were to shift from a dual-parallel runway configuration to a single-runway configuration, the subsequent annual service volume was estimated to be between 200,000 and 205,000 operations depending on potential exit taxiways and other factors. This would represent a demand to annual service volume ratio range of 0.55 to 0.54 by 2039, meaning that a single-runway configuration could accommodate forecast demand. It is recommended that the CCDOA closely monitor flight activity at Henderson Executive Airport for deviations from the forecast assumptions, especially over the next two to five years when the critical design aircraft is expected to shift. Socioeconomic data and expected growth in the Las Vegas Valley support the forecast changes in aircraft operations but, as demonstrated by the previous forecast, other airports and economic trends can have a substantial impact on future operations.

3.3. FAA Design Standards

FAA AC 150/5300-13A defines the applicable airport design standards for Henderson Executive Airport. Some key design standards, how they are determined, associated safety areas they affect, and where they apply at an airport are defined in **Table 3.3**. A graphical representation of where the various design standards apply at Henderson Executive Airport is found in **Figure 3.2**.

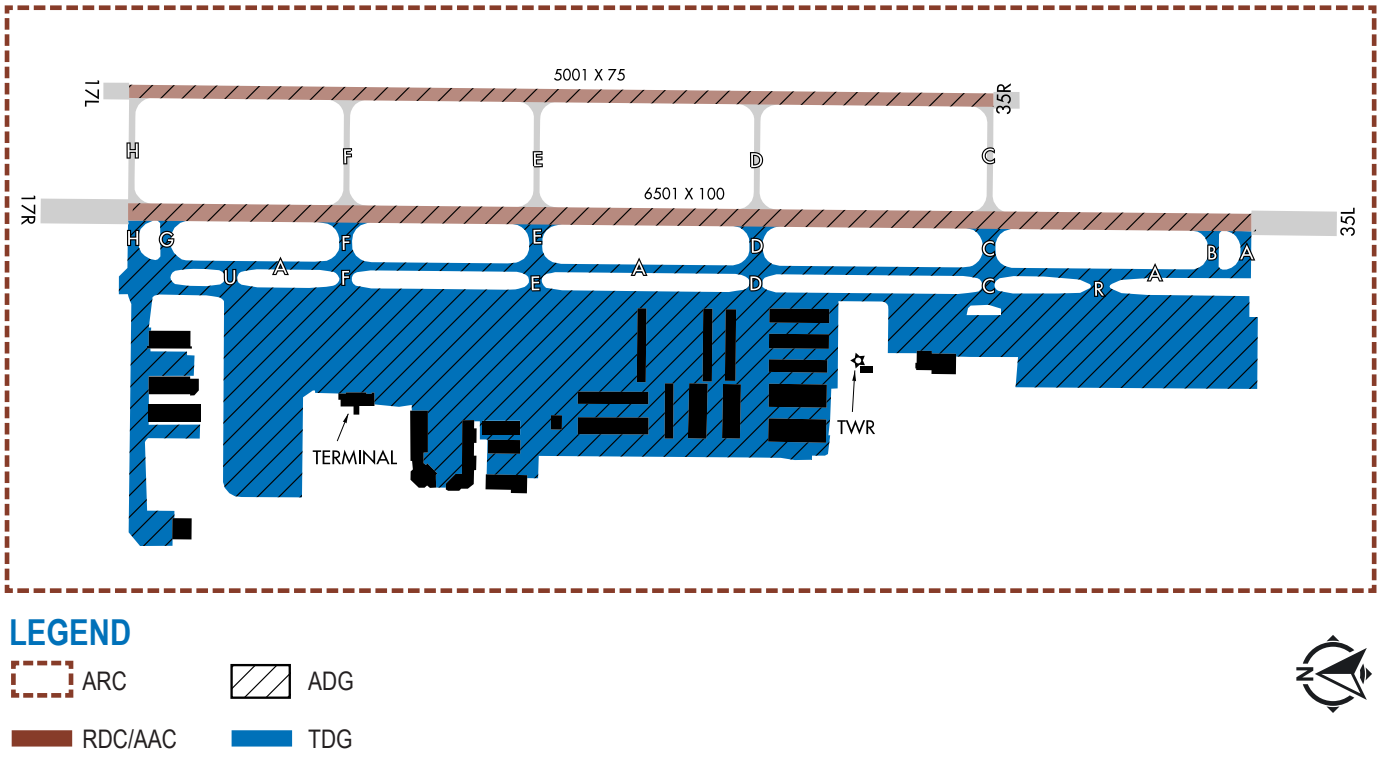
On July 21, 2020, the FAA released a draft version of AC 150/5300-13B, Airport Design, for industry review and input. Once input is received, revisions, as appropriate, will be made by the FAA and it is anticipated that AC 150/5300-13B will be finalized and published in early 2021. This AC will then provide the airport design standards applicable to the National Airspace System (NAS). To develop a flexible master plan that is not outdated shortly after completion, facility requirement analysis will be performed against this draft AC throughout this chapter.

Table 3.3 – *Applicability of FAA Design Standards*

FAA Design Standards	Applies To	Applicable Design Standards	Defined By
Airport Reference Code (ARC)	Entire Airport	N/A	Airport's highest RDC (minus the visibility component)
Runway Design Code (RDC)	Runway Environment	Runway Width Runway Shoulders Blast Pad Size Runway Safety Area Runway Obstacle Free Zone Runway Object Free Area Runway Protection Zone Hold Line Location Runway to Parallel Taxiway Separation Runway to Aircraft Parking Areas	RDC for an individual runway. The RDC is comprised of the Airplane Approach Category (AAC), Aircraft Design Group (ADG), and runway visibility minimums. The runway end with the most restrictive visibility minimums defines the visibility component for the runway.
Aircraft Approach Category (AAC) (included as part of the RDC)	Runway Environment	Runway Width Runway Safety Area Runway Object Free Area Runway Protection Zone Runway to Parallel Taxiway Separation	Approach speed
Taxiway Design Group (TDG)	Taxiway Environment Apron Areas	Taxiway Width Taxiway Edge Safety Margin Taxiway Should Width Taxiway/Taxilane Centerline to Parallel Taxiway/Taxilane Centerline	Outer to outer main gear width and cockpit to main gear distance
Airplane Design Group (ADG) (included as part of the RDC)	Runway Environment Taxiway Environment Apron Areas	Taxiway Safety Area Taxiway Object Free Area Taxilane Object Free Area Taxiway Centerline to Parallel Taxiway/Taxilane Centerline Taxilane Centerline to Parallel Taxilane Centerline Taxiway Centerline to Fixed or Movable Object Taxilane Centerline to Fixed Movable Object Taxiway Wingtip Clearance Taxilane Wingtip Clearance	Aircraft wingspan and tail height

Sources:
FAA Advisory Circular 150/5300-13A, Airport Design.
Kimley-Horn, 2020.

Figure 3.14 – *Applicability of FAA Design Standards*



Source:
Kimley-Horn, 2020.

3.3.1. Airport Reference Code

An airport's design standards are determined by the most demanding aircraft or grouping of aircraft that conduct or are anticipated to conduct 500 annual operations. This is referred to as the critical design aircraft. As previously noted, an airport's ARC and critical design aircraft are unrelated to aircraft classifications used for airport capacity determinations.

Henderson Executive Airport's current Airport Layout Plan (ALP) (2018) assigned the Fokker F27 as the critical design aircraft for Runway 17R/35L, which is classified as an ARC of B-III, and the Beechcraft Super King Air 200 as the critical design aircraft for Runway 17L/35R, classified as an ARC of B-II. The more demanding of the two critical design aircraft is the Fokker F27 and, therefore, the ARC for Henderson Executive Airport was previously defined as B-III.

The ARC and critical design aircraft were reevaluated in Chapter 2. Based on operational data obtained via the FAA's Traffic Flow Management System Counts database, the existing ARC at the time of this writing is a C-II for 17R/35L and B-II for 17L/35R. However, forecasts indicate a future ARC of D-III for 17R/35L, while 17L/35R remains a B-II. Therefore, the facility requirements for this Airport Master Plan Update evaluate the existing facilities against C-II and D-III design standards as the current and future ARCs, respectively.

Based on 2019 operations data, the ARC for the Airport is C-II. The ARC is forecasted to become D-III within the 20-year planning period, possibly as early as 2033.

The change in critical design aircraft and associated ARCs is a significant one for the Airport. FAA design standards for C-II runways are more stringent than what is required for B-III runways. The anticipated change from C-II to D-III also will impact the size of some design standards, but the change is not as dramatic as going from a B-III to C-II.

3.3.2. Runway Design Code

FAA AC 150/5300-13A introduced the Runway Design Code (RDC) to expand upon the ARC. While the ARC is used to relate overall airport design criteria to the operational and physical characteristics of the aircraft types that will operate at an airport, RDC provides information needed to determine design standards that apply to a particular runway. These standards provide basic guidelines for a safe and efficient airport system and are based on the most demanding aircraft expected to use the runway. **Section A.2.1** of **Appendix A** provides additional information on the RDC and a comparison of existing runway dimensions to design and separation standards for both existing and future RDCs.

It is recommended that nonstandard conditions, including the shoulder width and distance to the parallel taxiway for Runway 17R/35L and hold position locations for both runways, be corrected when an adjacent or pavement improvement project is undertaken. Consideration should also be given to controlling dust and foreign object debris (FOD). Due to the hot desert climate of Henderson Executive Airport dust and FOD mitigation is very difficult because nothing will grow in dirt areas. Therefore, paved areas may exceed FAA recommended minimum standards as a means to mitigate potential FOD. Additional information regarding how existing conditions at Henderson Executive Airport meet or deviate from these FAA design standards is described in subsequent sections of this chapter.

3.3.3. Taxiway Design Group

Taxiway design group (TDG) is a classification administered to aircraft based on outer-to-outer main gear width (MGW) and cockpit to main gear (CMG) distance. The TDG determines certain taxiway design standards such as the taxiway width, taxiway edge safety margin, taxiway shoulder width, and taxiway fillets. TDGs are applied to individual taxiways based upon the aircraft anticipated to use the facilities. This prevents potential overbuilding of taxiway infrastructure. Based on existing taxiway design standards used at the Airport, and the critical aircraft anticipated to operate at the Airport, TDG 2 standards apply (TDG 2 design standards are found in **Section A.2.2** of **Appendix A**). In draft AC 150/5300-13B, there are some significant changes to the taxiway design standards, including the further subdivision of TDG 2 into 2A and 2B. However, there is no difference in taxiway widths, taxiway edge safety margins, nor taxiway shoulder widths between TDGs 2A and 2B nor are there any differences from current TDG design standards

Taxiway protection and separation standards are determined by the ADG. **Section A.2.2** of **Appendix A** presents the applicable standards for the Airport, which are also summarized in **Figure 3.3**. ADG II taxiway design standards apply to the taxiways between the parallel runways and Taxiway R. ADG III applies to the remaining taxiways at the Airport.

Although taxiways and taxiway connectors at the Airport meet or exceed standard geometry requirements described by the FAA, there are multiple taxiways that provide direct access from aprons to the runway. Direct access between an apron and a runway increases the risk of runway incursions. Additional discussion of nonstandard taxiways is presented in subsequent sections. When reviewing areas of the airfield that exceed FAA minimum standards, it is important to consider FOD mitigation. These modifications are recommended to be performed when pavement maintenance is being conducted on the associated taxiway. Consideration may also be given to expanding existing shoulders to provide enhanced protection as associated taxiway pavements are being maintained.

Figure 3.15 – *Taxiways by Airport Design Group and Taxiway Design Group*



Taxiway	Airplane Design Group	Taxiway Design Group
Segments Between Parallel Runways		
C	II	2
D	II	2
E	II	2
F	II	2
Segments West of Runway 17R/35L		
A	III	2
B	III	2
C	III	2
D	III	2
E	III	2
F	III	2
G	III	2
H	III	2
R	III	2
U	III	2

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- Airplane Design Group II
- Airplane Design Group III

Sources:
Nearmap
Kimley-Horn, 2020.

3.4. Airside Facilities

As noted in **Chapter 1**, airside facilities as defined in this Master Plan Update include the runway and taxiway system, the runway approach areas, and the associated appurtenances such as airfield lighting, visual aids, and navigational aids (NAVAIDs). Aircraft parking areas are also included in this section. The ability of the present airside facilities to accommodate existing and future traffic, and the facilities required through the year 2039 are examined in the following subsections.

3.4.1. Runway Requirements

Chapter 1 described the existing runway system. Applicable design standards were defined in the previous sections of this chapter and in **Section A.2.1** of **Appendix A**. This section defines the runway requirements needed to satisfy the forecast demand in terms of runway length, pavement strength, crosswind coverage, and safety areas. Accommodation of these requirements will provide satisfactory facilities for the variety of aircraft expected to use the Airport throughout the planning period.

Runway Length Overview

Runway length is one of the most important factors when considering operational efficiency and facility requirements for forecast aviation activity at Henderson Executive Airport. As detailed in FAA AC 150/5325-4B, Runway Length Requirements, runway length requirements are influenced by multiple factors, including an airport's elevation above mean sea level (MSL), air temperature, runway gradient, runway surface conditions (e.g., dry, wet), and aircraft operating weight. Generally, required takeoff runway length for aircraft increases as the aforementioned factors increase due to the fact that air is less dense at higher elevations and temperatures. For example, the greater an airport's elevation above MSL, the greater takeoff distance an aircraft will require. Similarly, required runway length for takeoff will increase as air temperature rises. In both cases, the density altitude is higher, requiring more runway length for aircraft to achieve the lift necessary to safely operate. Since the Airport is situated in a warm, desert climate, approximately 2,500 feet above MSL, aircraft will generally require more takeoff runway length then if the same aircraft were operating at an airport located in a cooler climate and/or at a lower elevation.

Key factors in determining runway length requirements at Henderson Executive Airport:

- Airport elevation – 2,492 feet above MSL
- Air temperature – 104.9 degrees Fahrenheit (July)
- Runway gradient – 89.5 feet Runway 17R/35; 69.1 feet Runway 17L/35R
- Runway surface conditions - Dry
- Aircraft weight – 99,600 pounds (Gulfstream G650)

Although the runway can accommodate most aircraft takeoff operations at 85 percent maximum takeoff weight and above at the Airport's mean maximum temperature (105° F), the existing length significantly limits the potential for large business jet operations during the summer months. Subsequently, some aircraft, including the Airport's existing and forecast critical design aircraft, must operate with restrictions to their takeoff weight due to operational limitations. This is done through either reduced fuel load and/or reduced passenger/cargo capacity. Reductions in fuel loads adversely affects the range of the aircraft, meaning that aircraft will need to refuel sooner than the normal range of the aircraft. For example, an aircraft departing from Henderson Executive Airport bound for New York City generally will not be able to plan for a non-stop flight due to required weight limitations, which are often achieved through a reduced fuel load. Rather, the aircraft will need to plan a stop en route to refuel. This subsequently reduces the Airport's marketability for corporate aircraft. The main role of Henderson Executive Airport is to serve as a reliever to McCarran International Airport for these large business jet operations. This role helps minimize delays at McCarran International Airport and benefits the National Airspace System in reducing overall delays into Southern Nevada.

Since forecast future demand indicates the Airport should aim to accommodate aircraft operations with ARCs of up to and including D-III, **Chapter 4** includes an analysis of a possible 999-foot extension of Runway 17R/35L to provide an optimal runway length

of 7,500 feet. While some heavier aircraft may still need to operate with takeoff weight restrictions during the summer months, a 7,500-foot runway would provide an acceptable length for Henderson Executive Airport's forecast critical aircraft at up to 95 percent maximum takeoff weight.

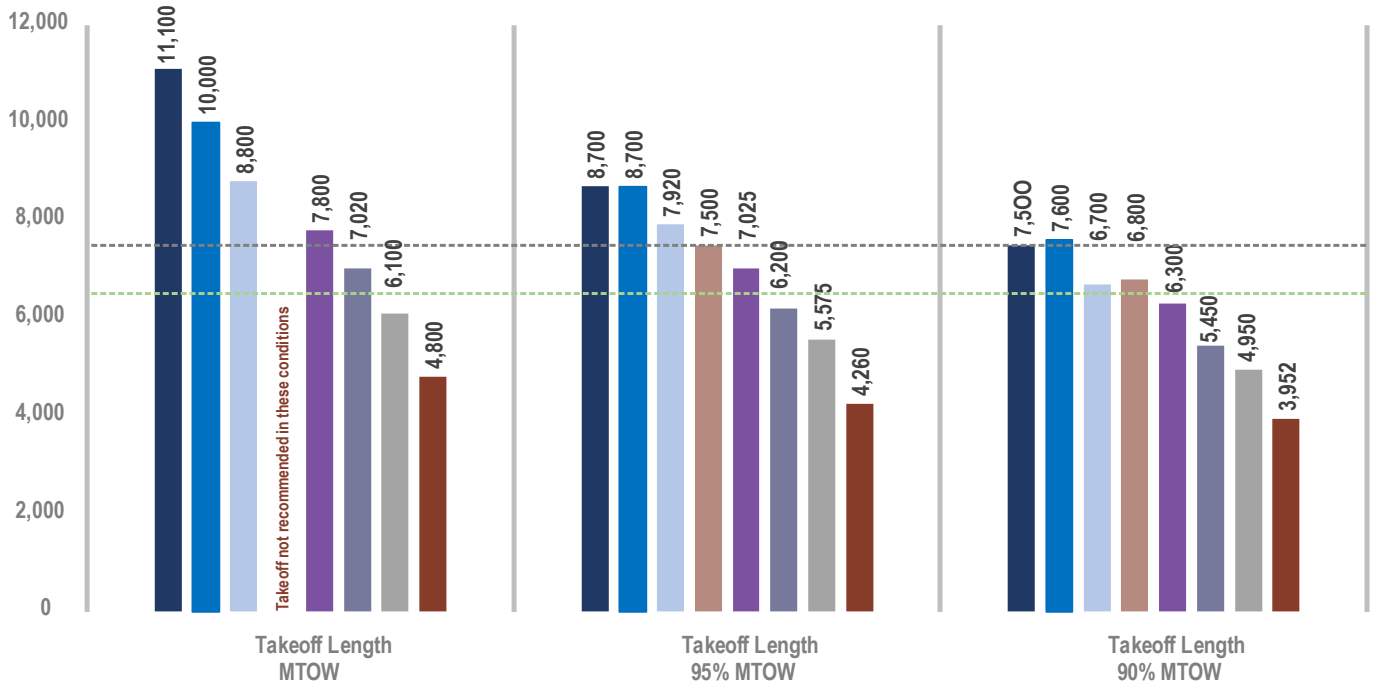
Runway Length Analysis

Figure 3.4 displays the required takeoff runway lengths for typical aircraft that have significant existing and forecast operations at the Airport. Using aircraft performance capabilities from the respective manufacturer planning manuals, the runway length analysis for Henderson Executive Airport was conducted based on dry runway conditions with a given elevation of 2,492 feet MSL and a temperature of 104.9 degrees Fahrenheit (104.9° F)—the mean maximum daily temperature during the hottest month (July) according to the National Oceanic and Atmospheric Administration's (NOAA) National Climate Data Center. As noted in **Chapter 3**, high temperatures adversely impact aircraft performance, and the mean maximum daily temperature during the hottest month was utilized for this analysis to determine overall facility adequacy. Use of the mean maximum daily temperature during the hottest month is standard practice when performing these planning analyses. Takeoff runway length required was calculated for certified maximum takeoff weight, 95 percent of maximum takeoff weight, and 90 percent of maximum takeoff weight.

FAA standards advise that runway lengths should be sufficient to accommodate the existing and forecast critical design aircraft, or the most demanding aircraft or group of aircraft that make regular use of the airport (e.g., at least 500 annual operations). As determined in **Chapter 2**, the Bombardier Challenger 300/350 and Gulfstream G600 are Henderson Executive Airport's existing and forecast design aircraft, respectively. As noted in **Figure 3.4**, the Gulfstream G650 was analyzed for the G600/G650 group of aircraft. Gulfstream G650s are among the Airport's existing users and possess similar characteristics as the G600, though G650s are slightly heavier aircraft with wider wingspans, thus presenting a slightly conservative analysis. The horizontal dashed lines in the chart represent the length of the Airport's existing primary runway (Runway 17R/35L) and the ultimate length of the runway after extension considerations.

The Boeing Business Jet (BBJ1), a variant of the Boeing 737-700, was included in this analysis for comparative purposes because a member of the TAC indicated a potential user would be interested in operating at the Airport. The BBJ1 requires additional facility needs that are documented in **Chapter 2**, as appropriate.

Figure 3.16 – *Runway Length Analysis at Henderson Executive Airport*



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- 737 BBJ1
- Gulfstream IV/G400
- Dassault Falcon 900B/900C
- Gulfstream G650(future critical aircraft)
- Dassault Falcon 900EX/LX
- Gulfstream G550
- Dassault Falcon/Mystère 50
- Cessna Citation Sovereign
- ---- Ultimate (7,500) (Ideal Future Length)
- ---- Runway 17R/35L (6,501)

Sources:
Aircraft Specific Planning Manuals and Performance Charts.
Kimley-Horn, 2020.

Runway Width

According to FAA AC 150/5300-13A, standard runway width is determined by the RDC and the critical design aircraft ARC. As detailed in **Chapter 2** of this Master Plan Update, the FAA approved the Bombardier Challenger 300/350 as the Airport's existing critical design aircraft (ARC C-II) and the Gulfstream 600 was determined to be the Airport's future critical design aircraft (ARC D-III).

The existing width of Runway 17R/35L is sufficient to accommodate forecast operations throughout the 20-year planning horizon.

Runway 17R/35L

For an existing RDC of C-II-5000, the standard width is 100 feet, which matches the current runway width.

Runway 17R/35L's future RDC is D-III-5000, which has a standard runway width requirement of 150 feet. However, if a runway's critical design aircraft has a maximum certified takeoff weight of 150,000 pounds or less, the runway's standard width requirement is reduced to 100 feet. The Gulfstream 600 has a maximum certified takeoff weight of 91,500, well under the 150,000-pound threshold. Therefore, the required runway width is 100 feet.

With a current width of 100 feet, no modifications to the width of Runway 17R/35L are anticipated during the planning horizon. If the BBJ1 surpasses forecast operations and reaches status as the Airport's critical design aircraft, the runway width requirement will increase to 150 feet given that the BBJ1 has a maximum certified takeoff weight greater than 150,000 pounds. This consideration should be evaluated in the next Master Plan Update.

Runway 17L/35R

The required runway width for Runway 17L/35R is 75 feet, which matches the existing width of the runway; therefore, no changes are required.

Runway Shoulders

Runway shoulders provide resistance to soil erosion, decrease the likelihood of engine ingestion of foreign objects, and accommodate the passage of maintenance and emergency equipment as well as the occasional passage of aircraft deviating from the runway. Like design standards for runway width, runway shoulder width is determined by the RDC. Paved shoulders are required for ADG IV and higher aircraft and are recommended for ADG III aircraft. Turf, aggregate-turf, soil cement, lime or bituminous stabilized soil are recommended adjacent to runways accommodating ADGs I and II aircraft.

Runway shoulders for Runway 17R/35L need to be increased to 20 feet. Runway shoulders on Runway 17L/35R meet requirements.

Runway 17R/35L

The existing shoulders of Runway 17R/35L are 10 feet wide and unpaved. Although 10 feet is sufficient for current operations, the runway's future critical design aircraft will increase to the Gulfstream 600–a 91,500-pound D-III aircraft–that requires a runway shoulder width of 20 feet. Therefore, the runway's shoulders will need to be extended by an additional 10 feet to meet design standards for forecast operations. Consideration may be given to paving the shoulders, particularly if aircraft with wing mounted engines become more prevalent in the fleet mix. Should aircraft with maximum takeoff weights greater than 150,000 pounds become the critical design aircraft, the shoulder width requirement increases to 25 feet.

Runway 17L/35R

With an RDC of B-II-5000, the standard shoulder width for Runway 17L/35R is 10 feet. Since the runway is not anticipated to accommodate aircraft with ARCs above B-II, the runway's existing 10-foot-wide unpaved shoulder meets design standards for current and forecast operations during the planning horizon.

Runway Blast Pads

Blast pads are paved surfaces adjacent to the ends of runways that provide erosion protection from jet blast and propeller wash. According to the FAA, blast pads must always be paved, extend across the full width of the runway plus the shoulders, and must be able to support the occasional passage of the most demanding aircraft as well as maintenance and emergency response vehicles. Blast pad dimensions are detailed in FAA AC 150/5300-13A and are determined by the RDC of the critical design aircraft ARC.

Runway 17R/35L

Runway 17R/35L has a paved blast pad at both runway ends, each measuring 500 feet long by 140 feet wide. This exceeds RDC C-II-5000 requirements of 150 feet long and 120 feet wide. It also exceeds the future blast pad length requirement of 200 feet and meets the future blast pad width requirement of 140 feet.

Runway 17L/35R

With an existing and forecast RDC of B-II-5000, the blast pad requirements are 150 feet long by 95 feet wide. Existing blast pads are 150 feet long by 95 feet wide and meet this requirement.

Runway Orientation

The orientation of runways at an airport is primarily a function of wind direction and speed, with aircraft aiming to takeoff and land into the prevailing wind. According to the Airport's previous Master Plan Update (approved in April 1997), and the subsequent 1998 Environmental Assessment, the existing runway orientation was based not only on prevailing winds but also to help reduce noise and enhance safety for the residential communities east of the Airport. The existing runways at Henderson Executive Airport are orientated in the true headings of 180 and 0 degrees and were constructed in 2003.

Runway Hold Lines

Runway hold lines indicate the position beyond which aircraft require airport traffic control tower (ATCT) authorization before proceeding on or across a runway. When specifically instructed by ATCT, aircraft must stop so that no part of the aircraft extends beyond the holding position marking. These markings are used where it is necessary to hold an aircraft on a taxiway that intersects a runway so that the aircraft does not interfere with runway operations. Design standards for runway hold lines are published in FAA AC 150/5300-13A and are measured in terms of distance from the runway centerline in feet.

Runway 17R/35L

There are 13 hold lines associated with Runway 17R/35L, each of which is located 200 feet from the runway's centerline. With an existing RDC of C-II-5000, the runway's hold lines do not meet the 250-foot design standard. The future standard hold line separation for the Airport is 275 feet from the runway centerline. As all 13 hold lines must be relocated to meet the current 250-foot design standard, consideration may be given to relocating all hold lines to the future distance of 275 feet. Relocation of the hold lines also requires relocation of associated runway hold signs. Solutions will be discussed in **Chapter 4**.

Runway 17L/35R

Runway 17L/35R contains five associated hold lines, each of which is located 125 feet from the runway's centerline. With an RDC of B-II-5000, the runway has a hold-line design standard of 200 feet from the runway's centerline. The five hold lines and associated hold signs will need to be relocated to meet this design standard.

Runway Safety Areas

The runway safety area (RSA) is a two-dimensional designated surface on the ground surrounding a runway to reduce the risk of damage to an aircraft in the event of an undershoot, overshoot, or excursion from the runway. The RSA must be cleared and graded, have no hazardous surface variations, and be free of all objects except for those needed for air navigation or aircraft ground maneuvering. While it is desirable not to have any objects in RSAs, it has been determined that the location of some NAVAIDs is critical for proper functioning. In this case, a "fixed-by-function" designation is given to certain NAVAIDs and allows them to be located within RSAs.

The RSA must be cleared and graded, have no hazardous surface variations, and be free of all objects to protect aircraft in the event of a runway undershoot, overshoot, or excursion from the runway.

RSA design standards are also published in FAA AC 150/5300-13A and are a function of RDC. These standards cannot be modified through a modification of standards (MOS) process and should be continually evaluated for all practicable alternatives to improve any substandard RSAs. **Section A.3.1** of **Appendix A** present a review of RSAs for each runway at Henderson Executive Airport based on airport geospatial information systems (AGIS) and aerial data. Additionally, **Figure 3.5** below highlights standard and nonstandard objects within the RSAs. Ultimately, all objects without a fixed-by-function designation should be removed from the Airport's RSAs. A review of the Runway 17R/35L RSA reveals multiple nonstandard conditions relative to the location of precision approach path indicator (PAPI) power and control units (PCUs) and runway hold lines. Alternatives to mitigate the Runway 17R/35L RSA will be presented in the next phase of this Master Plan Update. The Runway 17L/35R RSA meets FAA design standards for existing and forecast operations and no mitigative action is required.

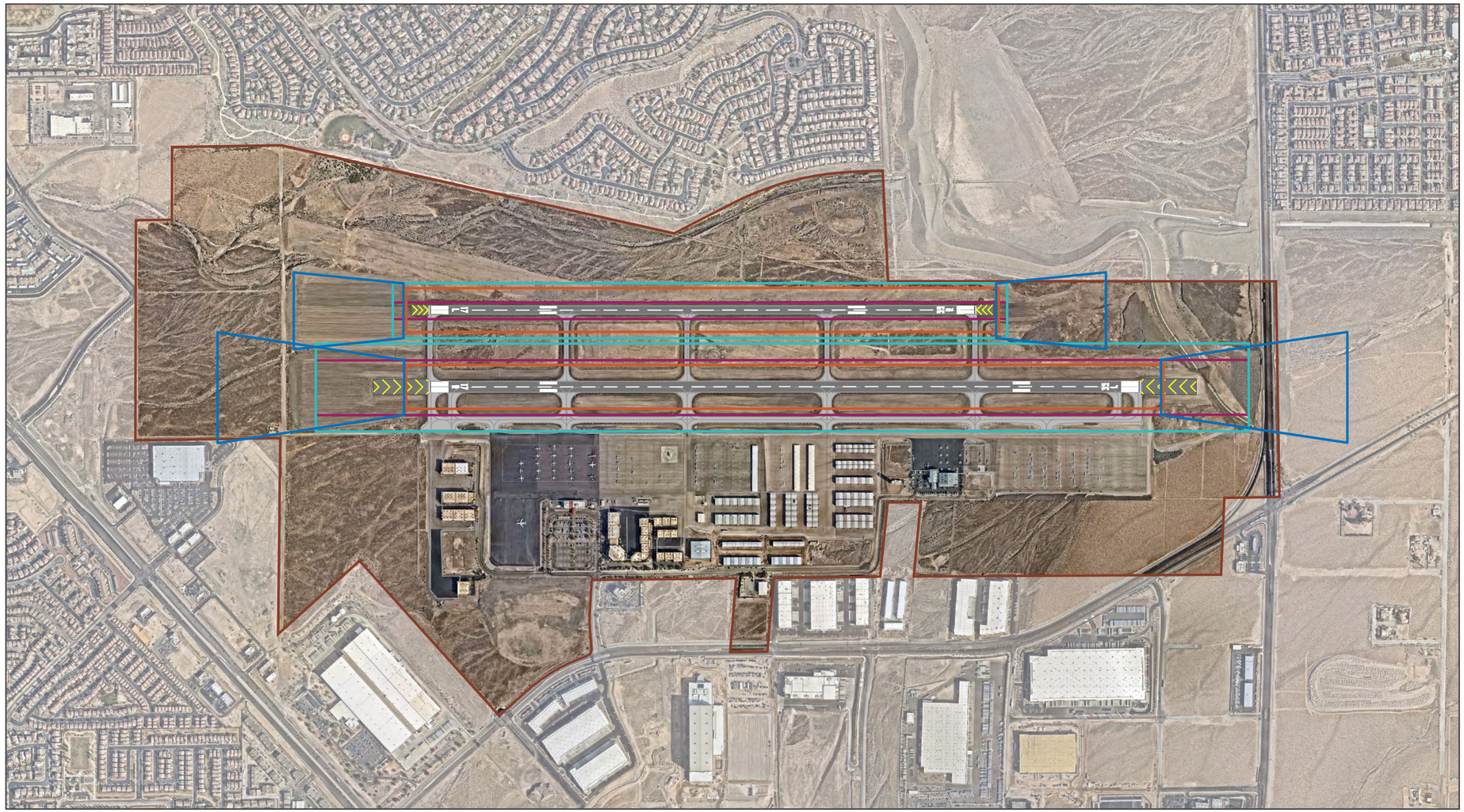
Runway Gradient

As the AAC increases, the requirements for longitudinal and traverse gradients become more stringent. Runway grading requirements and the topographic data collected as part of this Master Plan Update are presented in **Section A.3.1** of **Appendix A**. Due to FAA design standards continuing to evolve since the Airport was built and the change in ARC, both runways do not meet current FAA design standards for the existing and required runway gradient, it is recommended that gradient corrections are incorporated as part of the D-III airfield redesign project.

Runway Line-of-Sight

As Runway 17R/35L has a full-length parallel taxiway, the runway line of sight requirement is any point 5 feet above the runway centerline must be mutually visible with any other point 5 feet above the runway centerline that is located at a distance that is less than one half the length of the runway. Since Runway 17L/35R does not have an associated full parallel taxiway, the requirement is for any point 5 feet above the runway centerline to be mutually visible with any other point 5 feet above the runway centerline. A review of the topographic data reveals that line of sight requirements are met for both runways.

Figure 3.17 – *RSAs/ROFAs/OFZs/RPZs at Henderson Executive Airport*



LEGEND

- Airport Boundary
- Runway Object Free Area
- Runway Obstacle Free Zone
- Runway Safety Area
- Runway Protection Zone

0 800 1600 Feet

N

Sources:
Kimley-Horn, 2020.

Runway Obstacle Free Zones

The runway obstacle free zone (ROFZ) is a volume of airspace centered above the runway centerline, above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline, and extends up to 150 feet above the airport elevation. In the case of Henderson Executive Airport, the ROFZ for both runways extend to 2,642 feet MSL. Additionally, each runway's ROFZ extends 200 feet beyond the runway ends and is 400 feet wide (see **Figure 3.5**). The ROFZ must be kept clear during aircraft operations, with the exception of specific NAVAIDs that need to be located in the ROFZ because of their function. Like RSAs, the modification to standards process does not apply to ROFZs. In the case of Henderson Executive Airport, the ROFZs for both runways have obstacles within them that are recommended to be relocated. Further details on the ROFZs are provided in **Section A.3.1** of **Appendix A**.

The ROFZs for both runways have obstacles within them that are recommended to be relocated.

Runway Object Free Areas

The ROFA is an area centered about the runway centerline and should not have any above ground objects protruding above the nearest point of the RSA, including parked aircraft, agricultural operations, and other fixed objects. ROFA dimensions are determined based on the runway's RDC. Like the RSA, objects such as NAVAIDs that are fixed-by-function are to be frangible and are permitted inside the ROFA. Several nonstandard conditions exist within both the Runway 17R/35L and Runway 17L/35R ROFAs. Alternatives to mitigate these nonstandard conditions will be presented in the alternatives analysis of this Master Plan Update. Additional details on the ROFAs and the obstacles within each runway's ROFA are provided in **Section A.3.1** of **Appendix A**.

Impermissible objects exist within the ROFAs for both runways and should be relocated. The Airport perimeter fence near the detention pond south of Runway 35L is the largest ROFA penetration.

Runway Protection Zones

The runway protection zone (RPZ) is a trapezoidal area at ground level prior to the runway threshold or beyond the runway end that is centered above the extended runway centerline. The primary function of the RPZ is to enhance the protection of people and property on the ground. Runway ends have two RPZs: an approach RPZ and a departure RPZ. In the case of Henderson Executive Airport, the approach and departure RPZs are the same size and, since there are no declared distances, they are co-located at each runway end (see **Figure 3.5**).

Section A.3.1 of **Appendix A** provide additional information on RPZs, RPZ land use compatibility, and the Airport's RPZs.

Some portions of some RPZs extend beyond Airport property and contain incompatible land uses. CCDOA should obtain controlling interests in these areas to the extent practicable.

3.4.2. Taxiway Requirements

Presented in this section are the taxiway requirements for Henderson Executive Airport. This includes safety areas and separation standards, and a review of the existing taxiway layout against current taxiway design principles found in AC 150/5300-13A.

Parallel Taxiway Separation

Taxiway A is the parallel taxiway for Runway 17R/35L and is separated from the runway by 300 feet (runway centerline to taxiway centerline). This is adequate for current RDC C-II-5000 requirements. However, for the future, RDC D-III-5000 requirements, 400 feet is needed. Alternatives to meet this requirement will be analyzed in the next phase of this Master Plan Update.

The separation between Runway 17R/35L is 300 feet; 400 feet is required when the runway becomes an RDC D-III-5000 classification.

Runway 17L/35R does not have a parallel taxiway. If one were to be added, it would need to be 240 feet from Runway 17L/35R (runway centerline to taxiway centerline). It also would need to be at least 316 feet from the centerline of Runway 17R/35L to ensure the RDC D-III-5000 RSA is clear of the Taxiway Safety Area (TSA) with a 26-foot buffer for the ADG II taxiway wingtip clearance. These calculations assume that a parallel taxiway east of Runway 17R/35L is not used by ADG III aircraft and primarily facilitates circulation for Runway 17L/35R. Should ADG III aircraft use the taxiway, a runway centerline to taxiway centerline separation of 400 feet would be required.

During the alternatives analysis, consideration also may be given to increasing the runway centerline to taxiway centerline separation to enable aircraft to taxi on the parallel taxiway behind an aircraft stopped at the hold line. Standard separations defined in the FAA AC 150/5300-13A do not allow for this operation.

Taxiway and Taxilane Safety Areas

As noted earlier, except for the taxiways in between the two runways, the taxiways need to accommodate ADG III aircraft. Taxiways in between the runways are used by ADG II aircraft. TSAs for ADG III aircraft are 118 feet wide, centered on the taxiway centerline. ADG II TSAs are 79 feet wide. A review of the taxiways at Henderson Executive Airport against topographic mapping and aerial imagery collected for this Master Plan Update shows there are no penetrations to the TSAs. Taxilanes also have safety areas that are the same dimensions as the TSA. The main north/south taxilane on the easterly side of the ramp can accommodate ADG III aircraft for the entire length.

Taxilanes into the aprons and tie-down areas are tailored to the intended users and aircraft sizes and vary from being able to accommodate from ADG I through ADG III aircraft.

Taxiway and Taxilane Object Free Areas

Taxiway object free areas (TOFAs) also are centered on the taxiway and are 131 feet and 186 feet wide for ADG II and ADG III aircraft, respectively. A review of the taxiways at Henderson Executive Airport against topographic mapping and aerial imagery collected for this Master Plan Update shows there are no penetrations to the TOFAs.

Taxilane object free areas (TLOFAs) are slightly smaller in size than TOFAs because aircraft are operating at lower speeds on taxilanes. ADG II TLOFAs are 115 feet wide and ADG III TLOFAs are 162 feet wide. The main north/south taxilane on the eastern edge of the apron areas has sufficient clearance to accommodate an ADG III TLOFA. It is worthwhile to note that the small hangars between Taxiway D and the ATCT, which face eastward, are on the TLOFA boundary. Therefore, aircraft that are pulled out of the hangar immediately impact the taxilane.

As was mentioned in Section 3.3.3, a draft version of AC 150/5300-13B includes changes to taxiway design standards, including a reduction in both the TOFA and TLOFA. The reduced TOFA dimensions for ADG II is 124 feet and 171 feet for ADG III aircraft, and the reduced TLOFA dimensions for ADG II is 110 feet and 158 feet for ADG III aircraft.

Runway Exit Taxiways

Taxiways, which intersect with the runway, function as exit taxiways. Exit taxiways should be located such that they provide an efficient means of arriving aircraft to exit the runway. Well placed runway exits can benefit the overall capacity of the runway. A factor

in runway exit placement is the aircraft fleet mix anticipated to use the runway. Smaller, slower, lighter, aircraft can slow faster from their landing than larger, faster, and heavier aircraft.

Existing runway exit locations were located from updated mapping performed as part of this Master Plan Update (see **Table 3.4**). These locations were compared with FAA AC 150/5300-13A for capture rates by type of aircraft. They also were compared against the draft version of FAA AC 150/5300-13B (released July 21, 2020), which has updated aircraft exit data. Runway exits were analyzed using the Runway Exit Design Interactive Model (REDIM) developed by Virginia Polytechnic Institute and State University and supported by the FAA. Lastly, the number of exits is compared against exit factors described in FAA AC 150/5060-5 to determine if additional exits may further increase the capacity of the airport. The complete analysis of runway exit locations at Henderson Executive Airport is provided in **Section A.4.1** of **Appendix A** and a summary of findings is provided below.

Table 3.4 – *Runway Exit Locations*

Taxiway Exit	Runway 17R/35L Distance from Landing Threshold		Runway 17L/35R Distance from Landing Threshold	
	Runway 17R	Runway 35L	Runway 17L	Runway 35R
A	6,474’	24’	N/A	N/A
B	6,286’	212’	N/A	N/A
C	4,982’	1,517’	4,982’	17’
D	3,635’	2,864’	3,635’	1,365’
E	2,360’	4,139’	2,360’	2,640’
F	1,260’	5,238’	1,260’	3,739’
G	213’	6,286’	N/A	N/A
H	25’	6,473’	18’	4,982’

Sources:
Mapping acquired as part of this Master Plan Update.
Kimley-Horn, 2020.

Note:
Distances are measured from the landing threshold to the perpendicular point of the intersecting taxiway.

From an operational perspective, the runway exits for both runways are well placed. Additional runway exits are not required. Further optimization of the taxiways may be reviewed as part of the alternatives analysis and/or may be modified to address other concerns of the airfield, such as runway incursion mitigation (RIM) criteria. For example, to limit crossings in the middle third of the runway, it would be beneficial to close Taxiway E between the runways. However, doing this would increase the runway occupancy for Runway 17L/35R landings and reduce the hourly throughput of the runway.

Hot Spots

As identified in **Chapter 1**, two RIM hot spots are present at Henderson Executive Airport. The alternatives analysis will review recommendations to mitigate and/or remove these. Both hot spots include direct apron access from the apron to the runway.

Review of Taxiway Geometry at Henderson Executive Airport

As part of this Master Plan Update, a review of the existing airfield layout against the RIM design principles found in **Section A.4.1** of **Appendix A** was performed. In summary:

- Due to older taxiway fillet designs, all taxiways have wide expanses of pavement along the runways.
- There is a wide expanse of pavement between Taxiways G and H, west of Taxiway A; taxi islands are required.
- Taxiways C, D, E, F, and H have direct access to runways from apron taxilanes.
- Taxiways C, D, E, F, and H also cross Runway 17R/35L with Taxiways D and E crossing in the high energy portion of Runway 17R/35L.
- In addition to the above, it is recommended that taxiways parallel to the runway, which extend the full length of the runway, have rounded ends to help minimize wrong surface landings.

These items are illustrated in **Figure 3.6**.

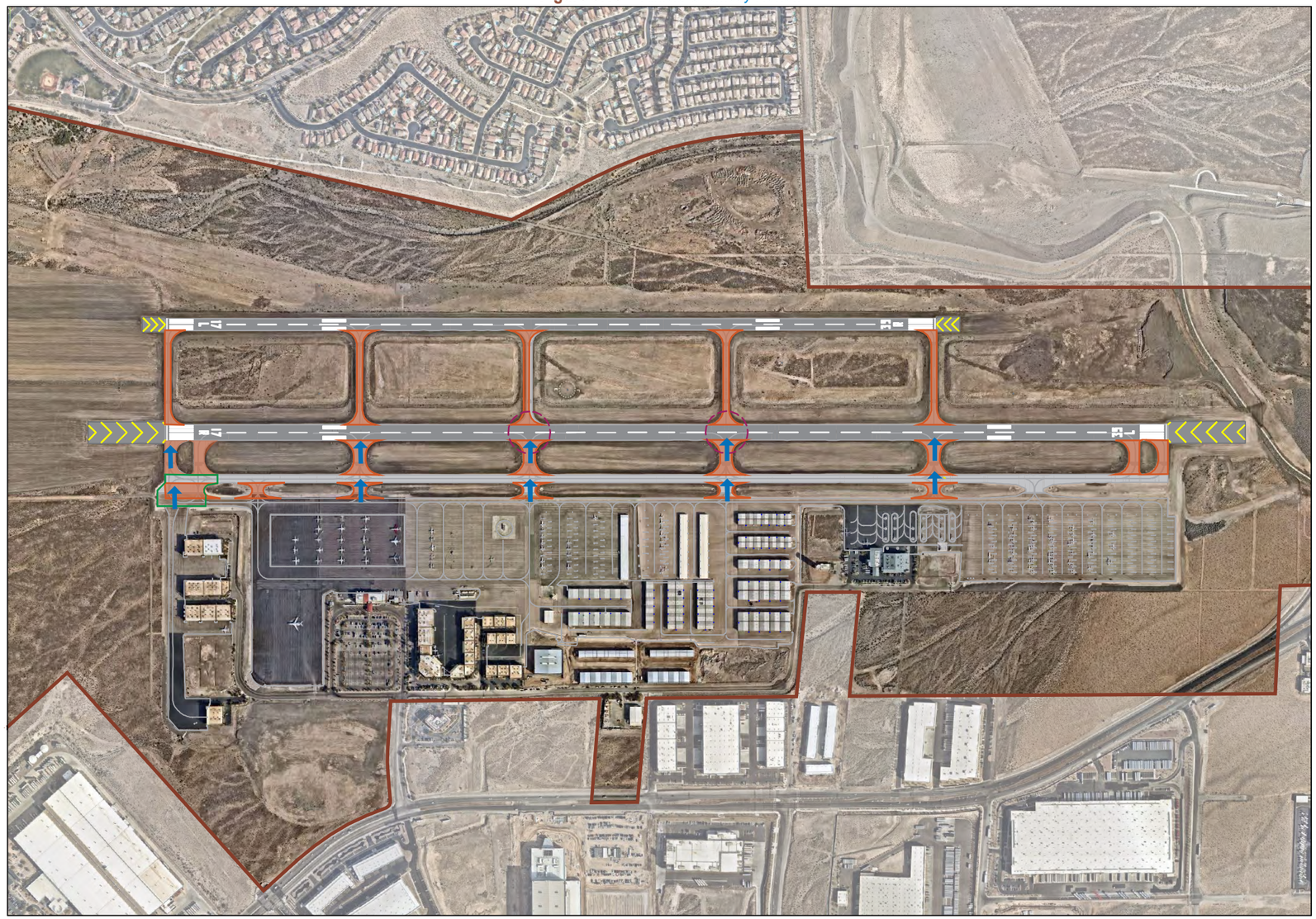
3.4.3. Navigational Aids

As noted in the **Chapter 1** of this Master Plan Update, both visual and electronic NAVAIDs can be found at Henderson Executive Airport. These NAVAIDs are sufficient to support operations at the Airport and there is no anticipated need for additional equipment through the planning horizon.

It is important to note that the NAVAIDs used by the existing instrument flight procedures into and out of Henderson Executive Airport are actually located off-airport. These NAVAIDs, as well as the en route and transition VORs/ VORTACs appear to be sufficient to continue supporting the current instrument flight procedures.

As part of this Master Plan Update, a study is underway to assess the feasibility of developing new performance-based navigation (PBN) procedures at Henderson Executive Airport. If feasible, these new PBN procedures would not rely on current or future conventional NAVAIDs at the Airport.

Figure 3.18 – *Airfield Geometry Review*



Sources:
Kimley-Horn, 2020.

3.4.4. Airfield Lighting and Marking Requirements

Airfield Lighting

As noted in **Chapter 1**, both runways have medium intensity runway lights (MIRLs). All taxiways are lit with medium intensity taxiway edge lights (MITLs). Each runway end also has threshold lights.

Existing airfield lighting meets the requirements noted in FAA AC 150/5340-30J, Design and Installation Details for Airport Visual Aids. Airfield lighting requires periodic inspection and maintenance that is accomplished through airport operations and maintenance functions.

Runway Markings

All runways are marked with non-precision approach markings that consist of the landing designator (runway number), runway centerline, and threshold markings. All runway ends also include aiming points, which are required on runways that are longer than 4,200 feet and have instrument approaches. All runway markings are white in color. Runway markings are listed as being in good condition on the Airport Master Record.[1]

Runway markings meet the requirements in FAA AC 150/5340-1M, Standards for Airport Markings. However, should a precision approach be desired at the Airport, additional markings will be required. Runway markings require regular maintenance and refreshing, which is accomplished through airport operations and maintenance functions.

Taxiway Markings

The existing taxiways at Henderson Executive Airport are marked with taxiway centerlines. Taxiway centerlines provide pilots with continuous visual guidance to permit taxiing along the designated path. All taxiways also have enhanced taxiway centerline markings. These markings precede runway hold lines and are typically 150 feet long and consist of yellow dashed lines on both sides of the taxiway centerline. Taxiway markings are yellow in color.

Runway hold lines and surface painted hold signs are present on all taxiways that intersect with the runways. These markings are painted on the taxiway surface. Further information about the location of the hold lines was presented above.

Taxiway markings meet the requirements in FAA AC 150/5340-1M, Standards for Airport Markings. Taxiway markings require regular maintenance and refreshing, which is accomplished through airport operations and maintenance functions.

3.4.5. Airfield Pavement

Both Runways 17R/35L and 17L/35R are constructed of asphalt. Runway 17R/35L has a single-wheel loading strength of 111,000 pounds, and Runway 17L/35R has a single-wheel loading strength 87,000 pounds. As noted in **Chapter 1**, the 2019 Airfield Pavement Condition Index Report published by Kimley-Horn reported the pavement condition of Runway 17R/35L to be fair with a pavement condition index (PCI) value between 56 and 70 (out of 100). The pavement condition of Runway 17L/35R was reported to be satisfactory with a PCI value between 71 and 85.

There are approximately 6 million square feet of pavement that compose the airside pavements at Henderson Executive Airport. The pavement network is constructed mostly of asphalt cement pavement (5,594,995 square feet). However, there is a small amount of portland cement concrete or PCC (31,601 square feet) pavement on the airfield.

The breakout of pavement areas and the average AC pavement sections at the Airport are summarized in **Table 3.5**.

1 FAA Form 5010-1 Airport Master Record Effective Date July 16, 2020, accessed August 4, 2020. https://adip.faa.gov/agis/public/#/airportData/HND

Table 3.5 – *Pavement Areas and Airside Pavement Sections*

Branch Use	Airside Pavement Areas		Airside Pavement Sections	
	Area (Square Feet)	Percent of Area	Asphalt Cement Thickness (inches)	Aggregate Base (inches)
Apron	3,079,470	55%	3-4	5-6
Overrun	168,500	3%	4	6
Runway	1,025,000	18%	4	5-6
Taxiway	1,353,626	24%	3-4	5-6
Totals	**5,626,596**	**100%**	**N/A**	**N/A**

Source:
Airport Pavement Management Program Services - 2019 Pavement Condition Index Report for Henderson Executive Airport, Kimley-Horn, 2019

Note:
N/A = Not applicable

Pavement Conditions

In 2019, CCDOA sponsored a PCI report for the Airport as part of their efforts to update CCDOA's airport pavement management system (APMS). For detailed information refer to the 2019 Pavement Condition Index Report for Henderson Executive Airport. Recommendations from the 2019 Pavement Condition Index Report will be included in the overall Capital Improvement Program developed in a later phase of this study.

3.4.6. Helicopter Landing Areas

Maverick Aviation Group represents the largest helicopter operator at Henderson Executive Airport. Maverick Aviation Group provides air tours with the primary nearby attractions being the Las Vegas Strip and the Grand Canyon. As they are a tenant at the airport, and have a large number of helicopter operations, there is an existing Letter of Agreement (LOA) in place between ATC and Maverick Aviation Group. Through this LOA, Maverick Aviation Group helicopter operations are conducted to and from their apron at their own risk. They do maintain contact with ATC during their operations. The LOA designates routes that Maverick Aviation Group flies, one of which aligns with the taxilane adjacent to the south apron, which can present some operational challenges with the mixing of fixed-wing aircraft and rotorcraft.

There are no heliports, which are designated helicopter landing and takeoff areas, at the Airport. Therefore, non-Maverick Aviation Group helicopter traffic typically operate to and from the runways, with limited landings and takeoffs occurring directly on the public apron areas. Helicopter operations direct to and from the west apron are not preferred. Should a heliport be desired in the future, specific separation requirements from runways and airspace protection requirements would need to be considered.

3.4.7. Airport Traffic Control Tower

As part of the alternatives development and analysis, consideration will be given to ATCT line of sight. ATCT controllers require visibility of the runway ends, final approaches, and movement areas. There are neither line of sight issues with the current ATCT location and movement areas, nor have any specific needs been identified during this phase of the Master Plan Update.

Based on conversations with the ATCT Manager, a portion of Hot Spot 1 encompasses nonmovement area that is outside of the purview of the ATCT. Challenges arise as pilots exit the nonmovement area towards the east without communicating with the ATCT, which becomes a pilot deviation. Hot Spot 1 is located approximately 1 mile from the ATCT, so it is difficult for controllers to positively identify aircraft transitioning from the nonmovement area. Hot Spot 1 will be further analyzed in the next phase of the Master Plan Update.

3.4.8. Run Up Aprons

Feedback received from the TAC and PAC indicated a need for run up aprons on the north and south ends of the Airport, along Taxiway A. Therefore, a requirement is to provide run up aprons able to accommodate up to three ARC B-II aircraft at the north and south ends of the Airport, along Taxiway A, as close as practicable to the runway thresholds. Each run up apron is to be approximately 5,500 square feet.

3.4.9. Airspace Protection

It is important to note that, as of the writing of this Master Plan Update, the FAA is engaged in the Las Vegas Metroplex study, which looks at optimizing the airspace and procedures in the Las Vegas metropolitan area and includes Henderson Executive Airport and other CCDOA system airports. To the extent possible, any preliminary findings from the Metroplex study applicable to this Master Plan Update will be incorporated into the final documentation.

For airspace protection, the FAA has established imaginary surfaces around and over airports to be used for identifying obstacles to air navigation and preventing the development of obstacles that could adversely impact aircraft operations. These surfaces define the limits of obstacle heights on and around the airport. For the purposes of this Master Plan Update, the airspace requirements encompass the civil airport imaginary surfaces defined in Title 14 Code of Federal Regulations (CFR) Part 77 (Part 77): Objects Affecting Navigable Airspace, Obstacle Clearance Surfaces (OCS) as defined in U.S. Standard for Terminal Instrument Procedures (TERPS), and Departure Surface criteria found in FAA Engineering Brief No. 99A.

Part 77 Requirements

Part 77 establishes civil airport imaginary surfaces in relation to the airport and to each runway. The size of each imaginary surface is based on the category of each runway according to the type of approach available or planned for that runway. The slope and dimensions of the approach surface applied to each end of a runway are determined by the most precise approach existing or planned for that runway end. The runway ends at Henderson Executive Airport—17L, 17R, 35L, and 35R—all have a Part 77 classification of B (V) – Visual Approach, which correspond to the surface descriptions below:

- The **Primary Surface** is a surface longitudinally centered on a runway. It extends 200 feet beyond each end of the runway; the elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width of a primary surface is 500 feet.
- The **Approach Surface** is a surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. The inner edge of the approach surface is the same width as the primary surface, 500 feet, and it expands uniformly to a width of 1,500 feet. The approach surface extends for a horizontal distance of 5,000 feet at a slope of 20 to 1.
- The **Transitional Surface** extends outward and upward at right angles to the runway centerline and the runway centerline extended, at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces.
- The **Horizontal Surface** consists of a horizontal plane, which is 150 feet above the established airport elevation. The established airport elevation at Henderson Executive Airport is 2,491.5 feet above MSL; thus, the horizontal surface is 2,641.5 feet.
- The **Conical Surface** extends outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

There are no anticipated changes to the Part 77 civil airport imaginary surface requirements (i.e., slopes and dimensions) applicable to Henderson Executive Airport. However, should the runway threshold locations change in the ultimate runway configuration, the Part 77 surfaces would subsequently need to be modified to reflect any new runway configuration or lengths.

TERPS

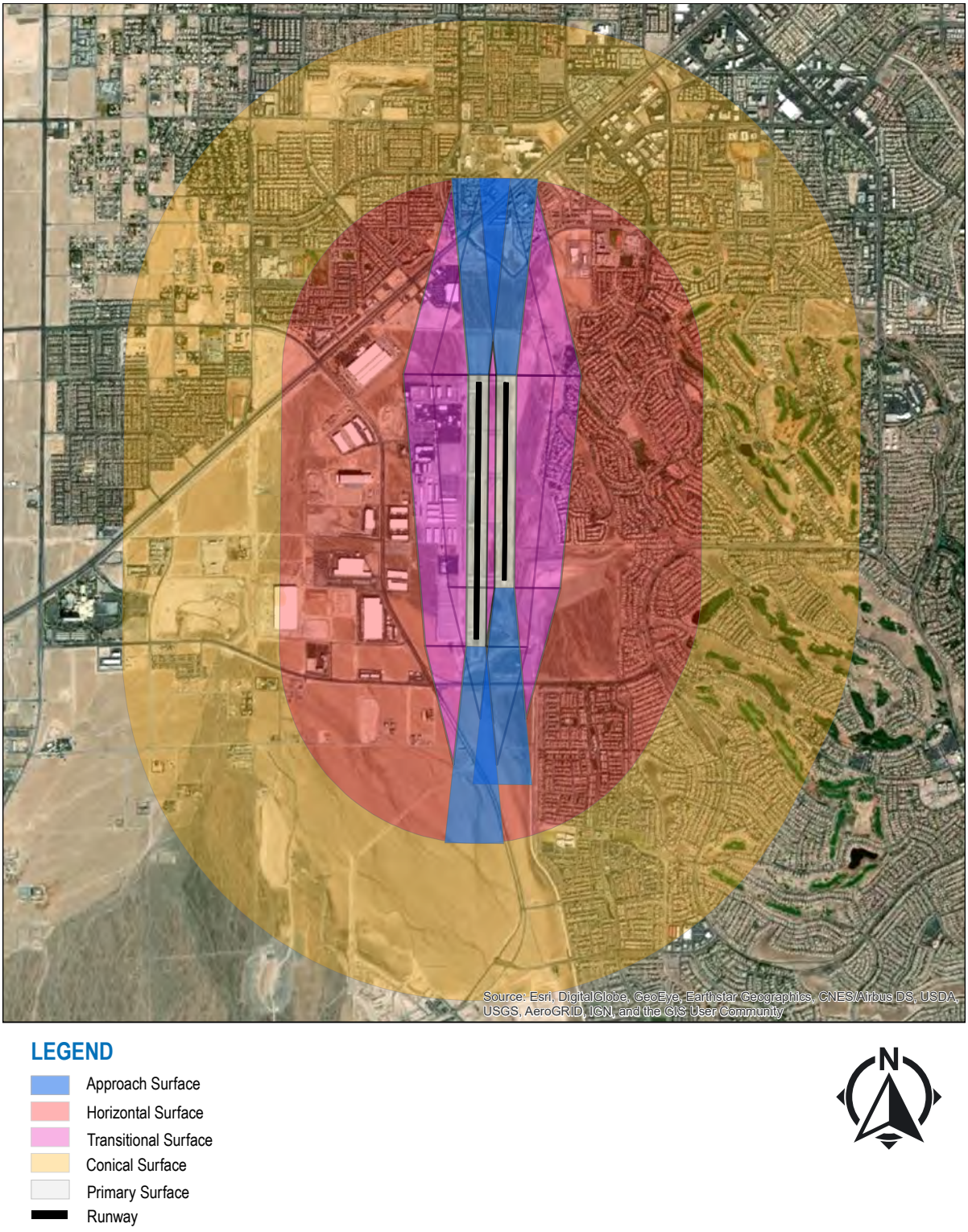
Henderson Executive Airport is served by two instrument approach procedures: RNAV (GPS)-B and VOR-C. For each procedure, it is required that the following airspace be protected: the final approach segment, the missed approach segment (especially those portions of the missed approach segment closer in to the runway), as well as circling approach protected areas, which have varying radii based on the respective category of aircraft approach speed.

Currently, both the RNAV (GPS)-B and VOR-C procedures are limited to Categories A-C aircraft approach speeds and do not provide support for Category D that larger business jets and regional aircraft require for instrument operations. As part of a separate airspace analysis and modeling effort within this Master Plan Update, the feasibility of the extension to Category D aircraft approach speeds for existing instrument flight procedures at Henderson Executive Airport is being assessed, including the airspace considerations for the larger design surfaces and approach areas required by Category D operating speeds.

Engineering Brief No. 99A

FAA's Engineering Brief No. 99A recently updated dimensional criteria for the 40 to 1 instrument departure surfaces traditionally found in FAA AC 150/5300-13A, Airport Design. These revised dimensional criteria have been considered as part of the airspace requirements of this Master Plan Update. In two-dimensions, the modified 40 to 1 instrument departure surface looks similar to that of the older criteria, but three dimensionally, the effective area has changed significantly. For example, the modified surface is broken into two sections. Section 1 starts at the departure end of the runway end elevation and matches the width of the usable runway (150 feet wide). It then projects outward from the runway end at a 40 to 1 slope. As excerpted from Engineering Brief No. 99A, Section 2 rises upward to 150 feet above the runway end elevation at a point 500 feet on either side of the runway centerline. It also rises upward along the extended runway centerline at a 40 to 1 slope until reaching 304 feet above the runway end elevation. Upon 304 feet, the surface levels out until the end of the departure surface. See **Figure 3.7**.

Figure 3.19 – *Title 14 Code of Federal Regulations Part 77 Surfaces at Henderson Executive Airport*



Source:
Kimley Horn, 2020.

3.4.10. Aircraft Storage Hangar Requirements

Hangar requirements were calculated for various based and itinerant aircraft types, and for both conventional hangars and commercial hangars. Conventional hangars are traditional "box" hangars, while commercial hangars include additional space for non-parking uses such as office space.

Currently, 117 of the Airport's 266 based aircraft are stored in conventional or commercial hangars, and the hangars are at capacity with some tenants noting waiting lists. The storage hangar requirements analysis assumed any future increase in the number of based aircraft at Airport would require additional hangar space. Currently, there are no dedicated hangars for itinerant aircraft parking, however, it was assumed that there would be space to accommodate up to three itinerant aircraft in hangars by 2039. The calculation of both based aircraft and itinerant aircraft storage hangar requirements is detailed in **Section A.4.2** of **Appendix A**, and the resulting hangar parking spaces and hangar space requirements by hangar type are shown in **Table 3.6**.

Table 3.6 – *Aircraft Hangar Space Required by Year*

	2024	2029	2034	2039
Additional Aircraft Requiring Hangar Storage (number)				
Conventional Hangar	11	22	34	50
Commercial Hangar	11	22	35	51
Itinerant Aircraft Commercial Hangar	–	1	2	3
Total	**22**	**45**	**71**	**104**
Additional Storage Space Required (SF)				
Conventional Hangar	29,050	67,200	111,000	163,550
Commercial Hangar	42,300	82,250	134,400	197,350
Itinerant Aircraft Commercial Hangar	–	11,700	18,200	24,700
Total	**71,350**	**161,150**	**263,600**	**385,600**

Sources:
Federal Aviation Administration Aircraft Characteristics Database.
Kimley-Horn, 2020.

Notes:
SF = square feet
Does not include increases or decreases in aircraft tie-down spaces or additional apron space required for hangar movement areas and the resulting surplus or deficit of apron space.

In early 2020, construction was completed on a full-service aircraft maintenance and repair facility that included 16 T-hangar spaces plus 9 commercial hangars encompassing 40,950 square feet. These additional hangars were not considered in the analysis above as they were built to accommodate current, unmet demand.

3.4.11. Aircraft Parking Apron and Tie-Down Requirements

Apron areas are used for based and itinerant aircraft parking and to provide taxilanes and movement areas outside of hangars. There are six existing apron areas at the Airport. Additional details about these apron areas are provided in **Chapter 1**. The Maverick Aviation Group apron is privately owned by the Maverick Aviation Group and is used exclusively by the company; therefore, it was excluded from this analysis. The north apron also is privately owned by Quail Air Center and provides movement areas for the enclosed hangars but does not include any tie-down spaces. The remaining aprons are summarized in **Table 3.7**.

Table 3.7 – *Apron Areas*

Apron	Tie-Down Spaces	T-Shade Spaces	Area (SF)	Use
West Apron (Large Aircraft Parking)	30	0	886,834	Itinerant Aircraft
South Terminal Apron (Small Aircraft Parking)	67	0	665,148	Based and Itinerant Aircraft*
Midfield General Aviation Apron	89	57	1,149,986	Based and Itinerant Aircraft*
South General Aviation Apron	189	0	667,087	Based Aircraft
Total	**375**	**57**	**3,369,055**	**–**

Sources:
CCDOA.
Kimley-Horn, 2020.

Notes:
SF = Square feet
Tie-down spaces represent marked tie-downs on the aprons. Actual aircraft accommodated will vary depending upon size of aircraft being parked.
**The South Terminal Apron and Midfield General Aviation Apron are flexed for use by both based and itinerant aircraft as demand dictates. The Midfield General Aviation Apron area calculation includes taxilanes connecting to hangar facilities and the existing shade hangars.*

The ongoing Northwest Apron project will add two new aircraft parking areas north and west of the existing North Apron and West Apron. These new apron areas were not included in the existing apron area for the aircraft parking apron and tie-down requirements analysis but do satisfy present demand and a portion of future apron space requirements.

With some exceptions during periods of peak activity, based aircraft and itinerant aircraft at the Airport use different aprons. As such, aircraft parking requirements for based aircraft and itinerant aircraft demand were calculated separately. Details on the forecast aircraft parking demand calculations are provided in **Section A.4.3** of **Appendix A.**

Future changes in apron parking demand for based aircraft were calculated using planning factors for the amount of space needed for individual aircraft types and circulation requirements by similar aircraft. Conventional and commercial hangars for based aircraft (presented previously in **Table 3.6**) also require 75 percent of the structure's footprint as apron space to provide a buffer for aircraft maneuvering. The resulting apron space required, and the net apron space available, is shown in **Table 3.8**.

Itinerant aircraft are parked on the West Apron during normal operations, and overflow parking during peak periods of activity is accommodated on South Terminal Apron and the Midfield Apron. Peak periods of activity occur frequently at the Airport and are driven by numerous events that are unique to the Las Vegas area. Historical and forecast itinerant operations were used to project future demand for itinerant aircraft parking needs, as shown in **Table 3.8**. It is expected that the Airport will require approximately 1,906,525 square feet of additional itinerant apron parking and an additional 241,035 square feet of based aircraft apron space by 2039.

Table 3.8 – *Based Aircraft and Itinerant Aircraft Apron Space Required*

	2024	2029	2034	2039
Based Aircraft				
Change in Apron Tie-Down Space Demand	0	(1)	(5)	(13)
Change in Tie-Down Apron Required (SF)1	0	(2,280)	(11,400)	(29,640)
Change in Based Aircraft Hangar Demand (SF)	71,350	149,450	245,400	360,900
Change in Based Aircraft Hangar Apron Required (SF)	53,513	112,088	184,050	270,675
Additional Based Aircraft Apron Required (SF)	53,513	109,808	172,650	241,035
Existing Apron Available (SF)	1,801,069	1,801,069	1,801,069	1,801,069
Total Based Aircraft Apron Required (SF)	**1,854,582**	**1,910,877**	**1,973,719**	**2,042,104**
Itinerant Aircraft				
Additional Itinerant Aircraft Apron Spaces (number)	39	69	88	121
Additional Itinerant Apron Required (SF)	624,000	1,088,000	1,376,000	1,888,000
Additional Itinerant Hangar Apron Required (SF)	--	8,775	13,650	18,525
Total Additional Itinerant Apron Required (SF)	**624,000**	**1,096,775**	**1,389,650**	**1,906,525**

Sources:
Clark County Department of Aviation.
Federal Aviation Administration Aircraft Characteristics Database.
Kimley-Horn, 2020.

Notes:
SF = square feet
1 Apron space required includes space for aircraft parking plus taxilane and movement areas.

3.4.12. Airside Facility Requirements Summary

Table 3.9 provides a summary of airside facility requirements identified in the previous sections and the triggers for these requirements.

Table 3.9 – *Airside Facility Requirements Summary*

Facility	Existing Condition	FAA Requirement	Trigger
Runways			
Runway 17R/35L Length	6,501’	7,500’	Change in design aircraft
Runway 17R/35L Shoulders	10’	20’	When annual operations of ARC D-III aircraft exceed 500
Crosswind Coverage (VFR, 10.5 knots)	93.15%	95%	Existing condition
Runway 17R/35L Hold Lines	200’	250’ / 275’	Existing condition/when annual operations of ARC D-III aircraft exceed 500

Facility	Existing Condition	FAA Requirement	Trigger
Runway 17L/35R Hold Lines	125’	200’	Existing condition
Runway 17R/35L RSA Half Width	155’	250’	Existing condition
Runway 17R/35L RSA Length Beyond the End of the Runway	348’ 1	1,000’	Existing condition
Runway 17R/35L ROFZ Half Width	155’	200’	Existing condition
Runway 17L/35R ROFZ Half Width	125’	200’	Existing condition
Runway 17R/35L ROFA Half Width	155’	400’	Existing condition
Runway 17L/35R ROFA Half Width	235’	250’	Existing condition
Runway 17R/35L and Runway 17L/35R RPZs	Extends beyond airport property	Airport sponsor control (preferably in fee title)	Existing condition
Taxiways			
Runway 17R/35L Centerline to Taxiway A Centerline	300’	400’	Existing condition
Hot Spots 1 and 2	Present	Mitigate	Existing condition
Taxiway Fillets/Wide Expanses of Pavement Entering the Runway	Present	Update to current standard	Existing condition
Direct Access to the Runway from the Apron	Taxiways C, D, E, F, and H	Mitigate	Existing condition
Taxiways Crossing a Runway	Five Crossings	Minimize	Existing condition
Taxiways Crossing the High Energy Portion of the Runway	2’	Eliminate/ Minimize	Existing condition
Aircraft Parking/Other			
Itinerant Apron	886,834 SF	1,906,525 SF	Based on design day activity, fleet mix, and user demand
Conventional Hangar	292,336 SF	455,886 SF	Based on tenant/user demand
Commercial Hangar	216,847 SF	414,197 SF	Based on tenant/user demand
Itinerant Aircraft Commercial Hangar	--	24,700 SF	Based on design day activity, fleet mix, and user demand
Run Ups	--	11,000 SF	Existing condition

Source:
Kimley-Horn, 2020.

Notes:
ARC = Airport reference code
RSA = Runway safety area
ROFA = Runway object free area
ROFZ = Runway obstacle free zone
VFR = Visual flight rules
Detention pound south of Runway 35L is within the RSA.

3.5. Landside Facilities

The following is an evaluation of landside facilities, including the GA terminal building and vehicle access and parking. The requirements found in these subsections are based upon the forecast total and peak hour demands. Further refinements may be required to account for the unique circumstances at Henderson Executive Airport, specifically the large number of special events that increases itinerant demand in the Las Vegas area and at the Airport.

3.5.1. General Aviation Administration Building

The Airport's administrative offices are housed in the main terminal building, a 24,000-square-foot facility that serves as the central hub of the Airport. The building houses Airport administration offices, meeting space, passenger waiting areas, a sit-down restaurant, rental car kiosks, and the Airport's FBO.

Section A.5.1 of **Appendix A** details the analysis to determine future general aviation administration building requirements for Henderson Executive Airport. Based on this calculation, the Airport currently has 375 square feet of excess terminal building space but may require approximately 4,000 additional square feet by 2024 and over 15,000 additional square feet by 2039, as summarized in **Table 3.10**. This suggests that the existing main terminal building is adequate to accommodate existing demand, but additional space may be needed in the future. As such, the Airport should consider preserving an area for potential building expansion and monitor building adequacy and potential chokepoints to determine future need.

3.5.2. Surface Transportation

The following subsections summarize airport landside access, roadway network considerations, and vehicle parking requirements.

Airport Access Roadways

On-Airport circulation roadways (Executive Terminal Drive and Jet Stream Drive) are anticipated to adequately serve Airport landside development on the west side of the Airport through the planning horizon, but a secondary access point to the south is required. Additionally, any future Airport development should review the Henderson Strong Comprehensive Plan, the City's Capital Improvement Plan, and any recent traffic impact studies in the vicinity of the Airport and consider any planned roadway or intersection improvements. **Section A.5.2** of **Appendix A** provide additional information on both existing access roadways as well as roadways that are currently or should be considered or planned.

Airport Parking

Secondary access to the Airport from Raiders Way is required.

There are several vehicle parking lots located throughout the Airport property. **Chapter 1** summarized the seven existing parking lots at the Airport. The primary vehicle parking location for the public is the main terminal lot located adjacent to the terminal building. Additional smaller lots primarily service specific uses and locations throughout the Airport such as the Quail Air Center and the ATCT. Currently, all regular demand for vehicle parking at the Airport is being met, though CCDOA has noted that the main terminal lot and other parking lots can be filled to capacity during peak periods of activity. Therefore, it was assumed that all increases in demand for terminal space, hangars and apron parking will require additional vehicle parking.

Section A.5.2 of **Appendix A** detail the calculation of future requirements for vehicle parking spaces based on the forecast change in aircraft parking requirements for based aircraft (apron and hangars) and the construction of new commercial itinerant aircraft hangar spaces, as discussed above, and changes in future demand at the main terminal based on the forecast change in design hour operations. An additional 592 vehicle parking spaces will be required at the Airport by 2039 due to the forecast increase in aircraft storage hangars and terminal building space, as summarized in **Table 3.10**.

3.5.3. Landside Facility Requirements Summary

Table 3.10 summarizes the landside requirements identified from the previous sections. In addition to the items shown in the table, a secondary access to Jet Stream Drive is required.

Table 3.10 – *Landside Facility Requirements Summary by Year*

Facility	Trigger / Additional Requirements	2024	2029	2034	2039
General Aviation Administration Building	Design Hour Operations	75	85	93	105
	Square Feet	4,125	7,875	10,875	15,375
Vehicle Parking	Design Hour Operations/ Additional Hangar-Terminal SF	75/ 75,475 SF	85/ 169,025 SF	93/ 274,475 SF	105/ 400,975 SF
	Vehicle Spaces	135	276	422	592

Source:
Kimley-Horn, 2020.

3.6. Support Facilities

The following describes the requirements for the Airport's support facilities, including aviation fuel storage, maintenance and storage, and utilities.

3.6.1. Aviation Fuel Storage

It is typically recommended that GA airports have sufficient fuel storage capacity for up to a week of fueling demands. The bulk fuel storage area at Henderson Executive Airport is located just south of the main terminal. An additional fuel island located northwest of Taxiway E contains a self-service station for 100 Low Lead (LL) Aviation Gas (AvGas). Fuel services are provided by the FBO, including providing Jet A and 100 LL AvGas for aircraft and unleaded and diesel for nonaeronautical vehicles. Fuel at the Airport is supplied by World Fuel Services Corporation. Fuel trucks are used to refill the tanks in the bulk fuel storage area as well as the self-service station. Maverick Aviation Group also leases their own fuel truck from CCDOA.

Full-service fueling, including Jet A fuel, is available 5:30 a.m. to 9:30 p.m., and the self-service station is available 24 hours a day. Airport tenants reported long wait times for fuel service, particularly during peak times. Consideration may be given by CCDOA to increase the number of trucks available at the airport to service aircraft.

As was noted in **Chapter 1**, the Airport currently has capacity to store 12,000 gallons of 100 LL Avgas and 70,000 gallons of Jet A. On average, the Airport receives a 5,000-gallon load of 100 LL AvGas weekly and four weekly 12,000-gallon deliveries of Jet A. Due to forecast increasing activity at the Airport, along with dead fuel in the fueling system, and required fuel settlement times, additional storage should be considered in the 20-year planning horizon. **Table 3.11** indicates the estimated fuel delivery requirements throughout the 20-year planning horizon. To derive the annual fuel flowage, 6 gallons of fuel were estimated per piston powered aircraft and 100 gallons of fuel were estimated per turboprop, jet, and helicopter operation. These assumptions are similar to fuel requirements per operation over the last 3 years.

Table 3.11 – *Estimated Fuel Delivery Requirements for Henderson Executive Airport by Year*

Fuel Type	2019	2024	2029	2034	2039
Estimated Annual Fuel Flowage (gallons)					
100 LL AvGas	257,079	337,000	364,000	368,000	391,000
Jet A	2,322,720	2,843,000	3,293,000	3,815,000	4,433,000
Annual Fuel Deliveries (number)					
100 LL AvGas	49	67	73	74	78
Jet A	203	237	274	318	369
Weekly Fuel Deliveries (number)					
100 LL AvGas	1	1	1	1	2
Jet A	4	5	5	6	7

Sources:
Clark County Department of Airports.
Kimley-Horn, 2020.

Given the estimated near doubling in Jet A fuel flowage from 2019 to 2039, additional storage capacity may be required. In 2019, fuel deliveries occurred, on average, every other day. In 2039, it is anticipated that, with current capacity, daily fuel deliveries will be required. To reduce the likelihood of supply interruptions having a detrimental impact on customer service, it is recommended an additional 20,000 to 40,000 gallons of Jet A fuel storage capacity be provided. Additionally, CCDOA has indicated an existing need for 100 LL AvGas storage facilities. CCDOA may consider installing an additional tank for 100 LL Avgas storage and which could later be converted to Jet A storage when demand dictates. As development occurs in currently undeveloped areas of the Airport property, expansion of fueling facilities to these locations should also be considered.

3.6.2. Airport Maintenance and Storage

The existing maintenance facility at the Airport is an 8,000-square-foot building located on the west side of Jet Stream Drive, west of the midfield GA apron. Since the Airport is operated by CCDOA, it frequently uses staff who are trained to perform tasks and services at multiple County airports, including McCarran International Airport. In addition, the Airport has access to specialized vehicles and equipment that are often shared with McCarran International Airport and other County airports; equipment that is not typically available at GA airports. Airport management has indicated that the maintenance facility and equipment is more than adequate to accommodate existing and future demand.

3.6.3. Utility Infrastructure

The ability of existing utility infrastructure to accommodate future development needs to be considered for long-term planning at the Airport. No field investigations were conducted to assess utility conditions for the purposes of this Master Plan Update.

Section A.6.1 of **Appendix A** provides additional details on the utility infrastructure at the Airport including:

- Water
- Sanitary Sewers
- Drainage
- Electrical Service
- Natural Gas
- Communications

As developments occur on the Airport, additional utility infrastructure will be required. Coordination with CCDOA and the City of Henderson is required prior to starting any development at the Airport.

3.7. Airport Security

The Transportation Security Administration, in cooperation with the GA community, has developed guidelines to enhance security at GA airports. Security Guidelines for General Aviation Airport Operators and Users, Version 2 was released in July 2017. These updated guidelines represent a significant change from Version 1, published May 2004. The updated guidance places a large emphasis on risk-based security by evaluating hazards/threats, vulnerabilities, and consequences. Risk-based security helps ensure resources and requirements are focused on the areas where the greatest risks are present.

Based on communications with CCDOA staff, key concerns at the Airport are personnel protection–in the form of very important persons (VIPs) using the facility–and barriers and access controls. The Airport currently has a 6-foot-tall perimeter fence, topped with three strands of barbed wire.

As security needs change with demand, CCDOA should conduct an assessment based on current guidance and implement security measures as appropriate.

3.8. Sustainability Requirements

As part of its efforts to embrace its role in social responsibility, maximizing operational efficiencies, ensuring economic viability, and minimizing environmental impacts of airport operations CCDOA has adopted sustainable practices. CCDOA hired a consultant to help develop a sustainability plan for use at McCarran International Airport and the GA airports within CCDOA's system of airports.

The consultant identified a number of items that could be implemented in the short term:

- Install water bottle filling stations
- Purchase new in-terminal recycle bins
- Place "We Recycle" signage/ placecarding in conspiciuous locations
- Place "Water Smart" placecards in bathrooms informing use of low-flow fixtures and xeriscaping as a community partner to conserve water
- Compile metrics for Republic Services recycling, waste oil, batteries, etc.
- Develope a sustainability web page on the Airport's website and link it to www.mccarran.com's Sustainability and Environmental Management System webpages
- Provide Henderson Executive Airport staff with sustainability awareneess training
- Circulate tenant questionnaire developed by the consultant

Even during the COVID-19 pandemic, CCDOA continued to implement sustainable practices, such as the utilization of carbon credit offsets provided by World Fuel Services. Several steps must be taken prior to investing a lot of resources into implementing sustainable practices, policy, and infrastructure at the Airport in the future, such as:

- Additional staff to implement and monitor projects and progress
- Completion of a dashboard to automate tracking
- Establish of sustainability goals and metrics

Any large-scale sustainability efforts will first be implemented at McCarran International Airport and Henderson Executive Airport would be the first GA airport in CCDOA's system to implement a large sustainability program. In addition to the short-term items noted above:



Private developers should seek to develop Leadership in Energy amd Environmental Design (LEED) - certified facilities



Installation of solar panels should be encouraged by tenants to the extent practicable and that it does not create a hazard to air navigation



Construction projects should seek to recycle construction materials (e.g., using millings to reduce dust in unpaved areas of airfield)



Retrofit fixtures as maintenance is required with more sustainable fixtures (e.g., light emitting diode [LED] lights and low flow faucets)



Implement stormwater pollution protection plans on all construction projects



CCDOA should continuously explore other potential grant and funding programs for sustainability efforts



Advertise how the Airport is a good and environmentally conscious neighbor

It was noted that Maverick Aviation Group has already implemented several sustainability practices and can serve as a resource to CCDOA and an example to the other tenants at the Airport. Many airport tenants and operations feature the following sustainable practices:

- LED and natural lighting
- Swamp coolers to minimize temperature fluctuations in summer months
- Waterless cleaning of equipment and fleet
- Fully compliant paint booth and shop
- Solvent saver recycler
- Water bottle filling station for employees and plastic water bottles for customers
- Waste oil/liquids recycling in house
- Safety record/corporate program
- Media blaster and cleaning regimen
- Recycle packaging and reuse of some items
- Recycling bins
- Corporate recognition program and local-socially responsible volunteerism activities

4. ALTERNATIVES ANALYSIS

Alternatives presented in this chapter are intended to accommodate aviation demand forecasts and facility requirements developed in previous tasks of this Master Plan Update. Feedback from the Master Plan's Technical Advisory Committee (TAC), Planning Advisory Committee (PAC), Airport Management, and the public also were incorporated. The following sections present alternatives that were considered. The preferred alternative is summarized in **Chapter 5** and depicted on the Airport Layout Plan.

4.1. Summary of Facility Needs

This section summarizes the recommended facility requirements described in **Chapter 3** to accommodate forecast demand. **Table 4.1** presents the airside requirements and **Table 4.2** notes the landside requirements. Alternatives developed within this Master Plan Update will seek to accommodate all of these facilities, to the extent practicable. Preferred alternatives for airside facilities, landside facilities, and on-airport land uses were identified based on the below facility needs and feedback received from TAC, PAC, and the public.



Table 4.1 – *Airside Facility Requirements Summary*

Facility	Existing Condition	Requirement	Trigger
Runways			
Runway 17R/35L Length	6,501'	7,500'	Change in design aircraft
Runway 17R/35L Shoulders	10'	20'	When annual operations of ARC D-III aircraft exceed 500
Crosswind Coverage (VFR, 10.5 knots)	93.15%	95%	Existing condition
Runway 17R/35L Hold Lines	200'	250'/275'	Existing condition/when annual operations of ARC D-III aircraft exceed 500
Runway 17L/35R Hold Lines	125'	200'	Existing condition
Runway 17R/35L RSA Half Width	155'	250'	Existing condition
Runway 17R/35L RSA Length Beyond the End of the Runway	348' 1	1,000'	Existing condition
Runway 17R/35L ROFZ Half Width	155'	200'	Existing condition
Runway 17L/35R ROFZ Half Width	125'	200'	Existing condition
Runway 17R/35L ROFA Half Width	155'	400'	Existing condition
Runway 17L/35R ROFA Half Width	235'	250'	Existing condition
Runway 17R/35L and Runway 17L/35R RPZs	Extends beyond airport property	Airport sponsor control (preferably in fee title)	Existing condition
Taxiways			
Runway 17R/35L Centerline to Taxiway A Centerline	300'	400'	Existing condition
Hot Spots 1 and 2	Present	Mitigate	Existing condition
Taxiway Fillets/Wide Expanses of Pavement Entering the Runway	Present	Update to current standard	Existing condition
Direct Access to the Runway from the Apron	Taxiways C, D, E, F, and H	Mitigate	Existing condition
Taxiways Crossing a Runway	Five Crossings	Minimize	Existing condition
Taxiways Crossing the High Energy Portion of the Runway	2'	Eliminate/Minimize	Existing condition
Aircraft Parking/Other			
Itinerant Apron	886,834 SF	1,906,525 SF	Based on design day activity, fleet mix, and user demand
Conventional Hangar	292,336 SF	455,886 SF	Based on tenant/user demand
Commercial Hangar	216,847 SF	414,197 SF	Based on tenant/user demand
Itinerant Aircraft Commercial Hangar	--	24,700 SF	Based on design day activity, fleet mix, and user demand
Run Ups	--	11,000 SF	Existing condition

Source:
Kimley-Horn, 2021.

Notes:
ARC = Airport reference code
ROFA = Runway object free area
VFR = Visual flight rules
SF = Square feet
RPZ = Runway protection zone
RSA = Runway safety area
ROFZ = Runway obstacle free zone
1 Detention pond south of Runway 35L is within the RSA.

Table 4.2 – *Landside Facility Requirements Summary by Year*

Facility	Trigger Additional Requirement	2024	2029	2034	2039
General Aviation Administration Building	Design Hour Operations	75	85	93	105
	Square Feet	4,125	7,875	10,875	15,375
Vehicle Parking	Design Hour Operations/ Additional Hangar-Terminal SF	75/75,475 SF	85/169,025 SF	93/274,475 SF	105/ 400,975 SF
	Vehicle Spaces	135	276	422	592

Source:
Kimley-Horn, 2021.

Note:
SF = Square foot

4.2. Airport Land Use Planning

This section documents, at a high level, the land use zoning adjacent to Henderson Executive Airport. More detailed information regarding zoning and land uses adjacent to the Airport can be found in **Chapter 1** of this Master Plan Update. In addition to summarizing the existing agreement with the Bureau of Land Management (BLM), ongoing development activities within the City of Henderson, discovered during this Master Plan Update are highlighted. These adjacent land uses and zoning will be considered in the evaluation of alternatives developed within this phase of the Master Plan Update.

4.2.1. Overview

Land use planning for areas immediately adjacent to the Airport is the responsibility of the City of Henderson and Clark County. In 2014, the Henderson City Council unanimously approved the West Henderson Land Use Plan, which identifies a preferred development strategy for the area and future land use goals, such as promoting industrial uses south of the Airport, protecting Airport operations, discouraging residential development west of the Airport, and improving transportation capacity. In conjunction with the West Henderson Land Use Plan, the City of Henderson also approved the Henderson Strong Comprehensive Plan to guide the development and growth of the City for the next 20 years, prioritizing light industrial and commercial uses near the Airport to ensure compatible economic growth while maximizing Airport expansion opportunities.

Currently, the areas immediately north, west, and east of the Airport are heavily developed and consist of residential neighborhoods, parks, schools, and industrial and commercial businesses. The northern Airport vicinity includes a combination of commercial, industrial, and residential land uses like the Silverado Ranch neighborhood, Liberty High School, and a Costco Wholesale. Land uses in the eastern vicinity of the Airport are predominantly single-family residential, though there also is an undeveloped tract of land that is owned by the U.S. government and used as a detention basin. While the majority of land south of the Airport is undeveloped, the Inspirada community has a large presence in this area and is expected to expand further along Via Inspirada. The area immediately adjacent to the west of the Airport consists of mostly industrial land uses like the Levi Strauss & Co. distribution center and the Las Vegas Raiders training and headquarters facility, though residential communities also are present.

4.2.2. Bureau of Land Management Agreement

To allow for increased safety, noise attenuation, and expansion opportunities, Clark County has an agreement with BLM that was originally executed September 7, 1999, and then amended on September 6, 2005, June 29, 2006, and August 2, 2010. Under the agreement, BLM is granted 110 acres of undeveloped land at North Las Vegas Airport that includes Las Vegas Bearpoppy Habitat. In exchange, the BLM agreed to keep 102 acres of land adjacent to the Airport undisturbed and undeveloped. This is a long-term

agreement that will last for 30 years from the original agreement and automatically renews for a term of 10 years unless one or both parties takes a termination action, which would require 1-year advance notice.

4.2.3. Recent Developments

Through TAC and PAC meetings held as part of this Master Plan Update, it was discovered that additional development will be occurring in the immediate vicinity of the airport.

- At the southeast corner of the Volunteer Boulevard and Via Inspirada a gas station is under construction.
- South of Sunridge Heights Parkway and west of Alper Center Drive a low rise (three- and four-story buildings), high-density, residential complex was approved.
- Additionally, there are efforts to rezone the vacant land north of the Sunridge Heights Parkway and South Maryland Parkway intersection to general industrial. Presently, this area is a mix of general industrial, industrial park, and community commercial. Industrial land uses in this location are compatible with the Airport as long as they do not penetrate any approach or departure surfaces of the runways.

4.3. Opportunities and Constraints

Prior to defining potential alternatives to accommodate forecasted demand, it is important to understand the unique opportunities and constraints present at Henderson Executive Airport. The sections below summarize some of the key opportunities and constraints associated with the physical development of the airport to accommodate forecasted demand. For additional information regarding the strengths, weaknesses, opportunities, and threats at the Airport, refer to **Chapter 1, Section 1.1.4**.

4.3.1. Opportunities

The Airport has many opportunities to support a growing community. Influential tenants such as the Vegas Golden Knights and Raiders provide consistent, high-end business and the numerous conventions and major events in the Las Vegas area drive traffic to the Airport annually. The National Business Aviation Association's Annual Convention and Exhibition, hosted every other year in Las Vegas, brings additional traffic and promotes the Airport on the national stage. The desirability of its location, combined with its modern and efficient facilities, has led to a large amount of pent-up demand for hangar facilities that could lead to increased revenues for the Airport. There is developable Airport property with the ability to connect to the airfield allowing for the continued expansion of aviation facilities to support the demand. A key opportunity is present due to the careful zoning and land use planning of the City of Henderson and Clark County to help ensure the Airport and the community can grow and thrive together.

4.3.2. Constraints

Potential alternatives for the Airport were limited by several physical constraints. There are multiple roadways near the Airport, especially Volunteer Boulevard to the south and Raiders Way to the west, which limits runway configuration options. The City of Henderson also desires to extend Sunridge Parkway across the northern end of the Airport. Existing residential neighborhoods east of the Airport and the Inspirada community to the south represent constraints. Development occurring along St. Rose Parkway also may be a constraint, particularly if the runway is extended to the north and taller development is allowed to occur. The airspace above and near Henderson Executive Airport is constrained by McCarran International to the north and mountains to the south.

Past projects, particularly the environmental assessment supporting the relocation of the runway to its present location, also represents a constraint. Several concessions were made to lessen the impacts on the Seven Hills community and changes to these past concessions will not be viewed favorably by the adjacent community nor the City of Henderson.

4.4. Evaluation Criteria

Evaluation criteria were established to compare and evaluate development alternatives in a consistent manner. Alternatives will be evaluated based on the following criteria. These criteria are generally qualitative and specific analysis, such as noise modeling and return on investment (ROI) calculations, are not developed for each alternative.

4.4.1. Evaluation Criteria 1: Satisfies Facility Requirements

The viability of a given alternative is impacted by its ability to accommodate the forecast demand as described in **Chapter 3** as well as safety requirements. Included in this criterion is the ability for an alternative to meet Federal Aviation Administration (FAA) design standards, which is an important factor when obtaining funding from FAA for a major Airport project. A '+' rating indicates all facility requirements and FAA design standards are met. A 'O' rating means approximately 80 percent of facility requirements and all FAA design standards are met. Any alternative that does not meet FAA design standards and/or does not meet 80 percent of facility requirements will receive a '-' rating.

4.4.2. Evaluation Criteria 2: Operational and Airspace Impacts

An alternative is best when its negative impacts to Airport operations and nearby airspace are minimized and positive impacts increased. The ability of aircraft to efficiently move about on the ground and use airspace around the Airport should be preserved as much as practicable. This criterion evaluates a variety of factors such as integration with McCarran International Airport's airspace, approach, and departure procedure capabilities, runway length usability, potential delays, and airfield capacity considerations. A '+' rating indicates enhancements to operational and airspace considerations described above. A 'O' rating identifies that there are no impacts, positive or negative, from existing conditions. Any alternative that negatively impacts Airport operations and the airspace will receive a '-' rating.

4.4.3. Evaluation Criteria 3: Environmental Considerations

The degree to which an alternative would impact the local environment and affect the level of Airport-related noise are important factors in the determination of preferred development alternatives. An important element to consider is how noise impacts to the local community would change, as this can be a major point of contention between residents and an airport. The level of impact on local wildlife plays a role in alternatives evaluation as well. This is a qualitative review of potential environmental impacts. Noise modeling is not performed for each alternative, neither is a detailed environmental study conducted. If aircraft operations or runways are shifted further from sensitive noise receptors and/or there are no negative impacts to other environmentally sensitive areas, the alternative will receive a '+' rating. Alternatives that retain the existing relative location of aircraft operations or runways to sensitive noise receptors and/or other environmentally-sensitive areas will receive a score of 'O.' A '-' rating will be assigned to any alternative that moves aircraft operations or runways closer to sensitive noise receptors and/or negatively impacts other environmentally-sensitive areas.

4.4.4. Evaluation Criteria 4: Cost Considerations

Important to any project is its cost to implement and potential ROI of an alternative. This criterion is a comparative analysis between the various alternatives and will focus primarily on the amount of new pavement and/or development that would be required. The intention is to understand, at a high level, which alternative will be most and least costly that would logically help inform which alternative would have the best chance at a favorable ROI. Detailed cost estimates are not developed for these alternatives. The alternative that is least costly to implement would receive a '+' rating and the costliest alternative would be a '-' rating. All other alternatives would receive a score of 'O.'

4.4.5. Evaluation Criteria 5: Construction/Phasing Issues

Construction complexity and the level of disruption from the implementation of the alternative assists in determining the viability of an alternative. Alternatives that require large amounts of construction in areas of existing facilities are much more challenging

to implement, require careful planning and phasing, and may take longer to implement to maintain Airport operations, or may effectively close the Airport for a period of time to enable the construction to occur. Also considered in this criterion are potential impacts to existing tenants. Alternatives that negatively impact existing tenants will receive a less favorable ranking. Similar to the cost considerations criterion, detailed phasing and construction plans are not developed for the alternatives. Rather, this is a comparative analysis. During the evaluation, the ability for an alternative to be constructed in less disruptive ways, such as at night is considered. This is particularly true for any airfield construction. The alternative that requires the least amount of construction and time to implement would receive a '+' rating and the alternative that requires the most amount of construction and time would garner a '-' rating. All other alternatives would receive a score of 'O.' The highest ranking of any alternative that negatively impacts existing tenants would be a 'O.'

4.4.6. Evaluation Criteria 6: Off-Airport Impacts

Impacts off-airport are very important to the viability of a given alternative. How a configuration would affect local roadways, existing businesses, future development, and land acquisition either in fee title or through an avigation easement are important factors to consider. Alternatives that require modifications to previous and existing agreements with individuals and businesses may indicate challenges in implementing an alternative. Furthermore, it is important to consider the effect an alternative could have on important development and infrastructure projects near the Airport. Similar to the two previous criteria, this criterion is comparative with the alternative that has the least amount of off-airport negative impacts achieving a '+' rating and the alternative with the most off-airport negative impacts receiving a '-.' All other alternatives will receive a 'O.'

4.5. No-Build Alternative

The no-build alternative does not consider any additional airside, landside, or support facilities to be constructed at the Airport to accommodate forecasted demand. Routine maintenance of existing facilities would continue to preserve the operational functionality of the Airport. No additional physical enhancements to the airfield or landside facilities would be implemented in this alternative. Forecasted demand identified in **Chapter 2** would not be met and neither would the subsequent facility requirements described in **Chapter 3**. Additionally, the airfield would not conform to the Airport Reference Code (ARC) C-II or D-III airport design standards of the existing and future critical aircraft, respectively. Enhancements would not be implemented to comply with the larger runway safety area (RSA) and runway object free area (ROFA) requirements either. Therefore, the no-build alternative is not a viable development strategy and is not recommended for the Airport. It is included in this analysis to serve as a baseline and for future environmental study.

4.6. Airside Alternatives

Development of the alternatives for the Airport was done in a sequential process with the largest, most critical portions of the Airport being defined first. The most controlling feature on any airport is its runway(s). Thus, for this Master Plan Update, alternatives first defined the recommended runway configuration for the Airport in terms of location and number of runways. Once the overall configuration was defined, a deeper look at how to accommodate the required 7,500-foot-long runway was performed. Once the airfield was determined, available areas and general layouts of aircraft parking could then be developed. Therefore, this portion of the chapter is subdivided into the following sections:

- Runway configuration (location and orientation)
- Runway extension
- Run Up Aprons
- Aircraft parking areas

4.6.1. Runway Configuration

The location and number of runways is the largest component to define for a future recommended development plan for the Airport. The Airport presently has two runways in a north/south alignment. Prior to analyzing potential runway configuration alternatives, existing nonstandard conditions and recommendations to mitigate them are defined. These recommended mitigation measures will be assumed for all subsequent airside alternatives.

RESOLUTION OF NONSTANDARD CONDITIONS

As described in **Chapter 3**, there are several nonstandard conditions within the RSA and ROFA of the runways. Resolution of these nonstandard conditions is described in the subsections below and summarized in **Table 4.3**. These nonstandard conditions are assumed to be resolved in each runway location and orientation alternative subsequently defined.

Table 4.3 – *Summary of Nonstandard Runway Conditions with Recommendations*

Nonstandard Condition	Recommendation
Runway 17R/35L	
Nonstandard objects located within the RSA.	As part of the PAPI upgrade project, relocate both runway end PAPI PCUs to be outside the RSA and ROFA to the extent practicable. If necessary, obtain a MOS for this condition.
Hold lines do not meet RDC D-III-5000 design standards.	As part of the runway redesign to RDC D-III-5000 standards, relocate all 13 hold lines to 275 feet from the runway centerline.
RSA extends into part of the detention basin south of Runway 35L and does not meet RSA grading requirements.	Grade the affected area to meet RSA design standards.
Nonstandard objects located within the ROFA.	Relocate the following objects outside the ROFA: primary wind cone, two supplemental wind cones, AWOS, two supplemental wind sensors, two utility boxes, temporary storage area, and chain-link perimeter and detention basin fence.
Longitudinal grading does not meet ARC C-II or D-III design standards.	To the extent practicable, regrade the runway to conform to ARC C-II and D-III design standards. Due to potential project costs and construction impacts, a MOS may be required.
Runway 17L/35R	
Nonstandard objects located in the ROFA.	Relocate the wind sensor outside the ROFA limits in a suitable area per 14 CFR Part 77. As part of the PAPI upgrade project, relocate both runway end PAPI PCUs to be outside the RSA and ROFA to the extent practicable. If necessary, obtain a MOS for this condition.

Source:
Kimley-Horn, 2021.

Notes:
RSA = Runway safety area
PAPI = Precision approach path indicator
PCU = Power and control units
MOS = Modification of standard
ROFA = Runway object free area
AWOS = Automated weather operating system
CFR = Code of Federal Regulation
RDC = Runway design code

RUNWAY 17R/35L

The precision approach path indicators (PAPIs) power and control units (PCUs) for both runway ends are within the limits of the RSA. The PAPI PCUs are not permissible within the RSA or ROFA. However, most PAPI PCUs are required to be in close proximity to the PAPI. Therefore, it is recommended that the PAPI PCUs be relocated outside of the RSA, within the ROFA, and a modification to standards (MOS) be obtained for the PAPI PCU within the ROFA. It is noted that Clark County Department of Aviation (CCDOA) intends to update the PAPIs at the Airport. It is recommended that CCDOA work with the selected vendor to develop a solution to eliminate the need for a MOS whether it be locating the PCUs outside of the ROFA limits or in an underground vault.

All 13 associated hold lines for Runway 17R/35L are located 200 feet from the runway centerline and are within the RSA. To comply with current Runway Design Code (RDC) C-II-5000 design standards, the hold lines are required to be a minimum of 200 feet from the runway centerline. To meet the RDC D-III-5000 design standards associated with the future critical aircraft, the hold lines are to

be located 275 feet from the runway centerline. It is recommended that as part of the redesign of the airfield to meet D-III standards that the hold lines be relocated.

Approximately 652 feet of the RSA extends into a portion of the detention basin south of Runway 35L, which is not graded per RSA standards. This area will be appropriately graded with impacts to the detention basin being mitigated by either expanding the limits towards the east or deepening the basin. Other potential solutions to meet the RSA requirements are to apply declared distances or install an Engineered Materials Arresting System (EMAS). From an airport operations and recurring maintenance cost perspective, grading the RSA per design standards is the best option; therefore, it is the recommended approach to be implemented by CCDOA.

Runway 17R/35L has objects within its ROFA that are not permitted. The following objects will be relocated outside the ROFA: the Airport's primary wind cone; two supplemental wind cones; the Airport's Automated Weather Observing Station (AWOS); two supplemental wind sensors; two utility boxes; and a temporary storage area. Additionally, the chain-link Airport perimeter and detention basin fence lies within the Runway 17R/35L ROFA and will be relocated as part of the RSA grading enhancements described above.

The longitudinal grading of Runway 17R/35L does not conform to ARC C-II or D-III standards. Specifically, when the runway was constructed, it was constructed to ARC B-II standards, which allows for a maximum allowable longitudinal grade of ±2.0 percent. The existing maximum runway gradient is 1.74 percent. With the change in existing critical aircraft from an ARC B-III to ARC C-II, more stringent grading standards are now applicable. For ARC C-II and D-III runways, the maximum longitudinal grade is ±1.50 percent; however, longitudinal grades may not exceed ±0.80 percent in the first and last quarter, or first and last 2,500 feet, whichever is less, of the runway length. To correct this deficiency, significant regrading of the runway is required and must be balanced with taxiway longitudinal grading requirements, which have a maximum longitudinal grade of ±1.50 for ARC C-II and D-III aircraft. Alternatively, CCDOA could seek a MOS for this deficiency.

RUNWAY 17L/35R

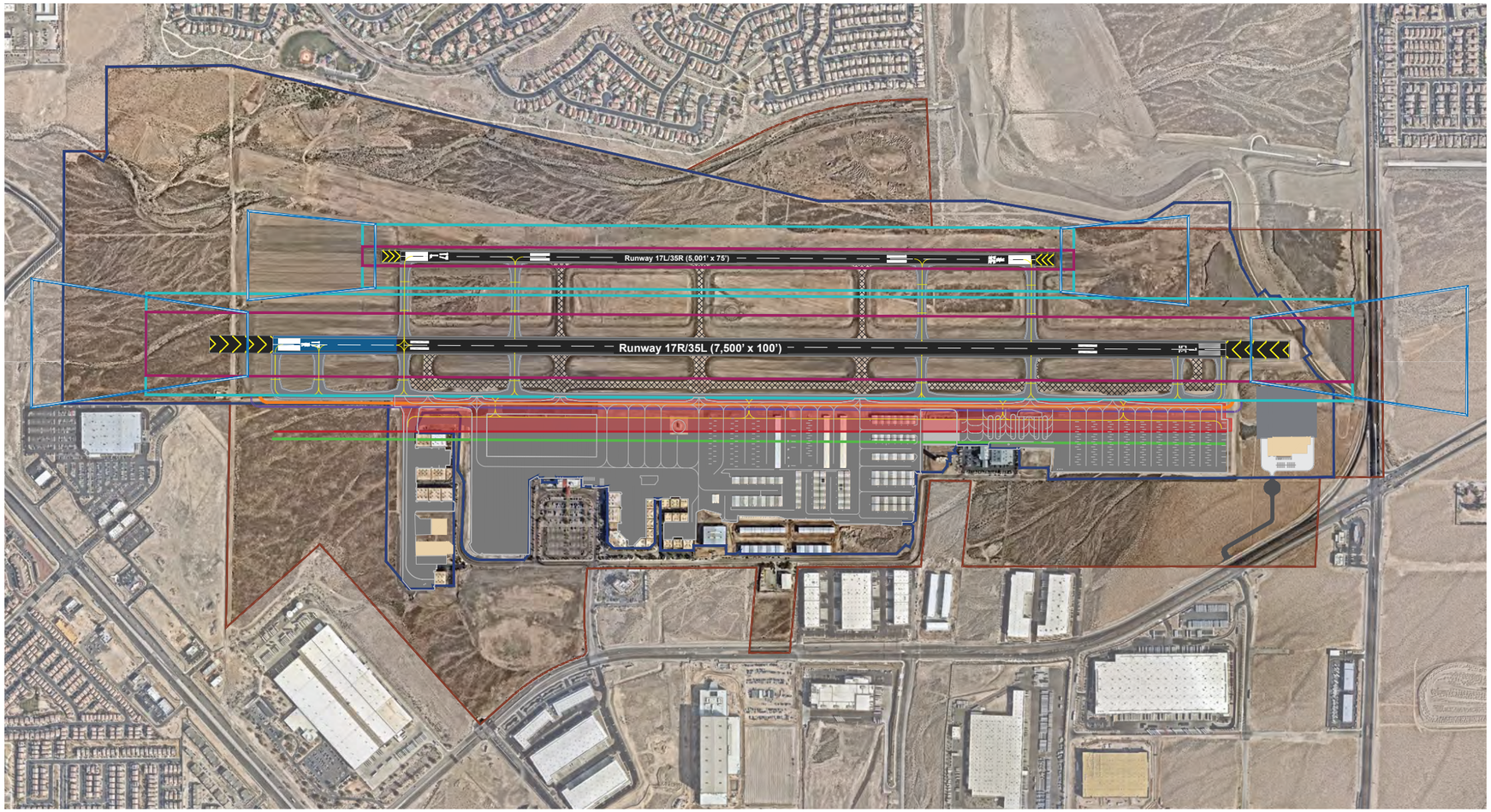
Runway 17L/35R has the following nonstandard objects in its ROFA: a wind sensor and the PCUs for the PAPIs off both runway ends. Most PAPI PCUs are required to be in close proximity to the PAPI; therefore, it is recommended that a MOS be obtained for the PAPI PCUs within the ROFA. It is noted that CCDOA intends to update the PAPIs at the Airport. It is recommended that CCDOA work with the selected vendor to develop a solution to eliminate the need for a MOS whether it be locating the PCUs outside of the ROFA limits or in an underground vault. The wind sensor is to be relocated outside of the ROFA limits and in a location that it does not become a Title 14 Code of Federal Regulations Part 77 (14 CFR Part 77) obstruction.

RUNWAY CONFIGURATION ALTERNATIVE 1

DESCRIPTION

The alternative in **Figure 4.1** (Alternative 1) proposes an extension of Runway 17R/35L to the north while maintaining the existing dual runway configuration with 700 feet of parallel separation at the Airport. Runway 17R/35L would be extended 999 feet to the north and result in a total runway length of 7,500 feet.

Figure 4.1 – *Runway Configuration Alternative 1*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

Parallel Taxiway A would be relocated 100 feet to the west to satisfy design standards for runway centerline to taxiway centerline separation of 400 feet for ARC D-III aircraft. The relocated Taxiway A would occupy pavement used by the existing parallel taxiway on the eastern edge of the apron and a parallel taxilane on the eastern edge of the reduced aircraft parking area would be implemented to allow for aircraft taxiing direction reversal during changing wind conditions as is currently possible. To allow for direction reversal, the taxilane in this alternative would have a taxiway centerline to taxilane centerline separation of 162 feet.

To mitigate runway incursions, direct access from the apron to the taxiway would be removed. Four crossover taxiways would be put in place to provide access to and from Taxiway A and the apron. An additional safety enhancement would be the reduction in total crossover taxiways to four by removing crossover taxiways from the middle third of Runway 17R/35L, also known as the high-energy portion of a runway.

These changes would require the removal of approximately 36 acres of existing aircraft parking area, which would necessitate the removal of the following facilities: 14 small box hangars, 14 helicopter parking positions, 110 feet of shade hangar length, and the existing fuel island.

Additionally, RPZs for three of the four runway ends would extend beyond the boundary of the Airport. The Runway 17R approach end RPZ would extend 5.5 acres beyond Airport property, an increase of 5.4 acres, with approximately 0.1 acre encompassing the Costco Wholesale parking lot. For the Runway 35L approach end RPZ, there would be no change compared to existing conditions that would maintain the existing 788 linear feet of Volunteer Boulevard within this RPZ. There would be no changes to the existing Runway 35R approach end RPZ, which currently extends 1.1 acres off Airport property.

PROS

- Maintains the dual parallel runway configuration and its associated traffic separation and operational flexibility
- Runway 17R/35L would be extended to 7,500 feet, consistent with runway length requirements for the critical aircraft
- Taxiing aircraft direction reversal would be possible due to separation between Taxiway A and the apron taxilane
- FAA airport design standards would be met with the changes to airfield geometry and modifications to the detention basin
- This alternative would have less grading and drainage impacts compared to other alternatives discussed in this chapter

CONS

- The aircraft parking area would be reduced by 36 acres or 34 percent of its current size requiring removal or relocation of 14 box hangars and 14 helicopter parking positions along with reductions in the T-shade hangars by 110 feet each
- Relocation of the existing fuel island would be required
- Potential increased CCDOA airfield maintenance costs for Runway 17L/35R and its associated taxiways

TAC/PAC FEEDBACK

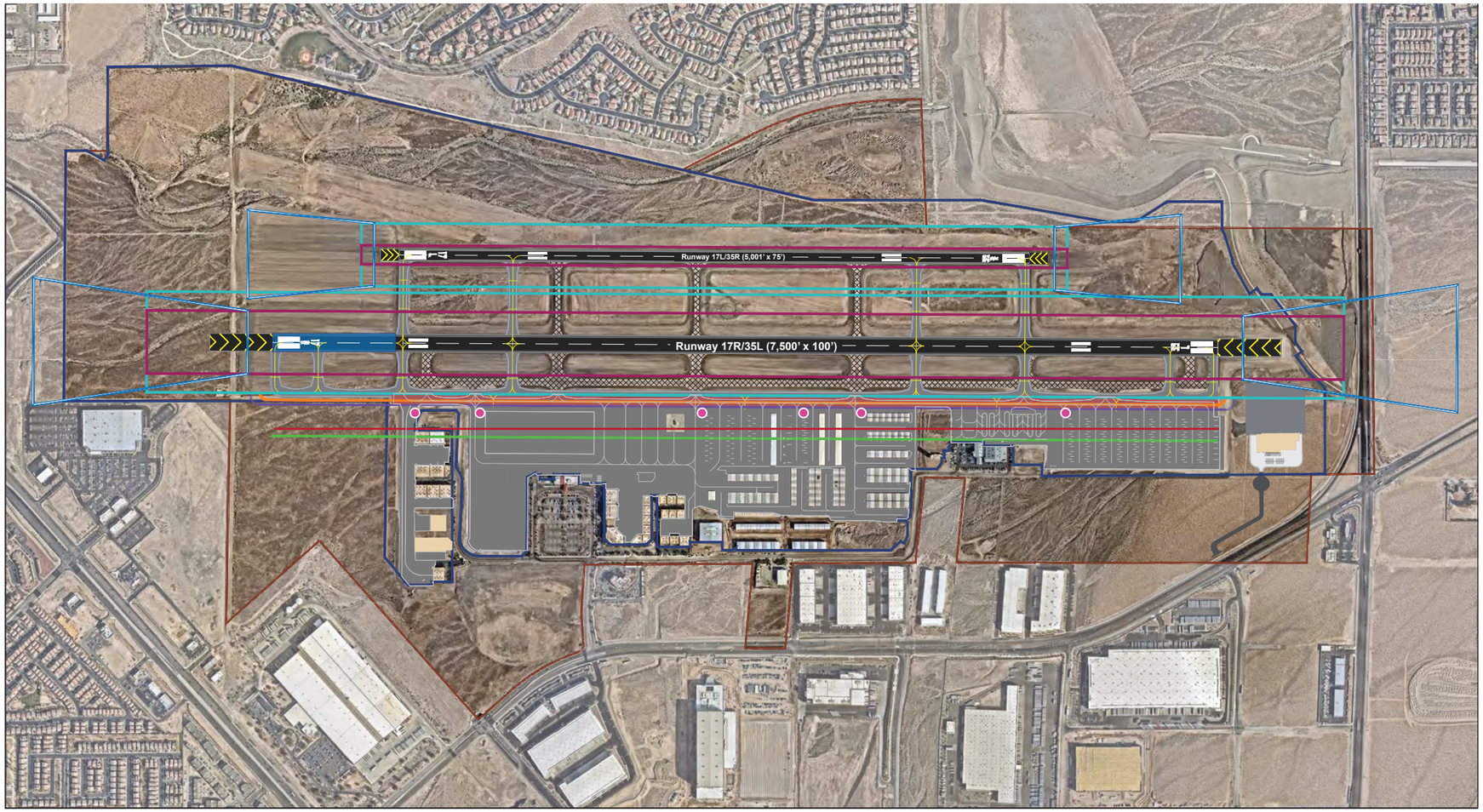
Multiple stakeholders were not in favor of reducing the aircraft parking area and questioned whether there would be enough benefit to maintaining a parallel taxilane if it would significantly impact hangars and apron parking. A concern was expressed that this alternative would create an increased potential for unstable approaches. It also was noted that the rapid pace of development near the south end of the Airport could constrain the airfield. It was pointed out that the Airport may need to acquire land or seek avigation easements to keep as much of the RPZs inside Airport property as possible. Much of the southern RPZ off the Airport is within the control of the BLM, which has a current agreement with the Airport to keep the land free and clear of development and obstructions.

RUNWAY CONFIGURATION ALTERNATIVE 1A

DESCRIPTION

Alternative 1A in **Figure 4.2** is a variation of Alternative 1. This alternative would extend Runway 17R/35L to the north and maintain the existing dual runway configuration with 700 feet of parallel separation at the Airport. Runway 17R/35L would be extended 999 feet to the north and result in a total runway length of 7,500 feet.

Figure 4.2 – *Runway Configuration Alternative 1A*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

The same as with Alternative 1, Alternative 1A would relocate the parallel Taxiway A 100 feet to the west, creating a 400-foot runway centerline to taxiway centerline separation that would satisfy design standards for ARC D-III aircraft. However, Alternative 1A does not include a parallel taxilane to minimize the impact to the aircraft parking area and instead directly connects the apron to the edge of Taxiway A. Access from the apron to Taxiway A would be controlled by new apron control markings that aircraft would taxi to before receiving clearance to enter the movement area. Apron control markings are used to facilitate the local apron tower or the FAA airport traffic control tower in the movement of aircraft and vehicles to designated areas of aprons and other paved areas between nonmovement areas and the movement area. In terms of air traffic controller (ATC) workload, the surface marking simplifies verbal communications between controllers, pilots, and vehicle drivers during this transition process.0F

To mitigate runway incursions, direct access to the runway from the apron to the taxiway would be removed. Four crossover taxiways are included to provide access to and from Taxiway A and the apron. An additional safety enhancement would be the reduction in total crossover taxiways to four by removing crossover taxiways from the middle third of Runway 17R/35L, also known as the high-energy portion of a runway.

Removing the parallel taxilane would minimize the amount of aircraft parking area reduced as part of this alternative. Only 11 acres of existing aircraft parking area, or 10 percent, would be removed. This is 25 acres, or 24 percent, less than Alternative 1. As a result, there would be no impacts to existing structures, aircraft parking spaces, or the fuel island. However, there is a chance that aircraft being pulled out of the eastern side of the easternmost box hangars ('F' Row Hangars) will enter the movement area due to their close proximity to the taxiway object free area (TOFA) at 26 feet separation.

As in the case of Alternative 1, with Alternative 1A, runway protection zones (RPZs) for three of the four runway ends would extend beyond the boundary of the Airport. The Runway 17R approach end RPZ would extend 5.5 acres outside the Airport, and increase by 5.4 acres, with approximately 0.1 acre crossing the Costco Wholesale parking lot. For the Runway 35L approach end RPZ, there would be no change compared to existing conditions, which would maintain the existing 788 linear feet of Volunteer Boulevard within this RPZ. There would be no changes to the existing Runway 35R approach end RPZ, which currently extends 11 acres off Airport property.

PROS

- The existing dual parallel runway configuration would be maintained, along with its traffic segregation and operational flexibility
- Runway 17R/35L would be extended to 7,500 feet, consistent with runway length requirements for the critical aircraft
- Airfield geometry would meet FAA airport design standards and the detention basin modified to provide full RSA and ROFA south of Runway 35L
- Compared to Alternative 1, the reduction in existing aircraft parking area would be 25 acres less and no relocation of aircraft hangars or the fuel island would be required
- There would be less drainage and grading impacts with this alternative compared to others discussed in this section
- Alternative 1A has the least amount of airfield construction and, therefore, the least cost of implementation compared to other alternatives

CONS

- This Alternative would reduce landside area by approximately 11 acres or 10 percent of the existing area
- Apron control markings are not common at general aviation (GA) airports, which may cause confusion with itinerant aircraft
- Painted islands would need to be painted on the existing apron to mitigate direct access between the apron and runways
- Additional consideration will be required to resolve Hot Spot 1
- New procedures and a letter of agreement would be required between the airport traffic control tower (ATCT) and Maverick, which currently follows the taxilane as part of its operations. Helicopter traffic will be in proximity to fixed wing traffic, and there is no alternate route to increase separation between these two aircraft types
- Ground movement flexibility would be reduced and there would be a potential for head-to-head operations when shifts in wind occur

- The usage of the easternmost box hangars could impact the movement area
- Potential increased CCDOA airfield maintenance costs for Runway 17L/35R and its associated taxiways

TAC/PAC FEEDBACK

There were concerns expressed that having apron control markings could cause pilot confusion and that ATC may not have the authority to direct aircraft from the parking area to the apron control marking. Feedback also indicated that head-to-head operations were perceived to be more likely due to the procedural changes to aircraft ground operations. Because of the ability to proactively engage the pilots and update pilot information (e.g., adding notes to the Chart Supplement, updating the Airport website, and pilot information handouts), it was determined that this alternative would be a net benefit to the Airport. Similar airports have implemented alternatives like this one before, which have resulted in long-term benefits for their operations. The overall sentiment of the TAC and PAC was that Alternative 1A was the preferred alternative.

RUNWAY CONFIGURATION ALTERNATIVE 2

DESCRIPTION

In **Figure 4.3**, Alternative 2 would remove Runway 17L/35R to create a single-runway configuration. Additionally, approximately 52 acres of aircraft parking area would be gained as a result of various airfield geometry changes in this alternative. The remaining runway, Runway 17R/35L, would be extended to the north by 999 feet to provide a total runway length of 7,500 feet. Other changes to this runway would include renaming it Runway 17/35 and relocating it approximately 500 feet east.

Parallel Taxiway A would be relocated approximately 385 feet to the east to create a 400-foot runway centerline to taxiway centerline separation that would satisfy the separation design standard for ARC D-III aircraft. Similar to the existing condition, there would be a parallel taxilane on the eastern edge of the apron with a taxiway centerline to taxilane centerline separation of 162 feet to allow for direction reversal. If direction reversal is not desired, this separation distance can be reduced to 152 feet and the amount of additional apron space would be increased.

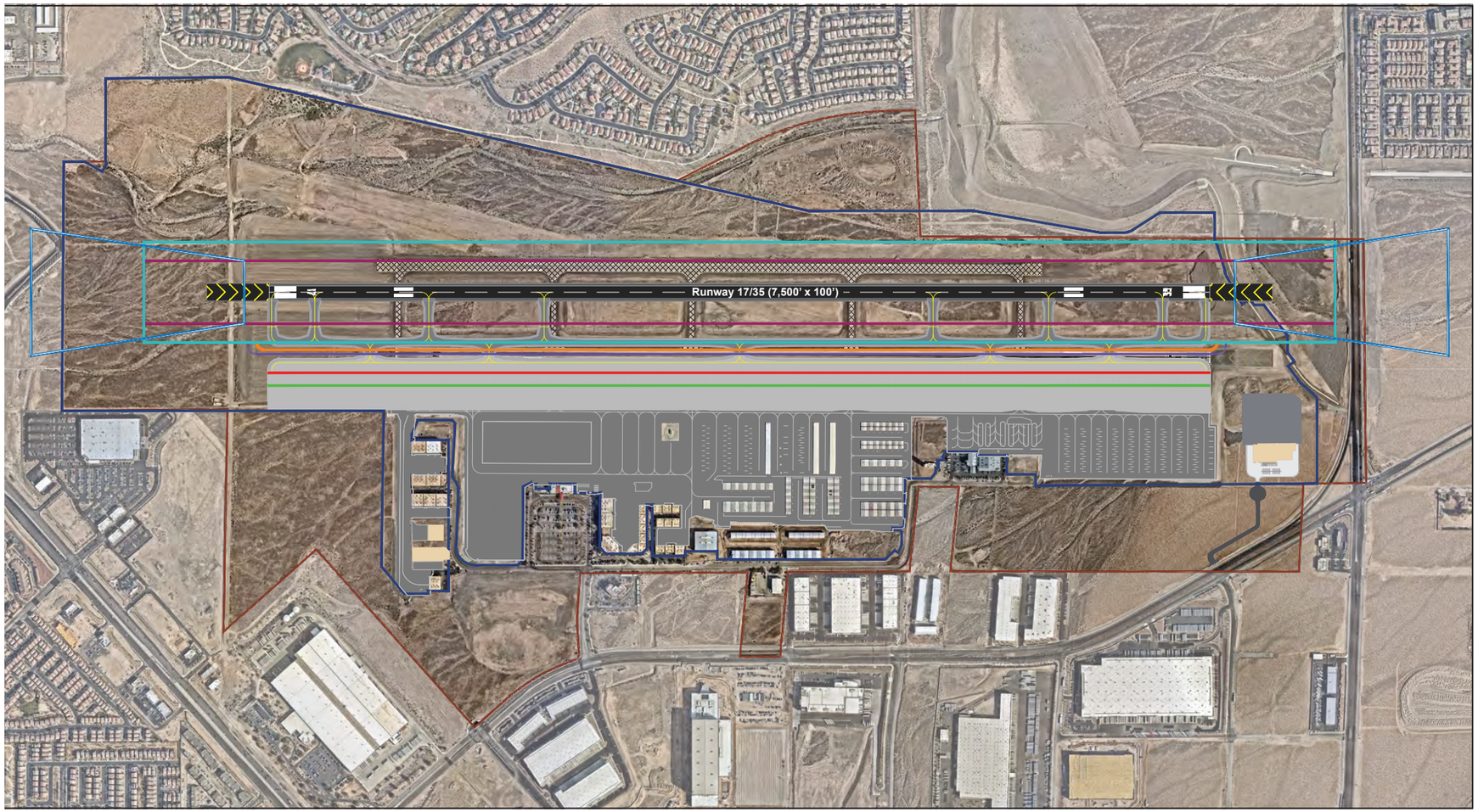
To mitigate runway incursions, direct access from the apron to the taxiway would be removed. Five crossover taxiways would be put in place to provide access to and from Taxiway A and the apron. With the new runway location, runway hold lines would be installed 275 feet from the runway centerline consistent with FAA airport design standards.

Both RPZs would extend beyond the boundary of the Airport. The Runway 17 approach end RPZ would be 5.7 acres outside the Airport, an increase of 5.6 acres compared to the existing RPZ, and approximately 455 linear feet of South Maryland Parkway and Sunridge Heights Parkway would be within the new RPZ. Existing conditions for the Runway 35 approach end RPZ would remain similar, though shifted eastward; 13.9 acres would extend off Airport property and approximately 788 linear feet of Volunteer Boulevard would be within the RPZ.

PROS

- The runway would be extended to 7,500 feet, consistent with runway length requirements for the critical aircraft
- Approximately 52 acres of new aircraft parking area would be gained
- Existing box hangars, aircraft parking positions, and the fuel island would not need to be relocated
- Taxiing aircraft direction reversal would be possible due to Taxiway A/apron taxilane separation
- FAA airport design standards would be met by these airfield geometry changes, including modifications to the detention basin to provide full RSA and ROFA off the south end of the runway
- Less pavement maintenance would need to occur at the Airport due to the elimination of Runway 17L/35R and its associated taxiways

Figure 4.3 – *Runway Configuration Alternative 2*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Hold Line Setback
- Taxiway Safety Area (TSA)
- Taxiway Object Free Area (TOFA)
- Taxilane Centerline to Fixed or Movable Object
- Building Restriction Line (BRL) (for a 35-foot tall building)
- Existing Apron
- Possible Future Apron Site
- Pavement Removal

0 350 700 1400 Feet

N

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

CONS

- Removing Runway 17L/35R, would result in a loss of operational flexibility and traffic segregation
- Both RPZs of the new runway would extend beyond the Airport boundary. Volunteer Boulevard would intersect the Runway 35 approach end RPZ while South Maryland Parkway and Sunridge Heights Parkway would intersect the Runway 17 approach end RPZ
- The movement of Runway 17R/35L would require the entire area of full-strength runway and taxiway pavement to be built, resulting in higher construction costs as well as increased grading and drainage impacts compared to Alternative 1

TAC/PAC FEEDBACK

Feedback from both committees revealed strong pushback against the removal of the Runway 17L/35R. Many believed that doing so was not in the best interest of the Airport and would have a negative effect on smaller GA and training traffic, which primarily operates on Runway 17L/35R and could effectively be forced out by the larger business jet traffic with only a single runway configuration. In addition, there was concern that regular construction projects or any emergency situation, such as a blown tire, would temporarily close the only runway, essentially halting operational activity at the Airport.

There was concern that the single runway configuration would shift operations closer to the Seven Hills community and impact the existing Fly Safely & Quietly program, which utilizes Runway 17R/35L for operations when possible. In this alternative, the Airport could potentially be seen by members of the community as being in violation of that agreement by moving flight operations, and noise, closer to Seven Hills.

Additionally, Sunridge Heights remains a top priority for the City of Henderson and the potential impacts of the north RPZs on this roadway development will be closely evaluated.

RUNWAY CONFIGURATION ALTERNATIVE 3

DESCRIPTION

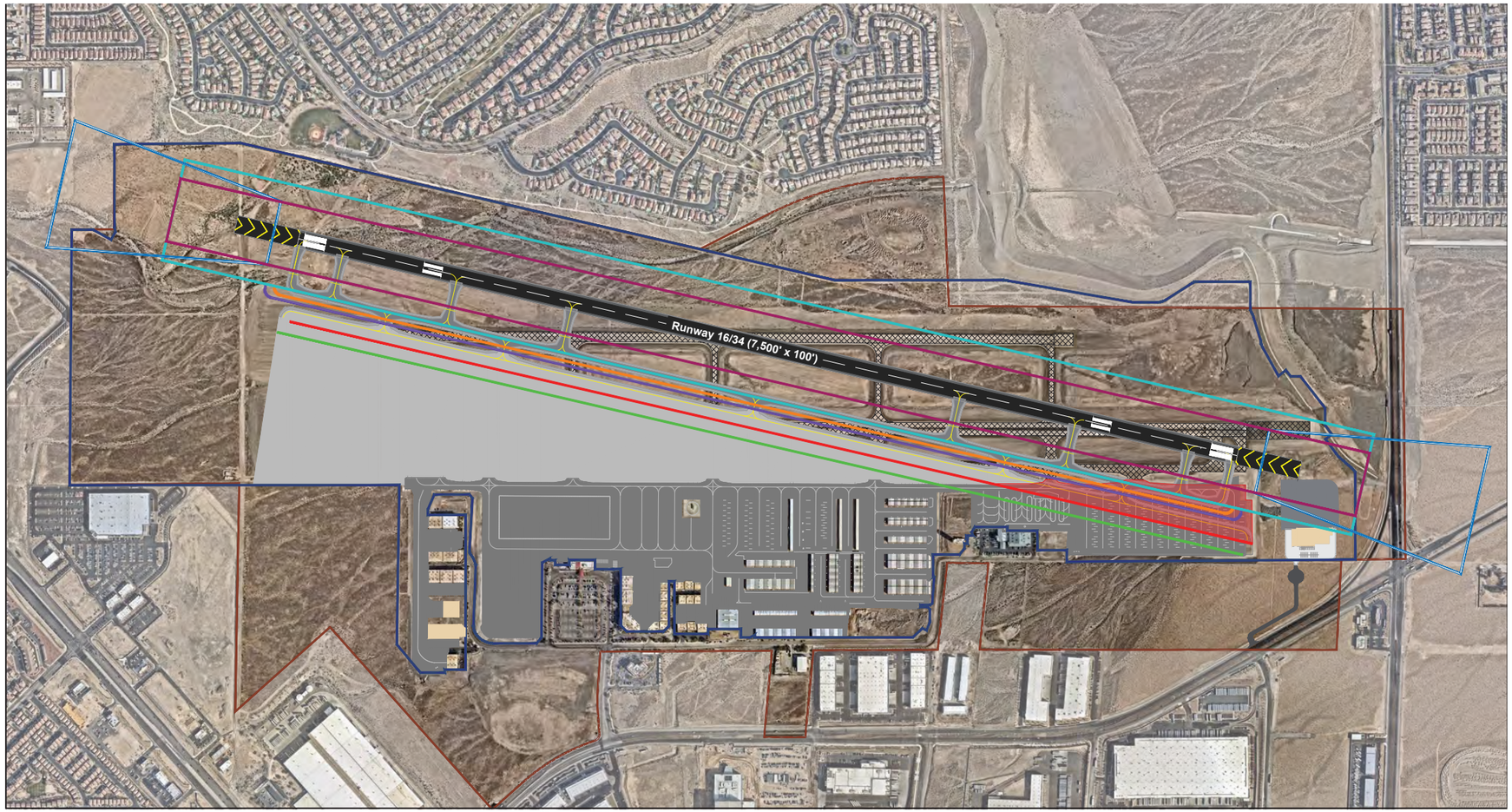
Alternative 3 in **Figure 4.4** would remove Runway 17L/35R to create a single-runway configuration. A net gain of approximately 88 acres of aircraft parking apron is present in this alternative. The remaining runway would be extended to the north by 999 feet to provide a total runway length of 7,500 feet. In addition, to optimize flight operations into prevailing winds, particularly for the smaller aircraft, the runway would be rotated 13 degrees clockwise and be renamed Runway 16/34. This rotation may benefit instrument flight procedures, allow for standard vertically guided approaches and approaches from the northeast, and may minimize conflicts with McCarran International Airport's airspace.

Taxiway A, the parallel taxiway, and the taxilane would all be rotated 13 degrees clockwise to keep them parallel to Runway 16/34. Similar to existing conditions, a parallel taxilane would be provided at a taxiway centerline to taxilane centerline separation of 162 feet to allow for direction reversal; this could be reduced to 152 feet if that flexibility is not desired.

To mitigate runway incursions, direct access from the apron to the taxiway would be removed. Five crossover taxiways would be put in place to provide access to and from Taxiway A and the apron. With the new runway location, runway hold lines would be installed 275 feet from the runway centerline consistent with FAA airport design standards. Modifications to the detention basin to provide full RSA and ROFA are required, though less impact to the detention basin is needed to provide standard RSA grading.

These airfield geometry changes would result in a gain of approximately 99 acres of aircraft parking area. However, these changes also would require the removal of approximately 11 acres of existing aircraft parking area (for a net gain of 88 acres), which would include the removal of one helicopter parking position and about 9.5 acres of the south GA aircraft parking area.

Figure 4.4 – *Runway Configuration Alternative 3*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Hold Line Setback
- Taxiway Safety Area (TSA)
- Taxiway Object Free Area (TOFA)
- Taxilane Centerline to Fixed or Movable Object
- Building Restriction Line (BRL) (for a 35-foot tall building)
- Existing Apron
- Possible Future Apron Space
- Lost Existing Apron Space
- Pavement Removal

0 350 700 1400 Feet

N

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

Additionally, both RPZs would extend beyond the boundary of the Airport. Approximately 8 acres of the Runway 16 approach end RPZ and 12 acres of the Runway 34 approach end RPZ would extend off Airport property. Approximately 850 linear feet of Volunteer Boulevard and 510 linear feet of Via Inspirada would lie within the Runway 34 approach end RPZ. No existing roads are within the Runway 16 approach end RPZ; however, a new high-density residential development was approved in close proximity and possibly partially within the RPZ. Residential development is an incompatible land use within an RPZ. There is a gas station under construction on the southeast corner of the Volunteer Boulevard and Via Inspirada intersection. Gas stations also are incompatible land uses within RPZs.

PROS

- Runway 16/34 would be constructed at 7,500 feet long, consistent with runway length requirements for the critical aircraft
- Realignment of the runway would provide better crosswind coverage, particularly for the smaller GA aircraft. The realigned runway may allow for lower approach minima and avoid terrain south of the Airport to potentially provide consistently repeatable, stabilized straight-in approaches
- Rotation of the runway may help minimize conflicts with McCarran International Airport's airspace
- Existing hangars and the fuel island would not need to be relocated
- Aircraft direction reversal would be possible due to separation between Taxiway A and the apron taxilane
- FAA airport design standards would be met by these airfield geometry changes and modifications to the detention basin to provide standard RSA and ROFA are lessened in comparison with the other alternatives

CONS

- Runway 17L/35R would be removed, along with its associated benefits to traffic segregation and operational flexibility
- Approximately half of the existing south GA aircraft parking area would need to be removed
- Both RPZs of the new Runway 16/34 would extend beyond the Airport boundary and the length of road within the Runway 34 approach end RPZ would increase. The new RPZ locations would introduce new incompatible land uses within the RPZs
- Rotation of the runway towards the Seven Hills Community would have noise impact considerations to that community and would require negotiation of existing agreements between Seven Hills and the City of Henderson
- Extensive airfield construction, grading, and drainage work would be required as the airfield would essentially be rebuilt in addition to the new construction of long taxiway connectors to provide access to existing aircraft parking and support facilities

TAC/PAC FEEDBACK

Like Alternative 2, the general sentiment of the TAC and PAC was broadly negative in regard to a single runway configuration. Additionally, some committee members thought that Alternative 3 would be like returning to the former configuration of the Airport in 1998, which could have negative impacts to the affected area. Many committee members were concerned about noise impacts and some felt that the Airport would need to pay for sound attenuation or even buy out certain developments if this alternative were implemented. There also were concerns expressed that the upcoming development would interfere with the RPZs on both ends of the runway while others thought that this configuration could introduce a new conflict with one of the approaches to McCarran International Airport.

EVALUATION OF RUNWAY CONFIGURATION ALTERNATIVES

The alternatives were ranked against the evaluation criteria defined in **Section 4.4**. As seen in **Table 4.4**, Runway Configuration Alternative 1A was the highest-ranking alternative. This alternative benefits from having the lowest construction cost, being one of the less complex alternatives to implement from a construction and phasing perspective and minimizing potential impacts to existing and proposed off-airport development. Runway Configuration Alternative 3 received the lowest ranking as there were many noise and political challenges with the rotated runway, along with it being difficult to implement while maintaining operations, and incompatible land uses would be present within the RPZs off both runway ends.

Table 4.4 – *Runway Configuration Alternatives Scoring*

	Satisfies Facility Requirements	Operational and Airspace Impacts	Environmental Considerations	Cost Considerations	Construction/ Phasing Issues	Off-Airport Impacts
Alternative 1	⊕	○	○	○	○	⊕
Alternative 1A	⊕	○	○	⊕	⊕	⊕
Alternative 2	⊖	⊖	⊖	○	○	○
Alternative 3	⊖	○	⊖	○	⊖	⊖

Source:
Kimley-Horn, 2021.

4.6.2. Runway Extension Alternatives

In order to meet the required 7,500-foot-long runway requirement for the future critical aircraft, a 999-foot extension is required on Runway 17R/35L. At the most basic level, there are three options to meet this requirement:

1. Extend the runway 999 feet to the north
2. Extend the runway 999 feet to the south
3. Extend the runway both north and south for a total 999-foot extension

The alternatives presented in **Section 4.6.**1 included a 999-foot extension to the north as there was adequate Airport property to accommodate the extended runway and associated safety zones. As inadequate Airport property is available south of the runway, a full extension to the south is not contemplated. The alternatives presented in this section analyze an extension to the north and a balanced extension to the north and south. These runway extensions can be applied to Alternatives 1, 1A, and 2 presented in **Section 4.6.1**.

Before analyzing the two viable runway extension alternatives, a discussion of declared distances is presented. The runway extension alternatives described below include further refinements to minimize potential incompatible land uses within the RPZs. This is achieved by applying declared distances.

DECLARED DISTANCES OVERVIEW

Declared distances are used by an airport sponsor or operator to "declare" the distances that are available for various takeoff and landing distance availability when airport design standards cannot be met through other means. It is incumbent upon the pilot to be familiar with these distances, which are included in FAA publications, and how to calculate their aircraft's performance and ability to operate within the published declared distances. The declared distances defined within this section are solely to address RPZ land use compatibility and may require further refinement due to obstructions in the vicinity of the Airport or other airspace or approach considerations. Definitions for declared distance terms are as follows:

- **Displaced Threshold:** A threshold located at a point on the runway other than the designated beginning of the runway and defines the earliest landing point available for the runway. The landing threshold may be displaced to clear obstacles, mitigate nonstandard safety areas, or eliminate incompatible land uses within the approach RPZ.
- **Accelerate-Stop Distance Available (ASDA):** The distance that an aircraft would need to accelerate from brake release to V1 and then immediately decelerate to a stop, plus additional safety factors. The ASDA is affected by RSA and ROFA compliance. Unless there is a designated stopway on the runway–which is uncommon–the ASDA will not exceed the length of the runway.

- **Landing Distance Available (LDA):** The distance from the threshold to complete an approach, touchdown, and then decelerate to a stop, plus additional safety factors. The starting point of the LDA is the landing threshold of the runway and the ending point can be affected by RSA and ROFA compliance.
- **Takeoff Run Available (TORA):** The distance that an aircraft would need to accelerate from brake release to liftoff, plus additional safety factors. The TORA is normally the same distance as the length of the runway, but may be reduced to eliminate incompatible land uses within the RPZ. The TORA cannot exceed the length of the runway.
- **Takeoff Distance Available (TODA):** The distance that an aircraft would need to accelerate from brake release past liftoff to the start of its takeoff climb, plus additional safety factors. The TODA may be reduced from the length of the runway to clear obstructions within the 40:1 departure surface. In uncommon circumstances, a runway may have a clearway that would enable the TODA to exceed the length of the runway.

RUNWAY EXTENSION ALTERNATIVE A

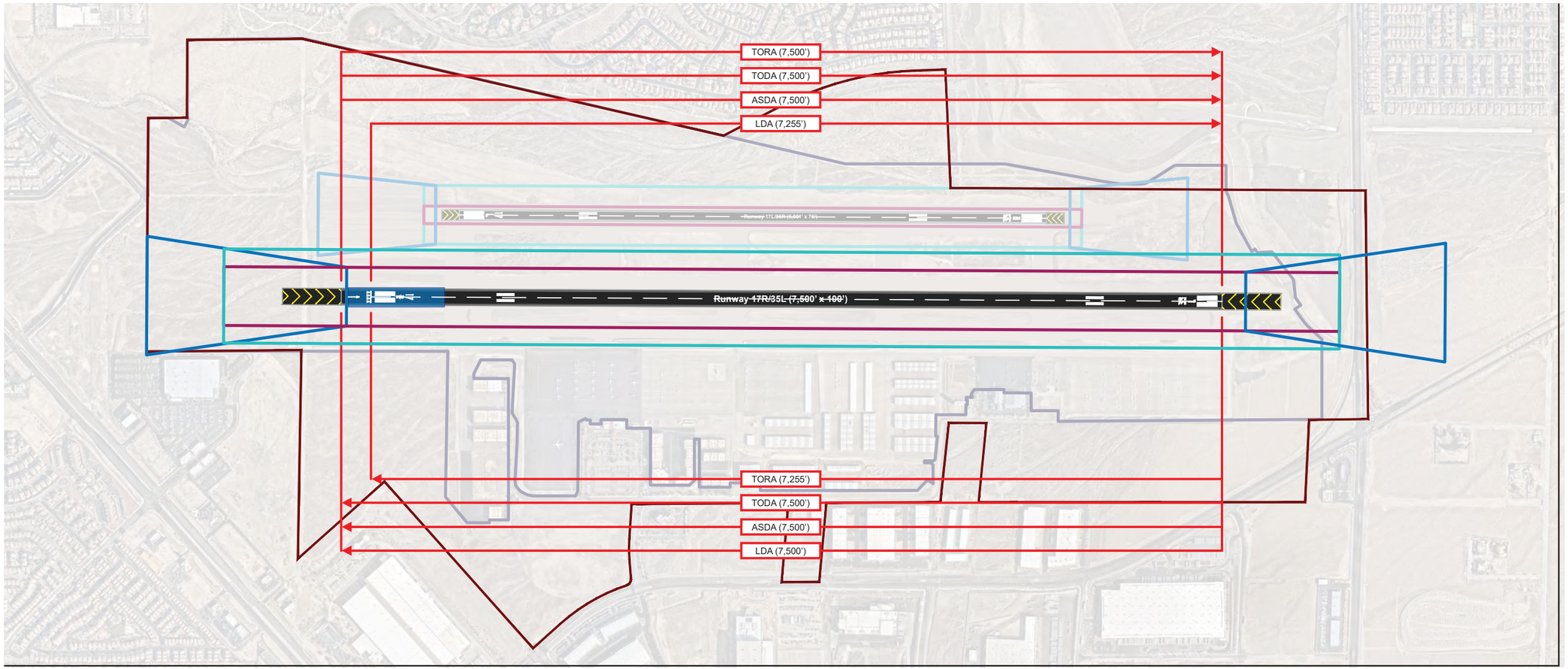
Overall, Alternative A in **Figure 4.5** would retain the southerly approach and departure RPZs in their existing location and shift the approach and departure RPZs to the north of Runway 17R further north, such that they would extend approximately 0.1 acre beyond the Airport's northern boundary. As a result, the RPZ controlled activity area would encompass a portion of the Costco Wholesale parking lot, the same as exists today. The two southerly RPZs would not change from existing conditions; approximately 13.90 acres would extend beyond the southern boundary and approximately 797.95 linear feet of Volunteer Boulevard would lie within the RPZs. Further evaluation is needed to validate the declared distances listed in **Table 4.5** below, based on obstacles and approach procedures.

Table 4.5 – *Runway Extension Alternative A: Runway 17R/35L Declared Distances*

Declared Distance	Runway 17R Length (feet)	Runway 35L Length (feet)
Takeoff Run Available (TORA)	7,500	7,255
Takeoff Distance Available (TODA)	7,500	7,500
Accelerate-Stop Distance Available (ASDA)	7,500	7,500
Landing Distance Available (LDA)	7,255	7,500

Source:
Kimley-Horn, 2021.

Figure 4.5 – *Runway Extension Alternative A*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Extension

0 400 800 1600 Feet

N

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

Notes:
All distances are rounded to the nearest whole number. Displaced threshold locations and TODA require additional obstacle analysis.

PROS

- Runway 17R/35L would be extended to 7,500 feet, consistent with runway length requirements for the critical aircraft
- Both southerly RPZs would remain in their existing locations and no incompatible land uses would be introduced within the RPZ limits
- While the northerly RPZs shift to the north, they are primarily within Airport property, with 0.1 acre extending beyond Airport property and encompassing a portion of the Costco Wholesale parking lot, the same as existing conditions
- Compared to Alternative B, more runway would be made usable for operations in either direction
- There is no change to the landing point from the south nor is the southerly departure point modified meaning that operations do not move closer to the mountains south of Henderson Executive Airport

CONS

- Due to displaced thresholds and the application of declared distances, the full length of runway pavement would not be available for both takeoffs and landings in either direction
- Airport flight operations to the north would be closer to McCarran International Airport resulting in sharper maneuvers to avoid conflicts with McCarran International Airport's protected airspace

TAC/PAC FEEDBACK

Committee members expressed concern over upcoming development around the Airport that could interfere with this alternative. Discussion revealed that development to the south would be less of an issue due to the ownership of much of that land residing with BLM, which has a long-term lease with CCDOA. Some would like to avoid vacating the section of Volunteer Boulevard within the south RPZ while many others strongly wanted the Sunridge Heights Parkway extension to be constructed as intended that would be a new incompatible land use within the RPZ. Overall, the sentiment was that significant changes to the current Airport layout were not desired and that if any development should occur at the Airport, it should have minimal impacts beyond the Airport's property.

RUNWAY EXTENSION ALTERNATIVE B

DESCRIPTION

In **Figure 4.6**, Alternative B proposes a 1,000-foot extension of Runway 17R/35L, which would result in a total runway length of 7,501 feet. This alternative converts the existing blast pads (overruns) to runway pavement that would reduce construction costs. Full RSA and ROFA requirements are assumed to be met off the Runway 17R end and declared distances are necessary to meet RSA and ROFA requirements south of the Runway 35L end.

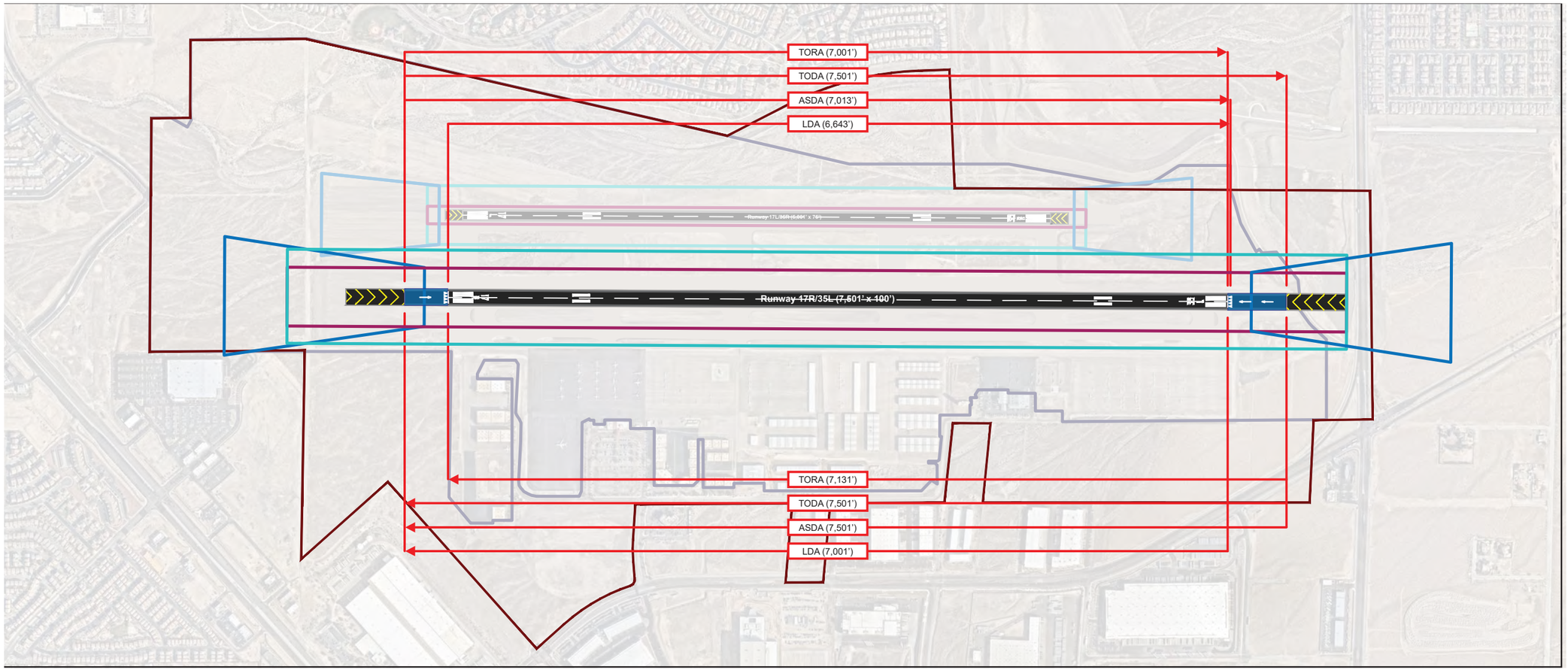
Displaced thresholds would be applied on both ends of Runway 17R/35L. For Runway 17R, a 370-foot displaced threshold would keep the approach RPZ on Airport property and avoid overlying with the Costco Wholesale warehouse building. The Runway 35L departure RPZ would be collocated with the Runway 17R approach RPZ by declaring a shorter TORA. Runway 35L would have a 500-foot displaced threshold, which would retain the location of the existing approach RPZ and provide adequate RSA and ROFA prior to landing (a minimum of 600 feet prior to the landing threshold is required). The Runway 17R departure RPZ would be maintained in its current location by declaring a reduced TORA. Further evaluation is needed to validate landing threshold locations based on obstacles and approach procedures (see **Table 4.6**).

Table 4.6 – *Runway Extension Alternative B: Runway 17R/35L Declared Distances*

Declared Distance	Runway 17R Length (feet)	Runway 35L Length (feet)
Takeoff Run Available (TORA)	7,001	7,131
Takeoff Distance Available (TODA)	7,501	7,501
Accelerate-Stop Distance Available (ASDA)	7,013	7,501
Landing Distance Available (LDA)	6,643	7,001

Source:
Kimley-Horn, 2021.

Figure 4.6 – *Runway Extension Alternative B*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Extension

0 400 800 1600 Feet

N

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

Notes:
All distances are rounded to the nearest whole number. Displaced threshold locations and TODA require additional obstacle analysis.

PROS

- Runway 17R/35L would be extended to 7,501 feet, which meets the runway length requirements for the critical aircraft
- Both RPZs south of Runway 35L would remain in their existing location
- While the northerly RPZs shift to the north, they are primarily within Airport property, with 0.1 acre extending beyond Airport property and encompassing a portion of the Costco Wholesale parking lot, the same as existing conditions
- Compared to Alternative A, Alternative B would have the least amount of airfield pavement construction and, therefore, the lowest implementation cost
- There is no change to the landing point from the south nor is the southerly departure point modified meaning that operations do not move closer to the mountains south of Henderson Executive Airport

CONS

- Compared to Alternative A, Alternative B would provide less usable runway length for operations
- Greater impacts to the detention basin than Alternative A

TAC/PAC FEEDBACK

While many committee members appreciated the potential for cost savings with this method compared to Alternative A, some were concerned that potential impacts from a runway extension over the flood control detention basin would reduce the cost benefit to a degree. Others were focused on Volunteer Boulevard and how extending the runway south could force this road to be realigned or moved underground, which would be costly and disruptive.

EVALUATION OF RUNWAY EXTENSION ALTERNATIVES

The runway extension alternatives were scored against the evaluation criteria previously defined in **Table 4.7**. This comparative analysis proves that Alternative A provides a greater benefit to all Airport stakeholders as it ranks higher in four of the six evaluation criteria. Greater useable runway length, fewer residential impacts, and reduced construction phasing issues are a few key reasons that justify support for Alternative A to provide a higher level of benefit to ongoing Airport operations and forecast Airport growth.

Table 4.7 – *Runway Extension Alternatives Scoring*

	Satisfies Facility Requirements	Operational and Airspace Impacts	Environmental Considerations	Cost Considerations	Construction/ Phasing Issues	Off-Airport Impacts
Alternative 1	⊕	⊕	○	○	○	⊖
Alternative 1A	⊕	⊖	⊖	⊕	⊖	⊕

Source:
Kimley-Horn, 2021.

SUMMARY OF CITY OF HENDERSON BRIEFING AND PUBLIC MEETING FEEDBACK

CITY OF HENDERSON BRIEFING

There was a concern that the Airport does not currently have hangar space for itinerant aircraft like what is seen at other GA airports and their fixed-base operator (FBO) facilities, especially given the prevalence of high-end jet traffic that arrives for major events. Additionally, like with the PAC and TAC committees, there was a strong sentiment that the Sunridge Heights project is a major City of Henderson priority and should be a consideration as the preferred alternative is identified. Others noted that extensive development in the City of Henderson has led to increased noise issues, particularly with touch and go activity on Runway 17L/35R. There also was concern that the additional need for City fire department services in the area would leave them with less available resources to service the Airport.

PUBLIC MEETING (DECEMBER 9, 2020)

The public participation and attendance at this virtual meeting was significant and the feedback received will inform the Master Plan Update. Several participants inquired about addition of Part 139 service at the Airport and the viability of smaller GA training activity at the Airport. The alternatives were developed based on the express intent of CCDOA to ensure Henderson Executive Airport continues to serve as a reliever airport of business jet and other GA traffic from McCarran International Airport as outlined in the National Plan of Integrated Airport Systems (NPIAS). CCDOA has no plans to restrict access to any Airport user. Some attendees were concerned about impacts to airport tenants resulting from certain alternatives and what hangar relocation could mean to those with existing leases. Similar comments were made about where other facilities would be located in the future configuration. This Master Plan Update identifies locations to accommodate impacted facilities and details between lessees and CCDOA will be negotiated outside of this Master Plan Update process. As with previous PAC and TAC meetings, some were concerned that a single-runway configuration would impact GA training activity. In addition, many participants strongly wanted the Sunridge Heights Parkway extension to be completed. Noise concerns were a major source of feedback, particularly with approaches over the Inspirada residential community. Another item of feedback related to approaches regarded the possibility of a new precision approach into the Airport given the current challenges in landing without one.

4.6.3. Run Up Aprons

Throughout this Master Plan Update several users expressed a strong desire to incorporate run up aprons. Ideally, these run up aprons will be located on the west side of the airfield. Consideration was given to placing run up aprons between the two runways; however, doing so would introduce additional runway crossings of aircraft that would increase ATC workload and present additional opportunities for runway incursions. Therefore, alternatives were only developed that considered run up aprons adjacent to future Taxiway A.

A total of three alternatives were developed—one for the north end of the airfield and two versions on the south end of the airfield. Members of the TAC were polled to determine the appropriate size of the run up aprons and number of positions to accommodate. Responses varied, but generally, the intention for the run up aprons is to allow smaller aircraft to perform full engine power tests. Therefore, the run up aprons depicted in the alternatives below are designed to accommodate ARC B-II aircraft. While the TAC indicated it was desirable to accommodate two to three run up positions, because of impacts to existing and designed facilities, one run up position is included in the alternatives below.

To limit the opportunity for head-to-head traffic, it is recommended that run up aprons are installed on both the north and south ends of the airfield. Pilots will be required to enter the movement area to access any run up apron placed along Taxiway A because the preferred runway option (Alternative 1A) does not include a parallel taxilane.

NORTH RUN UP APRON ALTERNATIVE 1

DESCRIPTION

In **Figure 4.7**, the North Run Up Alternative 1 uses a portion of the north apron that is presently in design. The alternative also provides run up access to the Runway 17R end without resulting in direct access from the apron to the runway. The run up position meets ADG-III centerline separation requirements from Taxiway A with a separation of 152 feet. This concept also proposes a blast fence north of the run up apron to protect vehicles on Sunridge Heights from prop wash when aircraft utilize the run up apron.

PROS:

- Provides efficient access to the Runway 17R end with limited taxi time and movement
- Access to and from the runway is compliant with FAA design standards
- Does not impact existing facilities

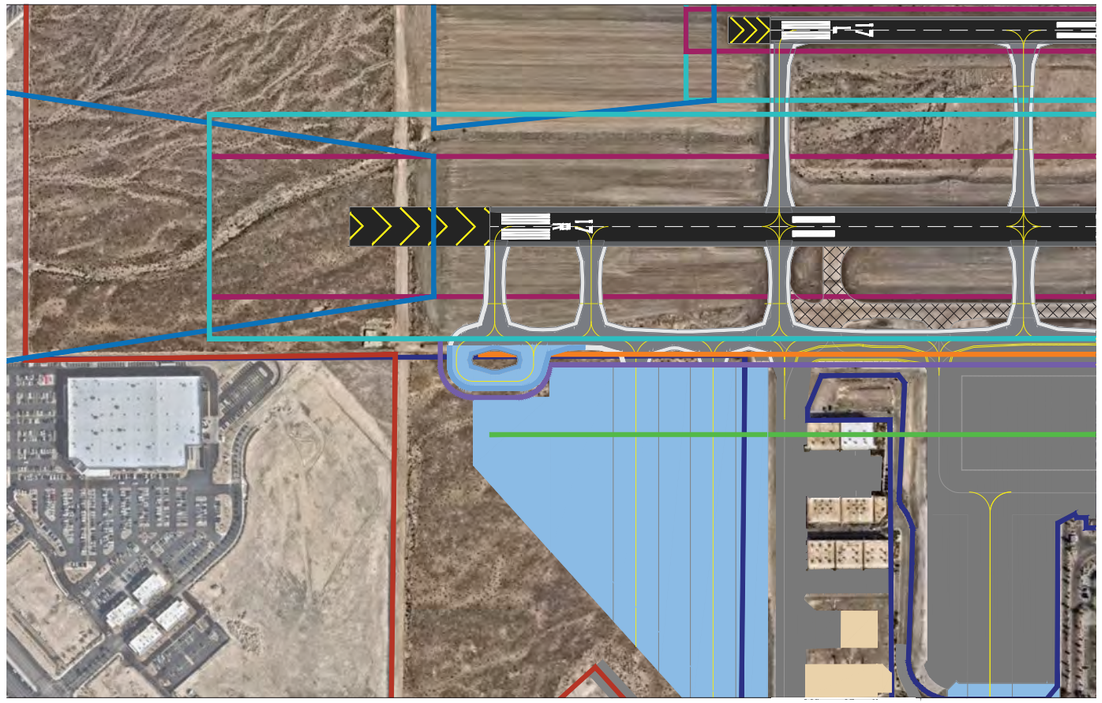
CONS:

- Impacts proposed future north apron expansion
- Requires blast fences to protect vehicles on Sunridge Heights from jet blast or prop wash
- Requires additional communication with ATC for access to and from the run up apron

TAC/PAC FEEDBACK

TAC/PAC feedback largely focused on the need for run up areas to be clear of adjacent parked aircraft, and that a north run up area on the Airport's north end may pose a challenge to visibility from the ATCT.

Figure 4.7 – *North Run Up Apron Alternative 1*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

NORTH RUN UP APRON ALTERNATIVE 2

DESCRIPTION

In North Run Up Alternative 2 (**Figure 4.8**), the single run up position was oriented perpendicular to the runway, and is accessible from the Runway 17R entrance taxiway. The separation distance between the run up position and the entrance taxiway is 152 feet, which allows for ADG-III operations on the entrance taxiway. This configuration is less than ideal as the aircraft is not pointed into the wind to conduct run up operations. Because of its location, a runway hold line would be located on the run up pavement, meaning that aircraft exiting the run up apron will be entering the runway environment. If the aircraft remains west of the hold line, it would not be in conflict with runway operations.

PROS:

- Provides efficient access to the runway end with limited taxi time and movement
- Access to and from the runway is compliant with FAA design standards
- Does not impact existing facilities nor the future north apron expansion

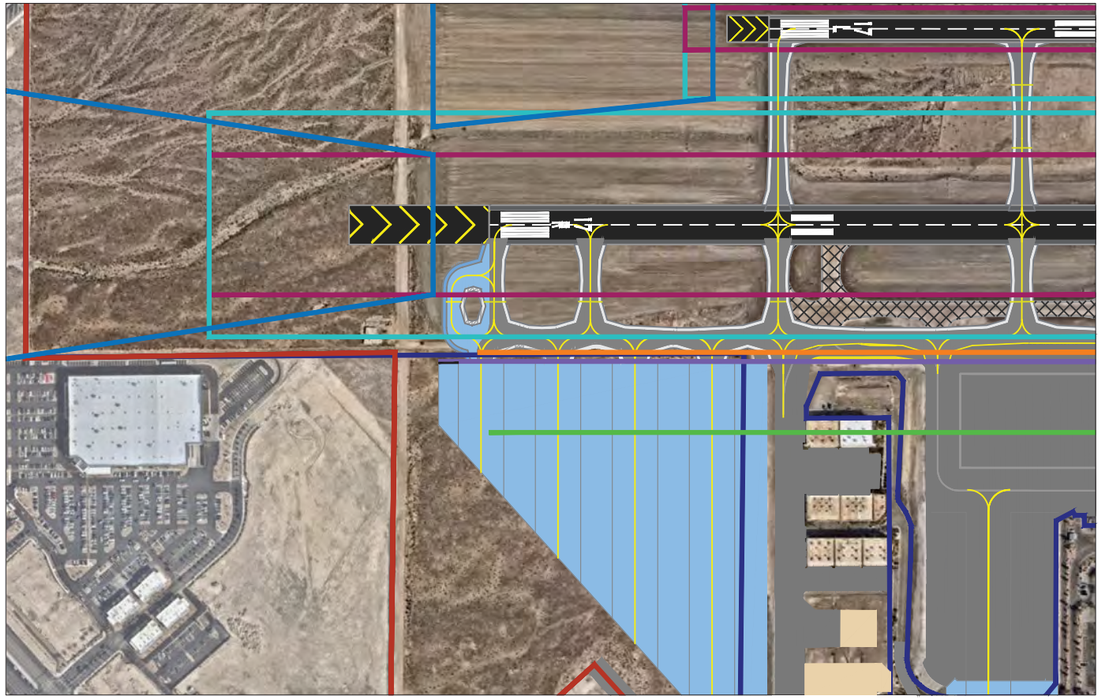
CONS:

- Aircraft is aligned perpendicular to the runway and not pointed into the wind
- Hold line is present on the run up apron requiring extra vigilance by ATC and pilots to avoid runway incursions

TAC/PAC FEEDBACK

Concerns were expressed regarding having aircraft conducting run up operations in such close proximity to the runway. There also was a concern about the increased potential of runway incursions.

Figure 4.8 – *North Run Up Apron Alternative 2*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

SOUTH RUN UP APRON ALTERNATIVE 1

DESCRIPTION

In **Figure 4.9**, this configuration accommodates one run up position by reallocating and repainting a northerly portion of the southern GA tie-down apron. This locates the run up apron adjacent to Maverick's helicopter operations. The run-up position meets ADG-III centerline separation requirements from Taxiway A with a separation of 152 feet. The concept proposes two blast fences to protect parked aircraft and helicopters in the surrounding apron areas. The concept also proposes a designated point of ingress and egress at the southern end of the GA apron without providing direct access to the Runway 35L end.

PROS:

- Provides efficient access to the runway end with limited taxi time and movement
- Access to and from the runway is compliant with FAA design standards
- Removing parked-based aircraft tie-downs adjacent to Maverick may provide an operational benefit to Maverick

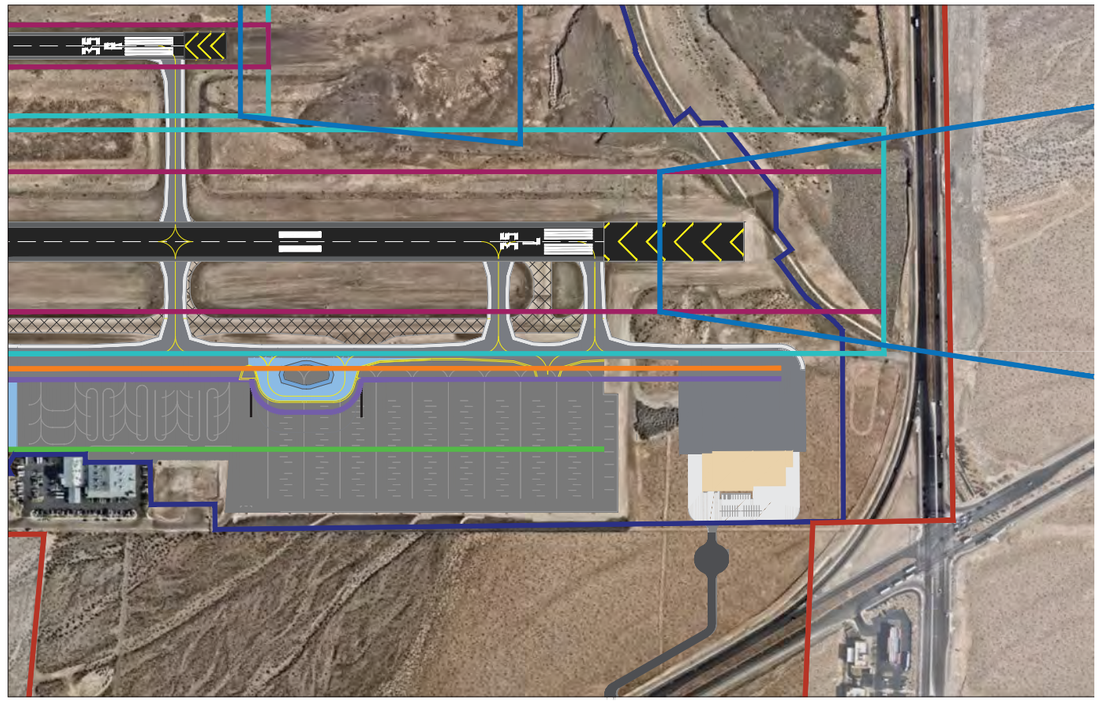
CONS:

- Impacts existing GA apron facilities and tie-down positions
- Reconfiguration of the existing facilities would be required
- Requires blast fences to protect parked aircraft on the GA ramp and Maverick property
- Requires additional communication with ATC for access to and from the run up apron

TAC/PAC FEEDBACK

No specific feedback was provided on this alternative.

Figure 4.9 – *South Run Up Apron Alternative 1*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

SOUTH RUN UP ALTERNATIVE 2

DESCRIPTION

Alternative 2 in **Figure 4.10** proposes reallocation and repainting a portion of the southern GA tie-down apron near the Runway 35L threshold for the run-up space. The run up apron was located such that no direct access to the runway from the apron would be introduced. Therefore, this configuration is compliant with current FAA design standards. The run-up position meets ADG-III centerline separation requirements from Taxiway A with a separation of 152 feet. The concept proposes two blast fences to protect parked aircraft in the surrounding apron areas. The concept also proposes a designated point of ingress and egress at the northern end of the GA apron without providing direct access to Runway 17R/35L.

PROS:

- Provides efficient access to the runway end with limited taxi time and movement
- Access to and from the runway is compliant with FAA design standards

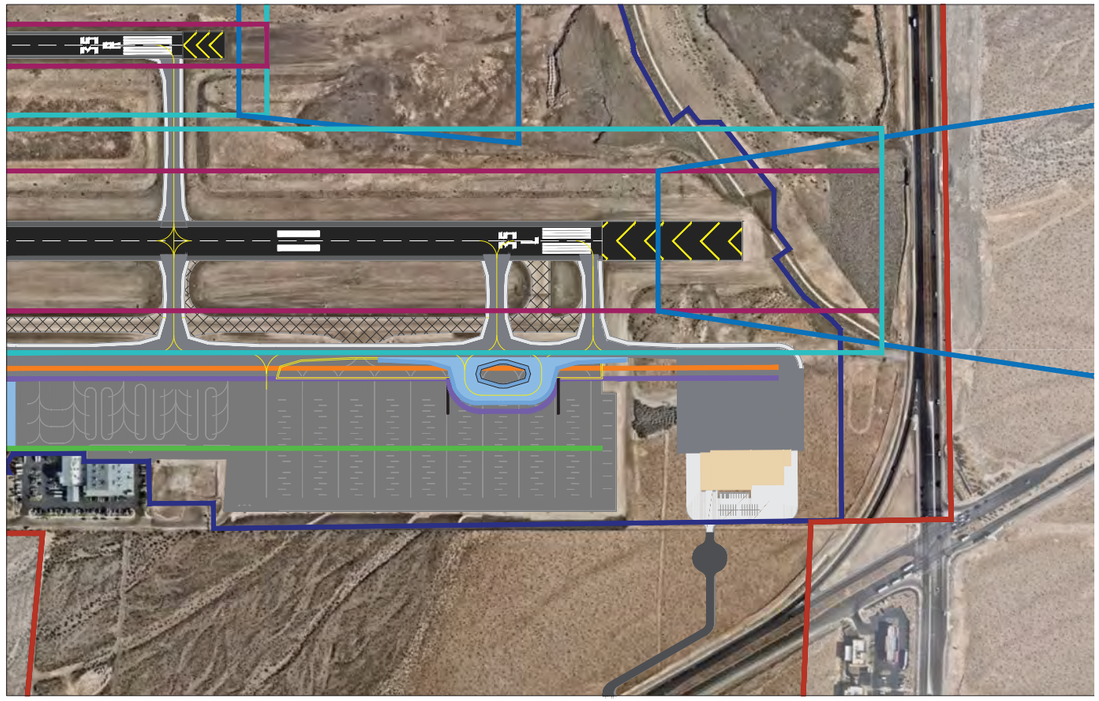
CONS:

- Impacts existing GA apron facilities and tie-down positions
- Reconfiguration of the existing facilities would be required and would present parking challenges on the south end of GA ramp
- Requires blast fences to protect parked aircraft on the GA ramp and aircraft using the future taxilane connecting to the southwest aviation development

TAC/PAC FEEDBACK

Feedback regarding south run up areas primarily focused on minimizing impacts to aircraft parking areas and maximizing operational flow of taxiing aircraft.

Figure 4.10 – *South Run Up Alternative 2*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

SOUTH RUN UP ALTERNATIVE 3

DESCRIPTION

Figure 4.11 illustrates Alternative 3, which proposes a run up apron parallel with the entrance taxiway of Runway 35L. This configuration is similar to North Run Up Apron Alternative 2 and allows ADG-III aircraft to operate freely on the entrance taxiway without conflicting with the run up position. Since the aircraft are not oriented into the wind, this configuration is less than ideal. A runway hold line would be located on the run up pavement, meaning that aircraft exiting the run up apron will be directly entering the runway environment. If the aircraft remains west of the hold line, it would not be in conflict with runway operations.

PROS:

- Provides efficient access to the runway end with limited taxi time and movement
- Access to and from the runway is compliant with FAA design standards
- Does not impact existing facilities or the ongoing Rocky Mountain Aviation hangar development

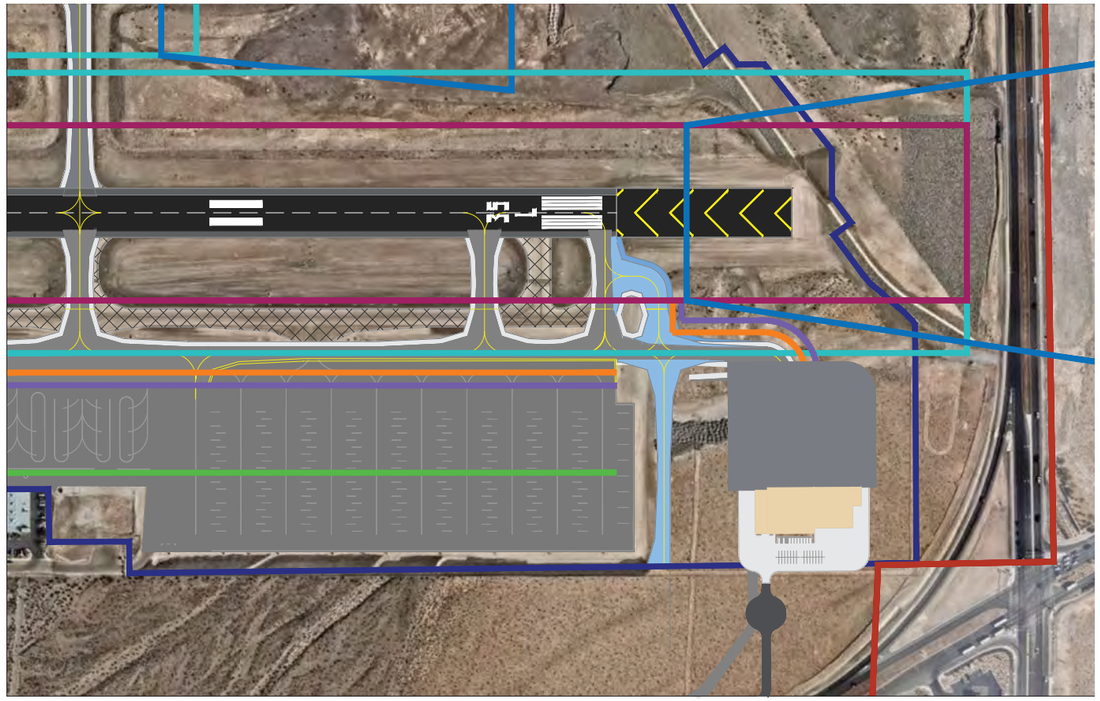
CONS:

- Aircraft is aligned perpendicular to the runway and not pointed into the wind
- Hold line is present on the run up apron requiring extra vigilance by ATC and pilots to avoid runway incursions
- To remain clear of ADG-III operations associated with Rocky Mountain Aviation, aircraft using the run up will be limited to aircraft that are less than 30 feet long

TAC/PAC FEEDBACK

In addition to the concerns expressed in North Run Up Alternative 2, there is limited pavement available in this configuration to perform actual run up operations.

Figure 4.11 – *South Run Up Alternative 3*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

EVALUATION OF RUN UP APRON ALTERNATIVES

Evaluating the run up apron alternatives against the evaluation criteria demonstrates that North Run Up Apron Alternative 1 ranks very high. South Run Up Apron Alternatives 1 and 2 are very similar in that they create challenges on the existing apron area and because the development is occurring where existing aircraft parking is, they are more challenging from a construction phasing perspective. Both North Run Up Alternative 2 and South Run Up Alternative 3 rate poorly. The results of the evaluation are shown in **Table 4.8**.

Table 4.8 – *Run Up Aprons Alternatives Scoring*

	Satisfies Facility Requirements	Operational and Airspace Impacts	Environmental Considerations	Cost Considerations	Construction/ Phasing Issues	Off-Airport Impacts
North Run Up Apron Alternative 1	⊕	⊕	⊕	⊖	⊕	⊕
North Run Up Apron Alternative 2	⊕	⊖	⊕	⊖	⊖	⊕
South Run Up Apron Alternative 1	⊕	○	⊕	⊕	○	⊕
South Run Up Apron Alternative 2	⊕	○	⊕	⊕	⊖	⊕
South Run Up Apron Alternative 3	⊕	⊖	⊕	○	⊖	⊕

Source:
Kimley-Horn, 2021.

SUMMARY OF PUBLIC MEETING FEEDBACK

PUBLIC MEETING (MARCH 2)

Feedback from this meeting primarily focused on impacts to the Airport and nearby development. Many provided questions and comments regarding the long-term viability of smaller GA users despite development driven by the FAA-approved forecasts. Others requested additional clarity about impacts to aircraft parking apron and hangars for leaseholders adjacent to Taxiway F. Changes in noise levels from these alternatives also were important to many participants, who wanted to keep noise as minimal as possible. Similar comments about noise were made about the potential negative effect of future flight paths in proximity to specific neighborhoods.

4.6.4. Aircraft Parking Area Alternatives

With the runway and taxiway system established, remaining airport areas can be investigated to accommodate forecasted aircraft parking demand. Aircraft parking, as used in this Master Plan Update, refers to both transient and based aircraft parking. When developing these alternatives several items were taken into consideration, as described below.

- CCDOA has designed an approximately 750,000-square-foot west apron expansion, extending the existing apron to Raiders Way. This requires the reconfiguration of Jet Stream Drive and a new road constructed to connect the Quail Air Center development with Sunridge Heights.
- CCDOA is presently in design to construct a new 897,000-square-foot (approximately) apron, capable of accommodating ADG-III aircraft, north of Quail Air Center. CCDOA has indicated that this apron may potentially be modified to meet requirements of this Master Plan Update.

- The above apron expansions will be constructed in the short term and will be counted towards accommodating apron space requirements noted in **Chapter 3**.
- During this phase of the Master Plan Update, Rocky Mountain Aviation executed a lease agreement with CCDOA. This new lease is for a private development and, therefore, will not be counted towards accommodating apron and hangar space requirements.
- No additional development is shown within Qual Air Center's leasehold. Approximately five additional hangars could be accommodated in this area. As this is a private development, additional aircraft parking facilities within the Quail Air Center leasehold will not count towards meeting facility requirements.
- The preferred location to develop is west of the south GA apron, referred to herein as the southwest area or southwest parcel. Development of land on the east side of the Airport for aircraft parking facilities is not contemplated in this Master Plan Update; however, the land should be preserved for future aircraft parking expansion.
  - Due to terrain and drainage of the southwest area, development does not connect with the south GA ramp. The existing Airport Operation Area fence west of the south GA ramp serves as the eastern boundary of any new aircraft parking development.
- It is preferred to plan primarily for large hangars capable of accommodating the critical design aircraft or multiple smaller aircraft.
  - Aircraft parking alternatives will meet ADG-III design standards for taxiway safety area, TOFA, and centerline separation requirements per FAA Advisory Circular 150/5300-13A.
- All alternatives illustrated below include:
  - Expansion of the apron area (approximately 71,000 square feet) just east of the ATCT
  - Expansion of small hangar facilities just south of Double Down Aviation, which will primarily support impacted based aircraft tenants in the F Row Hangars and an associated vehicle parking lot (approximately 100 spaces)
  - Reduction of T-shade hangars to accommodate apron circulation and taxilanes for aircraft movement on the apron
- New aircraft parking in the southwest area will be accessed through a new ADG-III taxilane constructed south of the GA apron and north of the Rocky Mountain Aviation leasehold.
- The new Rocky Mountain Aviation lease includes a secondary access to Raiders Way. Vehicle access to the proposed southwest development will be through a reconfiguration of this secondary access and assume a future signalized intersection at Raiders Way. This reconfiguration meets City of Henderson intersection design standards.

Four alternatives were developed, as described in **Table 4.9**, which seek to accommodate the following facility requirements:

Table 4.9 – *Aircraft Parking Area Alternatives*

Facility	Quantity
Apron (square feet)	1,906,525
Hangar (square feet)	385,600
Vehicle Parking (spaces)	428

Source:
Kimley-Horn, 2021.

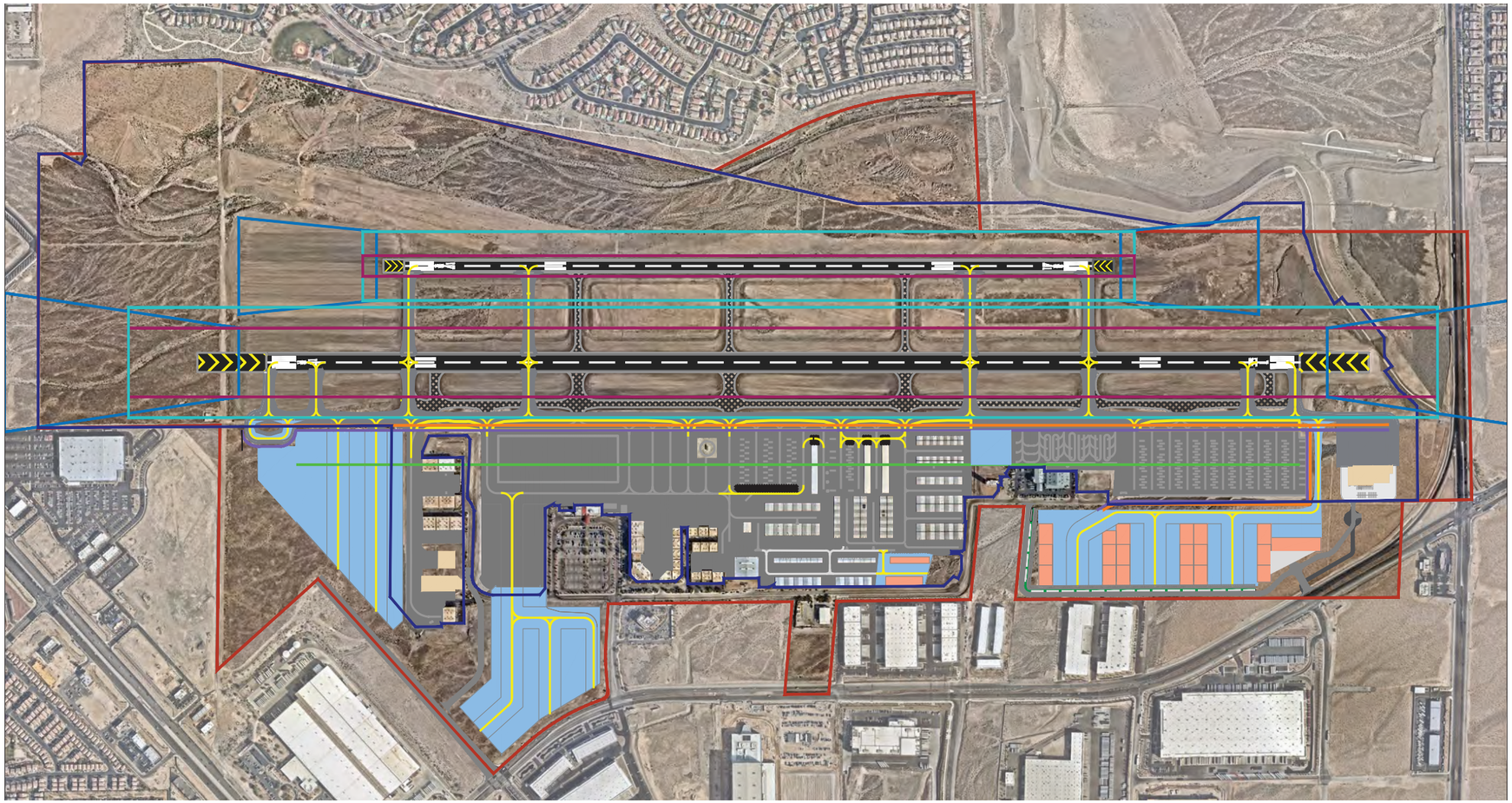
AIRCRAFT PARKING ALTERNATIVE - MATHEMATICAL OPTIMIZATION

DESCRIPTION

In **Figure 4.12**, this alternative seeks to maximize the amount of hangar storage within the southwestern parcel. Hangars are oriented east/west, perpendicular to the runway. The alternative allows for aircraft parking between taxilanes and each hangar facility for aircraft parking or loading and would not block taxilanes. Hangar sizes range from large commercial sized to extra-large commercial or community-sized hangar facilities for a total of 329,910 square feet of potential additional hangar space.

Vehicle access to the new southwestern development will be through the reconfigured secondary access point on Raiders Way. An Airport roadway is proposed along the perimeter of the southwestern development and will connect to Jet Stream Drive, near Maverick Aviation, providing secondary Airport access off of Raiders Way. Parking for the new southwestern development is perpendicular to the proposed access road and within a small lot adjacent to the secondary Airport access road. In total approximately 390 new vehicle parking spaces are provided in this alternative.

Figure 4.12 – *Aircraft Parking Alternative – Mathematical Optimization*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

In summary, inclusive of common elements in all alternatives, **Table 4.10** shows this alternative provides:

Table 4.10 – *Aircraft Parking Alternative – Mathematical Optimization Summary*

Facility	Facility Requirement	Provided in this Alternative	Meets or Exceeds Requirements?
Apron (square feet)	1,906,525	2,313,800	✓
Hangar (square feet)	385,600	329,910	✗
Vehicle Parking (spaces)	428	390	✗

Source:
Kimley-Horn, 2021.

PROS:

- Exceeds apron facility requirements
- Provides apron and hangar development for both itinerant and based aircraft
- Provides a layout that maximizes hangar and apron facilities within the footprint available
- Airfield development offers a mixture of hangar sizes from GA box hangars to commercial hangars ranging from 10,000 square feet to 36,000 square feet
- Provides a secondary connection to Raiders Way from Jet Stream Drive

CONS:

- Drainage and grading issues may arise due to existing conditions and terrain
- Does not meet hangar facility requirements
- Does not meet overall vehicle parking requirements associated with based aircraft facilities
- Limited throughput may present challenges and require additional communication with ATC due to single taxilane into southern development area
- Long taxi distance to fuel facilities
- Long distance from FBO and terminal facilities
- Large pavement and linear feet of striping requires additional maintenance
- This alternative does not provide for a consistent 20-foot setback from the vehicle parking and sidewalk to the edge of the apron and hangar development

TAC/PAC FEEDBACK

Participants inquired how the analysis was performed to determine apron demand and the primary item of importance was aircraft maneuvering and taxiing.

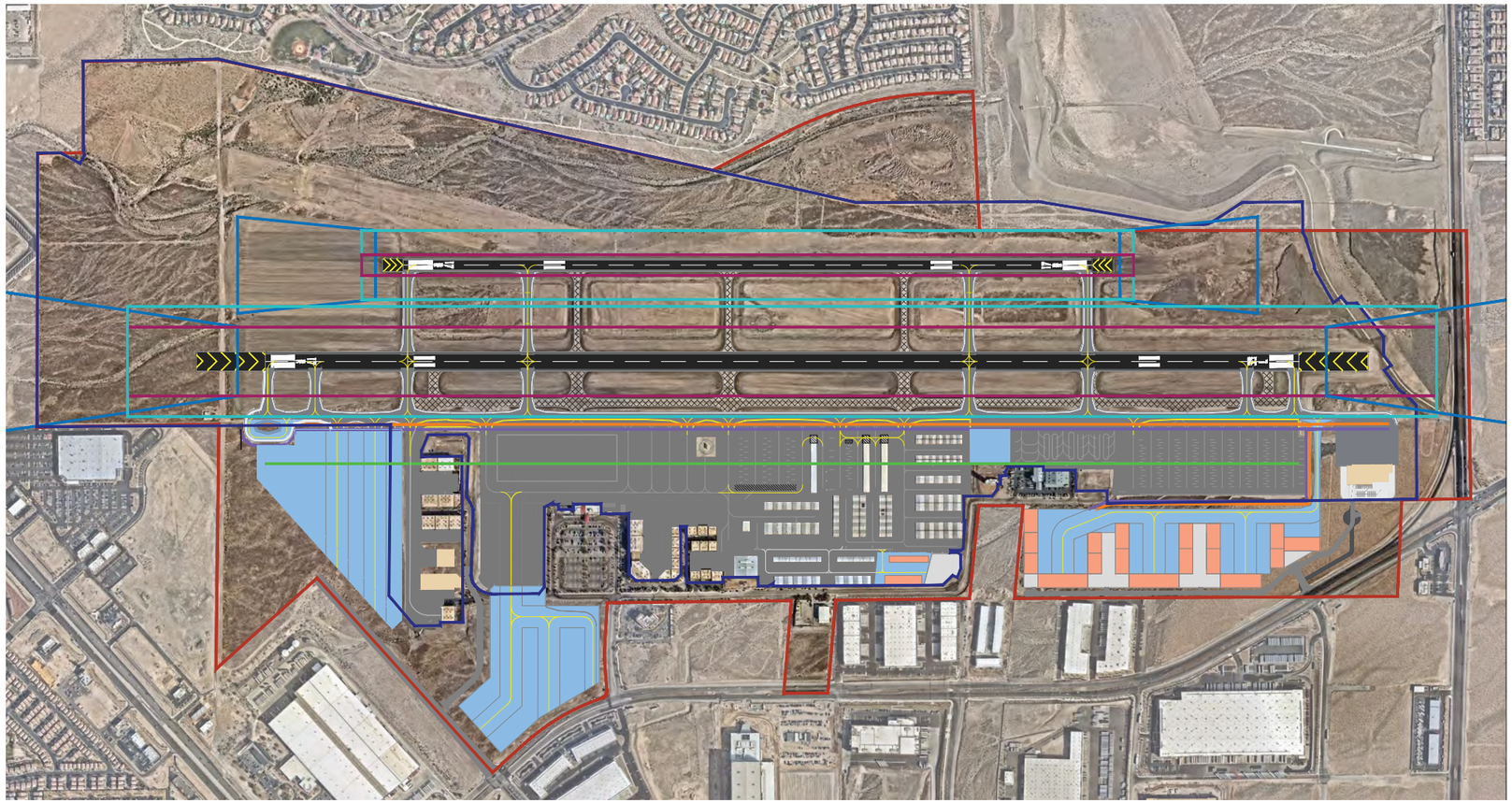
AIRCRAFT PARKING ALTERNATIVE - COMMERCIAL HANGAR DEVELOPMENT

DESCRIPTION

This alternative in **Figure 4.13** depicts 20 medium-to-large commercial-sized hangars totaling 347,100 square feet of potential hangar space. The configuration of these hangars was modeled after the Ribeiro development, just south of the terminal building. ADG-III taxilanes are depicted throughout the ramp area providing access to each grouping of hangars. Adjacent to each hangar is apron space available for aircraft parking or loading without impacting the taxilanes.

Like the previous alternative, vehicle access to the new southwestern development will be through the reconfigured secondary access point on Raiders Way. A dead-end Airport roadway is proposed along the western boundary of the southwestern development. This provides a dedicated vehicle access roadway for the new southwestern development and maximizes the amount of land available for aircraft parking facilities. Parking for the new southwestern development is provided in-between the hangar facilities and in two dedicated parking lots. In total approximately 424 new vehicle parking spaces are provided in this alternative.

Figure 4.13 – *Aircraft Parking Alternative – Commercial Hangar Development*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Taxiway Safety Area (TSA)
- Taxiway Object Free Area (TOFA)
- Building Restriction Line (BRL) (for a 35-foot tall building)
- Blast Fence
- Existing Apron
- Future Pavement
- Future Hangar
- Pavement Removal
- Impacted Pavement/Hangar
- Future Automobile Parking
- Existing Automobile Parking
- Existing Rocky Mountain Aviation Hangar
- Existing Automobile Driveway for Rocky Mountain Aviation

0 350 700 1400 Feet

N

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

In summary, inclusive of common elements in all alternatives, **Table 4.11** shows this alternative provides:

Table 4.11 – *Aircraft Parking Alternative – Commercial Hangar Development Summary*

Facility	Facility Requirement	Provided in this Alternative	Meets or Exceeds Requirements?
Apron (square feet)	1,906,525	2,221,600	✓
Hangar (square feet)	385,600	378,740	✗
Vehicle Parking (spaces)	428	424	✗

Source:
Kimley-Horn, 2021.

PROS:

- Exceeds apron facility requirements
- Provides apron and hangar development for both itinerant and based aircraft
- Provides a layout that prioritizes hangar and apron facilities in the footprint available
- Airfield development offers a mixture of hangar sizes from GA box hangars to commercial hangars ranging from 10,000 square feet to 26,000 square feet
- Provides the most hangar space of the aircraft parking alternatives

CONS:

- Drainage and grading issues may arise due to existing conditions and terrain
- Limited throughput may present challenges and require additional communication with ATC due to single taxilane into the southern development area
- Does not meet 20-year requirements for hangar development identified in the facility requirements
- Does not meet overall vehicle parking requirements associated with aircraft parking
- Long taxi distance to fuel facilities
- Long distance from FBO and terminal facilities
- Large pavement and linear feet of striping requires additional maintenance
- Does not provide a secondary connection to Raiders Way from Jet Stream Drive

TAC/PAC FEEDBACK

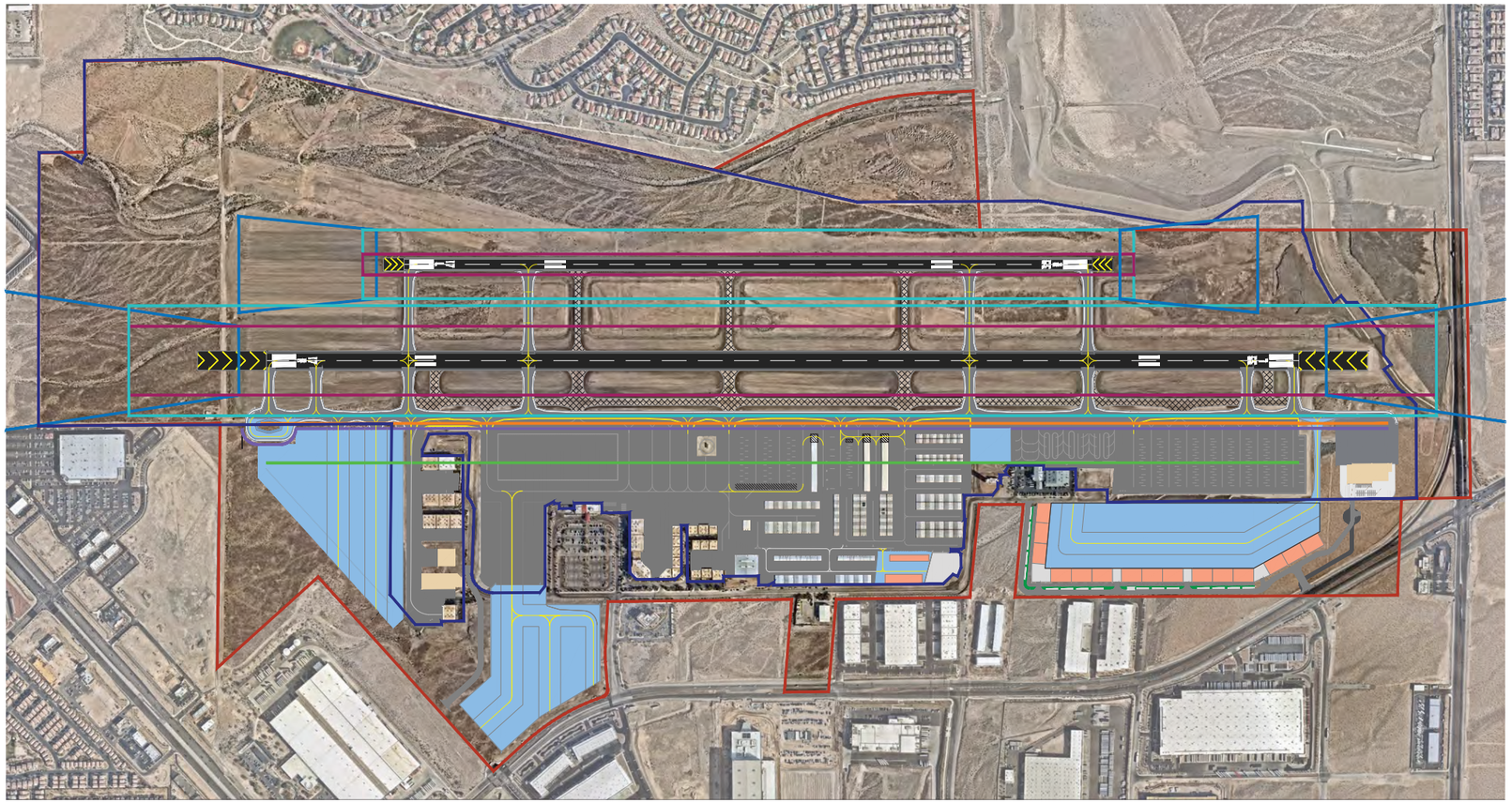
The TAC and PAC did not have any significant input on this alternative.

AIRCRAFT PARKING ALTERNATIVE - APRON MAXIMIZATION

DESCRIPTION

In **Figure 4.14**, this alternative maximizes the space available for future apron development with a large open space for aircraft parking and loading. Because the large apron area would be public and used by multiple tenants, it would be eligible for FAA Airport Improvement Program (AIP) grant funding. While eligible for FAA AIP grant funding, apron development is a lower priority than safety-related development on the Airport and maintenance of the runway and taxiway system. The apron and hangar development are served by an ADG-III taxilane providing access to the facilities in the area. The concept depicts 15 commercial size hangars in the southwestern development area and 8 commercial size hangars along the northwestern edge of the north apron. Hangars depicted are approximately 15,000 square feet each, totaling 345,000 square feet of hangar space.

Figure 4.14 – *Aircraft Parking Alternative – Apron Maximization*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Taxiway Safety Area (TSA)
- Taxiway Object Free Area (TOFA)
- Building Restriction Line (BRL) (for a 35-foot tall building)
- Blast Fence
- Existing Apron
- Future Pavement
- Future Hangar
- Pavement Removal
- Impacted Pavement/Hangar
- Future Automobile Parking
- Existing Automobile Parking
- Existing Rocky Mountain Aviation Hangar
- Existing Automobile Driveway for Rocky Mountain Aviation

0 350 700 1400 Feet

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

This alternative provides a perimeter road connecting Jet Stream Drive to the reconfigured intersection of Raiders Way (same as discussed in the Mathematical Optimization alternative). Perpendicular parking along the hangars and supplemental vehicle parking is located in-between the groupings of hangars. A building setback of 20 feet is provided around the perimeter of the development. In total approximately 524 new vehicle parking spaces are provided in this alternative.

In summary, inclusive of common elements in all alternatives, **Table 4.12** shows this alternative provides:

Table 4.12 – *Aircraft Parking Alternative – Apron Maximization Summary*

Facility	Facility Requirement	Provided in this Alternative	Meets or Exceeds Requirements?
Apron (square feet)	1,906,525	2,579,800	✓
Hangar (square feet)	385,600	375,716	✗
Vehicle Parking (spaces)	428	524	✓

Source:
Kimley-Horn, 2021.

PROS:

- Provides apron and hangar development for both itinerant and based aircraft
- Provides a layout that prioritizes apron space, maximizing the potential for FAA AIP grant funding assistance, in the footprint available while accommodating future automobile parking and roadway access
- Airfield development offers a mixture of hangar sizes from GA box hangars to large commercial up to 15,000 square feet
- Provides the most apron space of the aircraft parking alternatives
- Provides a secondary connection to Raiders Way from Jet Stream Drive
- Provides the second most square feet of hangar space of all the alternatives
- Exceeds vehicle parking requirements

CONS:

- Drainage and grading issues may arise due to existing conditions and terrain
- Large pavement requires the highest maintenance of all alternatives
- Limited throughput may present challenges and require additional communication with ATC due to single taxilane into southern development area
- Long taxi distance to fuel facilities
- Long distance from FBO and terminal facilities

TAC/PAC FEEDBACK

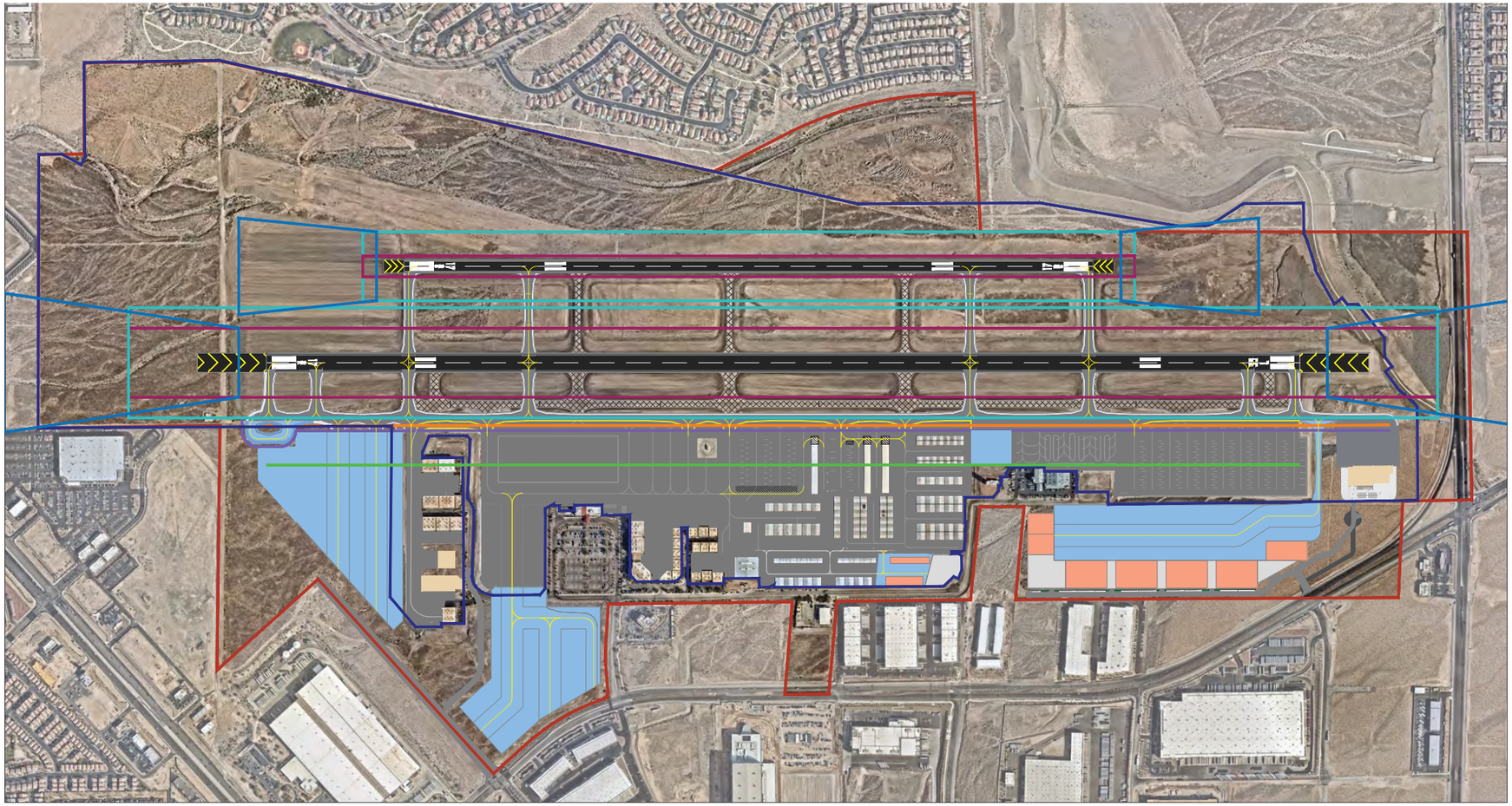
Feedback indicated that there was concern from some participants that smaller GA aircraft would not be accounted for in the Master Plan Update and that these types of aircraft would not have space in which to grow.

AIRCRAFT PARKING ALTERNATIVE - COMMUNITY HANGAR DEVELOPMENT

DESCRIPTION

In **Figure 4.15**, this alternative would provide the airport with extra-large hangars available for large single tenants or multiple tenants in a community fashion. The community hangar development concept would provide a potential seven hangars for a total of 339,553 square feet of hangar space. An ADG-III taxilane is depicted to provide access to aprons and hangars throughout the facilities. The concept also boasts a large open apron space for aircraft parking and loading.

Figure 4.15 – *Aircraft Parking Alternative – Community Hangar Development*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

Like the Commercial Hangar Development alternative, vehicle access is provided from the reconfigured intersection at Raiders Way and does not connect to Jet Stream Drive. The alternative features parallel parking in front of the hangars and parking in-between the hangars. Two larger parking lots are provided—one at the terminus of the new vehicle access road and one near the reconfigured intersection. In total approximately 514 new vehicle parking spaces are provided in this alternative.

In summary, inclusive of common elements in all alternatives, **Table 4.13** shows this alternative provides:

Table 4.13 – *Aircraft Parking Alternative – Community Hangar Development Summary*

Facility	Facility Requirement	Provided in this Alternative	Meets or Exceeds Requirements?
Apron (square feet)	1,906,525	2,341,300	✓
Hangar (square feet)	385,600	371,179	✗
Vehicle Parking (spaces)	428	514	✓

Source:
Kimley-Horn, 2021.

PROS:

- Provides apron and hangar development for both itinerant and based aircraft
- Provides a layout that prioritizes hangar and apron facilities in the footprint available
- Exceeds vehicle parking requirements
- Airfield development offers a mixture of hangar sizes from GA box hangars to extra-large commercial/community hangars up to 60,000 square feet
- Large hangars would accommodate a wide range of aircraft type
- Meets all apron requirements identified in the facility requirements

CONS:

- Drainage and grading issues may arise due to existing conditions and terrain
- Large pavement and linear feet of striping requires additional maintenance
- Limited throughput may present challenges and require additional communication with ATC due to a single taxilane into southern development area
- Large community hangars could deter future tenants who desire a private hangar and/or small aircraft owners
- Increase costs associated with large hangar construction
- Long taxi distance to fuel facilities
- Long distance from FBO and terminal facilities
- Does not provide a secondary connection to Raiders Way from Jet Stream Drive

TAC/PAC FEEDBACK

Feedback showed that high demand for hangar development typically diminishes once people are made aware of cost associated with design, construction, and satisfying local fire protection standards for development. Some members agreed that large and small GA aircraft should be separated to the extent practicable.

EVALUATION OF AIRCRAFT PARKING ALTERNATIVES

Using the southwestern parcel to meet aircraft parking demand, coupled with apron space development already in design results in no alternative meeting the requirements for hangar demand, though the Commercial Hangar Development comes closest. Except for the Mathematical Optimization Alternative all the aircraft parking alternatives meet between 96 and 98 percent hangar demand

requirements and, therefore, were given a '+' rating. The Mathematical Optimization Alternative provides approximately 86 percent of required hangar facilities and receives an 'O.'

The Apron Maximization Alternative splits hangar development on the future north apron and the southwestern parcel. Therefore, new hangar development in this alternative is accessed from the new east/west taxilane to the southwest parcel and a taxilane directly connecting the new parallel taxiway to the north apron. This has some operational flexibility in comparison with all the other alternatives, which have the new hangar development on the southwestern parcel and accessed via one taxilane that could present some operational challenges. Secondary taxilane access to the southwestern parcel is challenged by existing development and site terrain. Development of all alternatives will not impact airspace. Because of the hangar development on the north apron, the Apron Maximization Alternative is ranked as '+.' The Mathematical Optimization Alternative was scored as a 'O' because of the limited aircraft access. Alternatives that do not provide roadway connectivity to Jet Stream Drive are scored as '-.'

The four aircraft parking alternatives all represent greenfield development and are in an area that does not have any environmental sensitivities. Aircraft parking development is proposed on the west side of the Airport, away from sensitive noise receptors. None of the development extends beyond existing Airport boundaries.

It is assumed that apron development will be paid for by CCDOA, FAA AIP grant funding, private parties, or a combination thereof. All hangar development is assumed to be paid for by private parties. When evaluating cost considerations, only the portion of the alternative that CCDOA would be required to pay for is considered. In other words, the alternative with the least amount of apron represents the least amount of cost to CCDOA and will receive the best ranking.

The highest score was given to the alternative that required the least amount of construction (e.g., the least amount of apron space and taxilane) per phase of development (see **Table 4.14**).

Scoring of the alternatives illustrates that the alternatives are all very close to each other. The Apron Maximization Alternative slightly rises above the other alternatives because it comes within 10,000 square feet of hangar space needs, provides the most apron space, provides the most vehicle parking, includes a secondary access point of Jet Stream Drive to Raiders Way, and includes hangar development on the future north apron. The balancing of hangar facilities in two different locations provides operational efficiencies and can enable easier construction of hangars as demand dictates.

Table 4.14 – *Aircraft Parking Alternatives Scoring*

	Satisfies Facility Requirements	Operational and Airspace Impacts	Environmental Considerations	Cost Considerations	Construction/ Phasing Issues	Off-Airport Impacts
Mathematical Optimization Alternative	O	O	⊕	⊕	O	⊕
Commercial Hangar Development Alternative	⊕	⊖	⊕	O	⊖	⊕
Apron Maximization Alternative	⊕	⊕	⊕	⊖	⊕	⊕
Community Hangar Development Alternative	⊕	O	⊕	O	O	⊕

Source:
Kimley-Horn, 2021.

SUMMARY OF PUBLIC MEETING FEEDBACK

PUBLIC MEETING (MARCH 2)

There was no specific feedback provided in terms of preference of alternative. As was noted previously, there is a general concern about accommodating smaller aircraft in the long term and accommodation of displaced tenants from the row F hangars.

4.7. Landside Alternatives

Subsequent to the airside alternatives, landside alternatives were developed. Alternatives were developed for the following landside facilities: Terminal building, terminal vehicle parking, Airport support areas, and the City fire station.

4.7.1. Terminal Building

The existing terminal is a two-story building and encompasses 24,000 square feet. The facility requirements identified a potential need for an additional 15,375 square feet in 2039, for a total terminal building size of 39,375 square feet, to accommodate forecasted demand. Due to existing site constraints and previous investments made in the terminal facility, only two viable alternatives are available: expanding the terminal 107 feet to the north or south (see **Figure 4.16** and **Figure 4.17**, respectively). The terminal expansion is assumed to be two stories, reducing the overall building footprint required.

NORTH EXTENSION PROS:

» No structures in the way of the extension

NORTH EXTENSION CONS:

» Blocks restaurant views from the patio and inside the restaurant
» Removes existing limo parking area for picking up and dropping off VIPs
» Potentially impacts the primary vehicle gate for the Airport

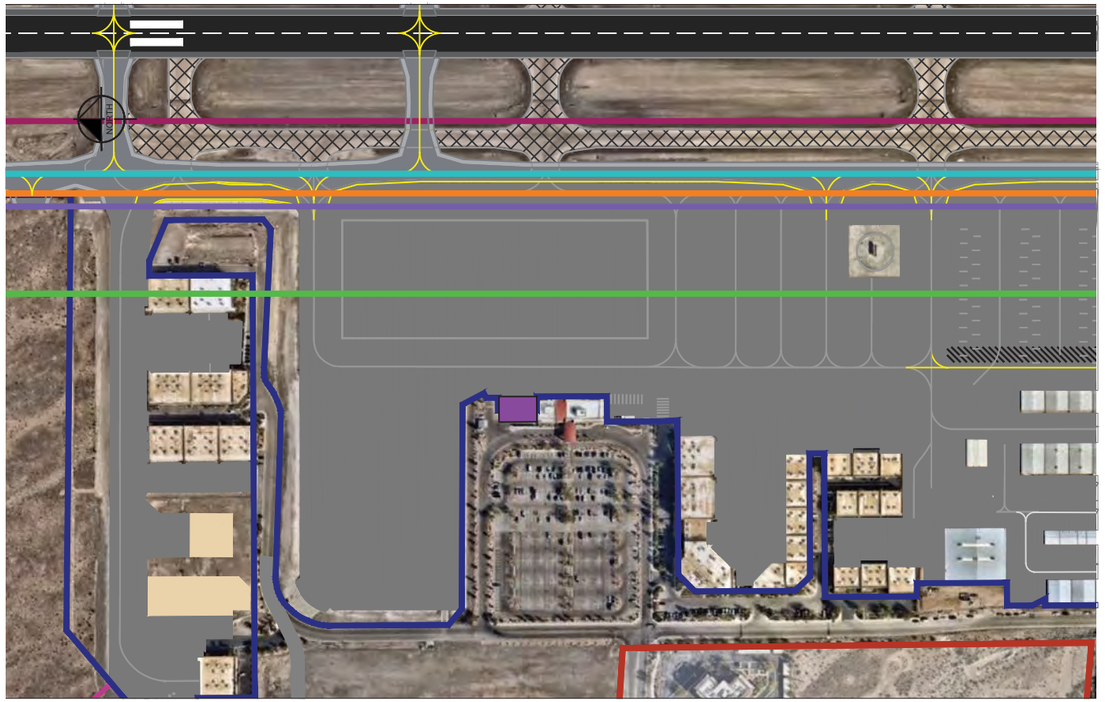
SOUTH EXTENSION PROS:

» Does not box in the restaurant
» Retains area for VIP limo pickup and drop-off

SOUTH EXTENSION CONS:

» Requires relocation of terminal support facilities, Airport vehicle parking, and the electrical vault
» Requires modification of an infrequently used vehicle gate

Figure 4.16 – *North Terminal Expansion Alternative*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

EVALUATION OF TERMINAL BUILDING ALTERNATIVES

Due to existing facilities inside the terminal building and impacts to the limo parking, and loading and unloading area, the preferred alternative is to extend the terminal to the south. A summary of the ratings of these two alternatives is presented in **Table 4.15**.

Table 4.15 – *Terminal Building Alternatives Scoring*

	Satisfies Facility Requirements	Operational and Airspace Impacts	Environmental Considerations	Cost Considerations	Construction/ Phasing Issues	Off-Airport Impacts
North Extension	⊕	⊖	⊕	○	⊕	⊕
South Extension	⊕	⊕	⊕	○	⊖	⊕

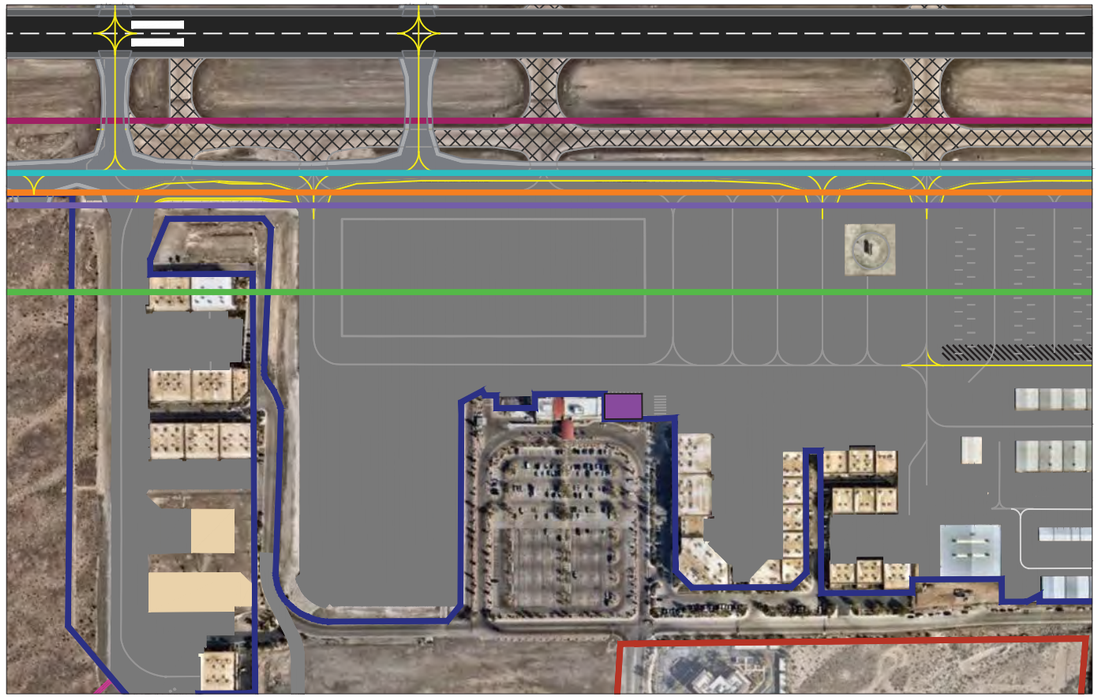
Source:
Kimley-Horn, 2021.

SUMMARY OF PUBLIC MEETING FEEDBACK

PUBLIC MEETING (MARCH 2)

The public did not have any significant questions or comments regarding the proposed alternatives for terminal expansion.

Figure 4.17 – *South Terminal Expansion Alternative*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

4.7.2. Terminal Vehicle Parking

As has been previously discussed in this Master Plan Update report, terminal vehicle parking is inadequate during special events within the Las Vegas metropolitan area. The facility requirements identified a future need of an additional 162 vehicle parking spaces. Due to the west terminal apron expansion that is currently in design and other existing facilities adjacent to the terminal, opportunities for additional vehicle parking adjacent to the terminal building are limited.

PARKING STRUCTURE ALTERNATIVE

DESCRIPTION

In **Figure 4.18**, this alternative proposes a one-story parking structure (ground level and one-structured level of vehicle parking). The parking structure is 300 feet by 360 feet, for a total of 216,000 square feet of parking area. The parking structure would provide a total of 540 parking spaces and approximately 140 spaces of surface parking west of the parking structure for a total of approximately 680 spaces. Therefore, this alternative provides an additional 163 parking spaces (approximately). Consideration may be given to designing the structure so that a second level could be added later. Additionally, the top floor of the structure could be covered and solar panels placed on top to increase efforts towards sustainability.

PROS:

- Provides additional parking close to the terminal
- Opportunity for covered parking
- Expandable to accommodate future demands
- Preserves other Airport areas for revenue producing opportunities
- Provides opportunity for covered parking and solar panels

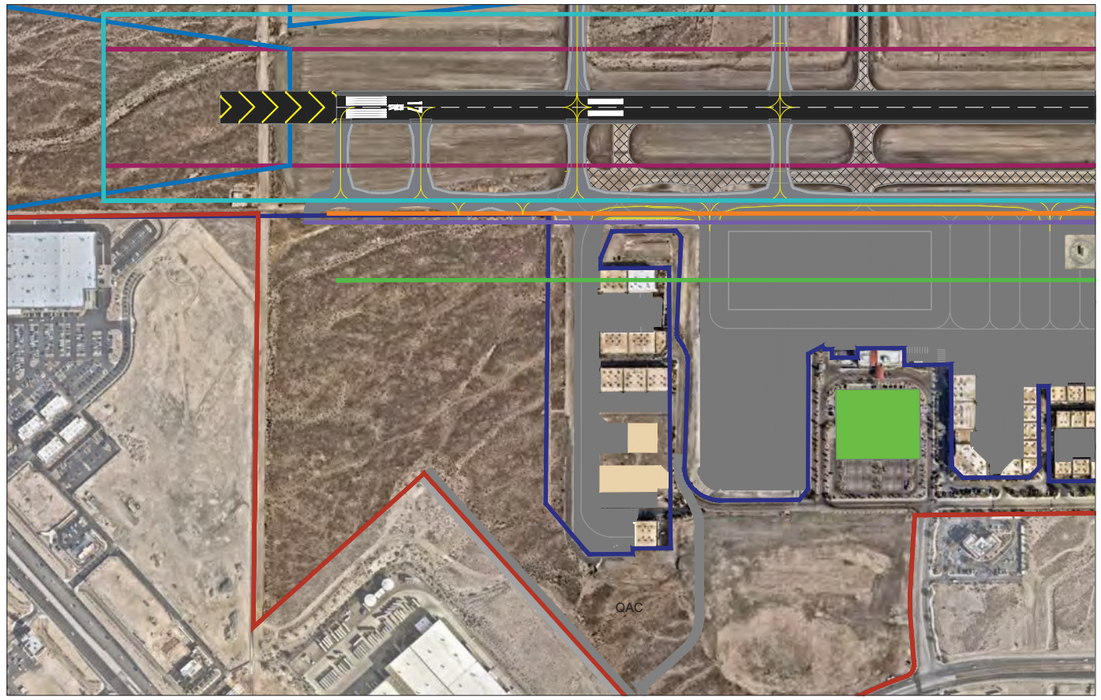
CONS:

- Cost to construct a parking structure
- Structured parking has additional maintenance requirements
- During construction of the parking structure terminal parking facilities will be impacted

TAC/PAC FEEDBACK

There was no significant feedback from the PAC and TAC regarding vehicle parking alternatives.

Figure 4.18 – *Parking Structure Alternative*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

REMOTE SURFACE PARKING ALTERNATIVE

DESCRIPTION

Recognizing that parking demand exceeds capacity only during special events, consideration was given to using a remote surface parking lot as shown in **Figure 4.19**. Costs to construct a surface lot are less expensive than a parking structure; however, a shuttle would be provided by CCDOA during special events. CCDOA would leverage its shuttle buses used at McCarran International Airport during these events. The surface lot is proposed in a triangular portion of the Airport property just east of Levi Strauss & Co and accessed by the recently extended portion of Sunridge Heights in this area. The surface parking area encompasses approximately 1.9 acres and can accommodate approximately 200 parking spaces.

PROS:

- Surface parking is less expensive to construct
- CCDOA can leverage McCarran International Airport shuttle buses during special events when the surface parking lot is in use

CONS:

- Additional parking is remote to the terminal and FBO, making it inconvenient for users

TAC/PAC FEEDBACK

There was no significant feedback from the PAC and TAC regarding vehicle parking alternatives.

EVALUATION OF TERMINAL VEHICLE PARKING ALTERNATIVES

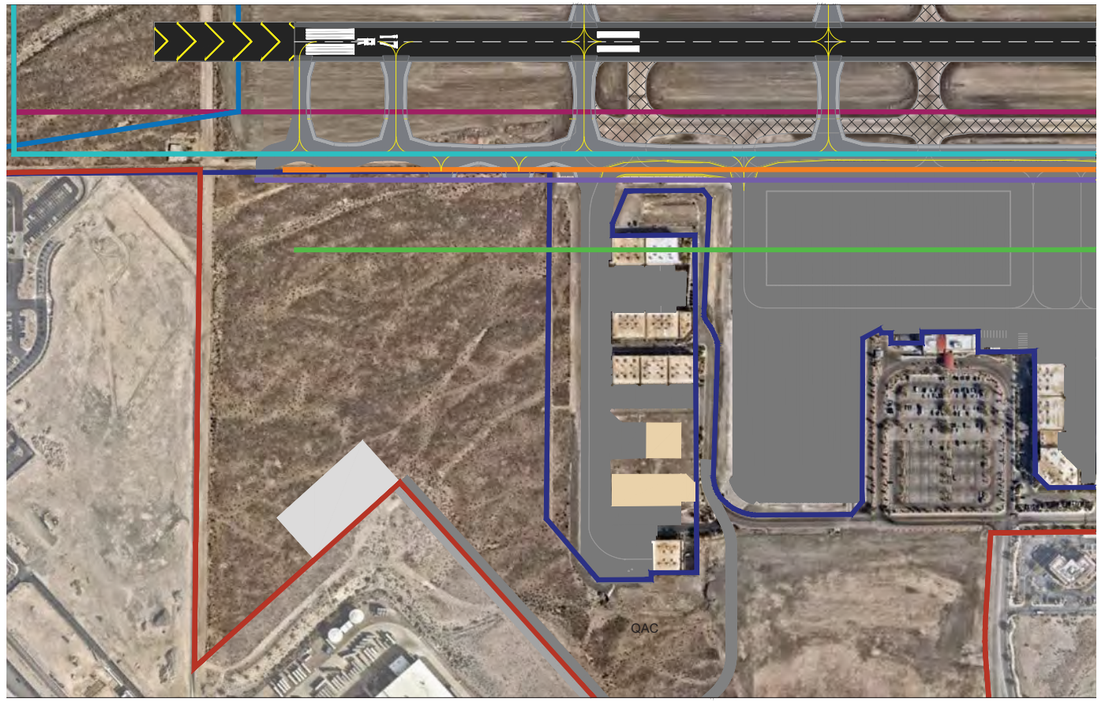
The two terminal vehicle parking alternatives were scored using the evaluation criteria defined in **Section 4.4** and shown in **Table 4.16**. The main differentiators between the two alternatives are the long-term operational impacts, cost considerations, and construction/phasing issues criteria. As noted above, the Remote Surface Parking Alternative will require some form of a shuttle service. As Henderson Executive Airport is part of CCDOA's system of airports, and McCarran International Airport has a shuttle system, the McCarran International Airport shuttles can be used during events at Henderson Executive Airport. Therefore, the operational impacts of a shuttle bus at the Airport is not as challenging as other GA Airports that are not part of a larger system. Conversely, the parking structure will be very costly to erect and phasing during construction will be challenging as the structure will be constructed where current terminal vehicle parking is located. The construction also could potentially impact the terminal loop road. The Remote Surface Parking Alternative is the preferred option.

Table 4.16 – *Terminal Vehicle Parking Alternatives Scoring*

	Satisfies Facility Requirements	Operational and Airspace Impacts	Environmental Considerations	Cost Considerations	Construction/ Phasing Issues	Off-Airport Impacts
Parking Structure Alternative	⊕	⊕	⊕	⊖	⊖	⊕
Remote Surface Parking Alternative	⊕	○	○	⊕	⊕	⊕

Source:
Kimley-Horn, 2021.

Figure 4.19 – *Remote Surface Parking Alternative*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

4.7.3. Airport Support Areas

This Master Plan Update focuses on two specific airport support areas: aviation fuel storage and Airport maintenance facilities.

AVIATION FUEL STORAGE

Chapter 3 identified the need for an additional aviation fuel storage tank between 20,000 and 40,000 gallons in size. Ultimately, this fuel tank should be used to accommodate Jet A fuel. However, consideration may be given in the short term to construct a fuel tank that accommodates 100 low lead (LL) Avgas and later convert it to Jet A. Installation and future conversion of fuel tanks will be timed to meet actual demand experienced at the Airport.

Two potential fuel storage options were considered:

NORTH FUEL STORAGE ALTERNATIVE

This alternative, illustrated in **Figure 4.20**, installs a 30,000-gallon above ground storage tank adjacent to the other fuel storage tanks. This new tank would connect into the existing fuel facilities.

SOUTH FUEL STORAGE ALTERNATIVE

Figure 4.21 depicts the South Fuel Storage Alternative. This alternative constructs a second self-service fuel island with an associated 30,000-gallon above ground storage tank. A second self-service fueling island was considered because of feedback received from tenants and users about long wait times to fuel their aircraft and because most of the future based aircraft expansion areas are on the south end of the Airport.

Figure 4.20 – *North Fuel Storage Alternative*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

EVALUATION OF FUEL STORAGE ALTERNATIVES

While the South Fuel Storage Alternative ranks slightly lower, it is the recommended alternative because the benefits of having a secondary self-service fuel island outweighs the additional cost consideration.

Table 4.17 – *Fuel Storage Alternatives Scoring*

	Satisfies Facility Requirements	Operational and Airspace Impacts	Environmental Considerations	Cost Considerations	Construction/ Phasing Issues	Off-Airport Impacts
Parking Structure Alternative	⊕	○	⊕	⊕	○	⊕
Remote Surface Parking Alternative	⊕	⊕	⊕	⊖	○	⊕

Source:
Kimley-Horn, 2021.

TAC/PAC FEEDBACK

There was no significant feedback from the PAC and TAC regarding fuel storage alternatives.

AIRPORT MAINTENANCE

No additional Airport maintenance space was identified in **Chapter 3**. Thus, this Master Plan Update does not provide for the expansion of the existing facility or location of additional Airport maintenance facilities.

Figure 4.21 – *South Fuel Storage Alternative*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Taxiway Safety Area (TSA)
- Taxiway Object Free Area (TOFA)
- Building Restriction Line (BRL) (for a 35-foot tall building)
- Existing Apron
- Future Fuel Tank
- Impacted Pavement/Hangar

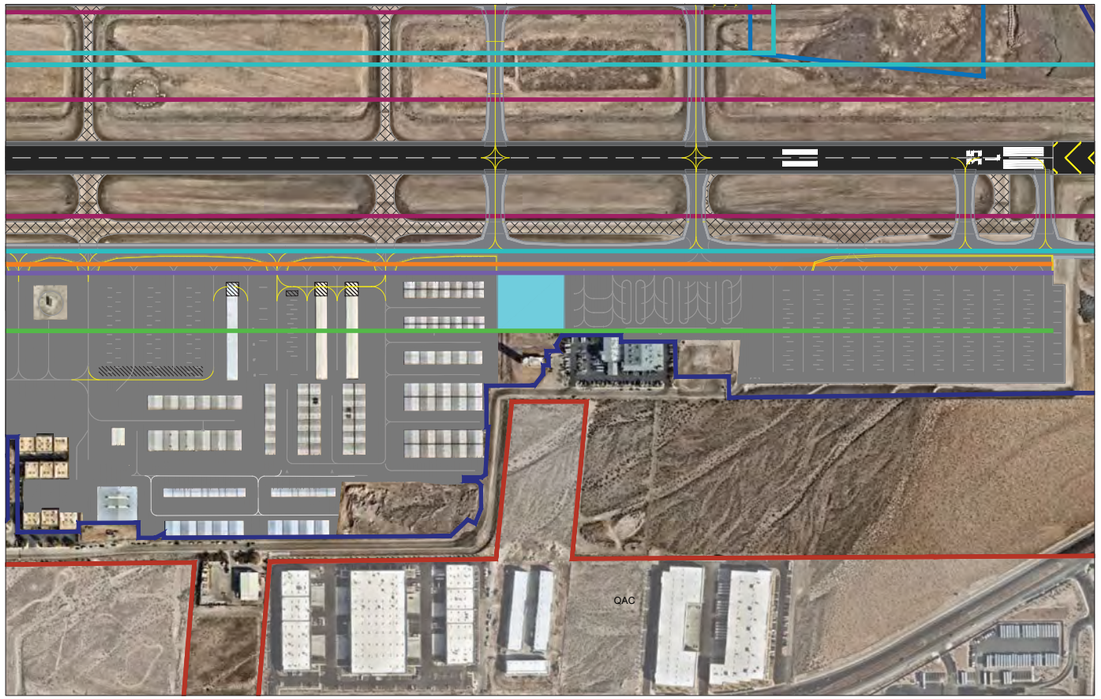
0 100 200 400 Feet

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

4.7.4. City Fire Station

Previous planning done for Henderson Executive Airport included reserving 2.5 acres of land for a City of Henderson fire station to be located on Airport property. The intention of this facility is that it would be a first responder to incidents on the Airport and also serve the community. The previously identified site was immediately east of the ATCT. As presented in **Figure 4.22**, this Master Plan Update carries forward this recommendation as the proposed site provides immediate, direct access to respond to incidents on the airfield.

Figure 4.22 – *Airport Fire Station*

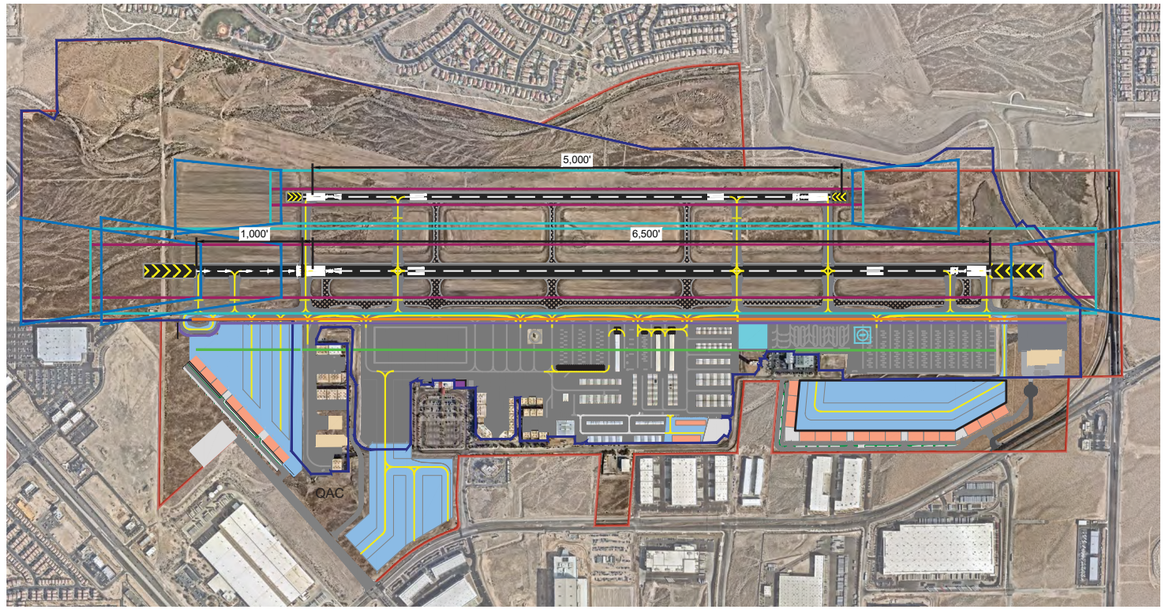


Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

4.8. Recommended Development Plan

Recommended development described in this chapter is presented in **Figure 4.23**. The recommended phasing of these improvements along with cost estimates and funding sources are presented in **Chapter 6**. It should be noted that the improvements shown in **Figure 4.23** depict conditions at the end of the 20-year planning horizon.

Figure 4.23 – *Recommended Development Plan*



Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

5. FACILITIES IMPLEMENTATION PHASING PLAN

Analyses documented in previous chapters of this Airport Master Plan Update were culminated into a Recommended Development Plan (RDP), presented in **Chapter 4**. The RDP reflects a summation of all improvements to be made at Henderson Executive Airport during the 20-year planning horizon. This chapter provides an individual listing of projects categorized into four phases in 5-year increments.

While projects are phased over the 20-year planning horizon, it is important to understand that the phasing is for high-level planning purposes. Many development recommendations contained in this Airport Master Plan Update are based on projected traffic levels and attainment of these levels. It is crucial to understand that recommendations for development are based on actual—not forecast—demand or traffic levels (such as hangars or apron space), and this dictates the timing of construction. This is true except in the case where development is recommended to enhance the safety of the Airport. A schedule based upon the forecasts of aviation demand presented in **Chapter 2** is provided in this chapter for planning purposes.

Prior to project implementation, environmental clearance for projects must be obtained. This chapter presents strategies for obtaining environmental clearance of the individual projects defined to implement the RDP.

It also is important to consider that the schedule of improvements proposed in this Airport Master Plan Update is contingent upon the availability of federal, state, and Clark County Department of Aviation (CCDOA) funds, along with investments from the private sector. While improvements are scheduled for specific phases, it should be noted that the programming of the Airport Improvement Program (AIP) by the Federal Aviation Administration (FAA) will determine the timing of many projects as will CCDOA's priorities and funding capacity across its system of airports. Development projects at the Airport must be reconciled with development priorities of other airports within the FAA region.

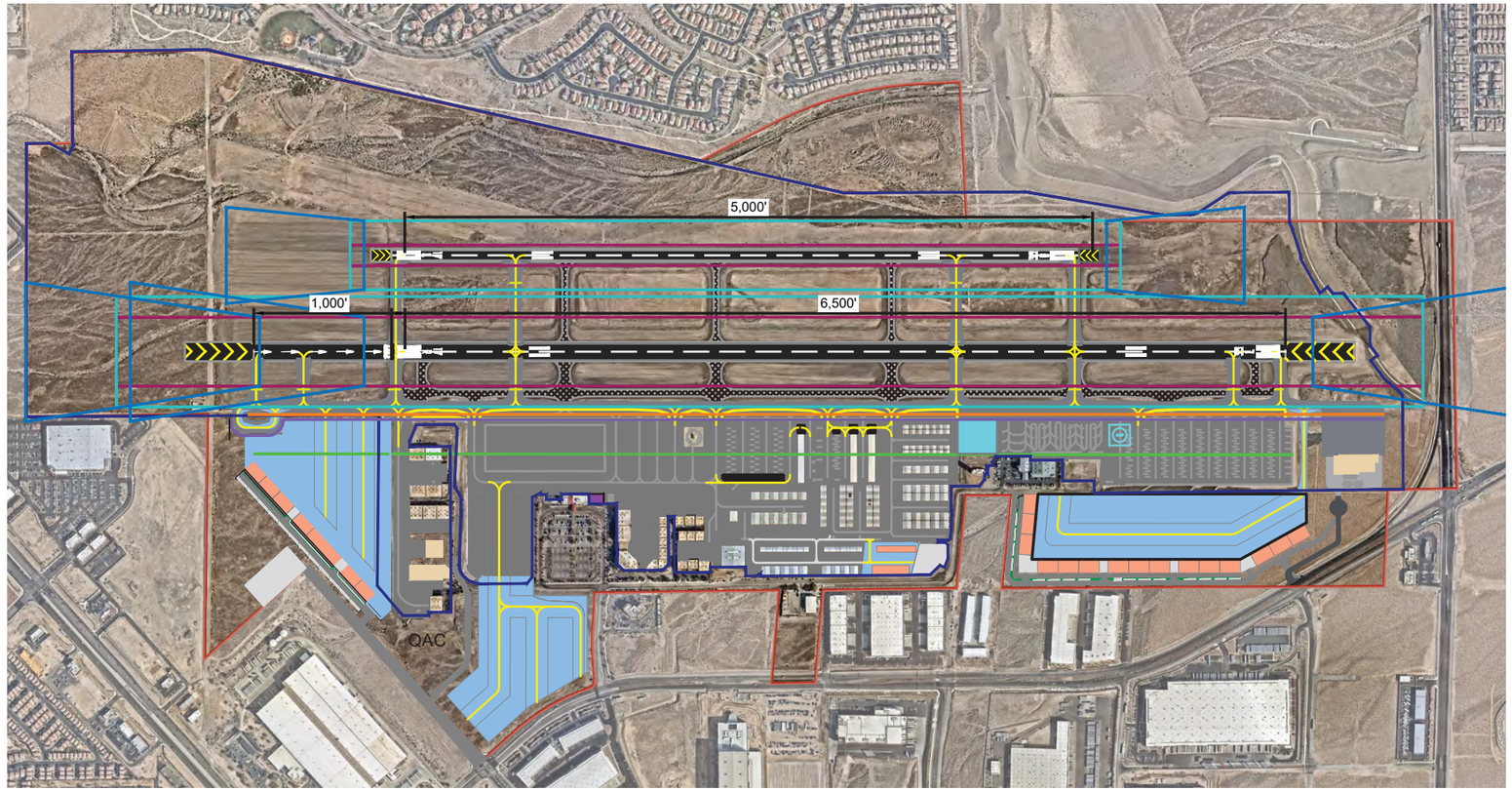
In summary, implementation of projects will depend on obtaining environmental clearance, the availability of funds, FAA programming, CCDOA system priorities, and attainment of activity levels.

Included in this chapter is an opinion of probable costs (OPCs) for each individual project. These OPCs should be re-evaluated and updated as projects transition from high-level planning to engineering and construction.

5.1. Project Descriptions

Individual projects are defined within this Airport Master Plan Update by phase to achieve the RDP. Projects are grouped into four, five-year phases and are planned based upon anticipated demand at the Airport. Brief project descriptions are presented below and are graphically depicted in **Figure 5.1**. Additional project definitions will be added as the project transitions from planning to engineering and construction.

Figure 5.1 – *Recommended Development Plan Phasing*



LEGEND

- Airport Property Boundary
- Existing AOA Fence
- Runway Protection Zone (RPZ)
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Taxiway Safety Area (TSA)
- Taxiway Object Free Area (TOFA)
- Building Restriction Line (BRL) (for a 35-foot tall building)
- Existing Apron
- Future Pavement
- Future Hangar
- Pavement Removal
- Impacted Pavement/Hangar
- Future Automobile Parking
- Future Airport Fire Station
- Future Terminal Expansion

0 350 700 1400 Feet

N

Source:
Kimley-Horn, 2021. AGIS survey data. Nearmap (accessed March 2020).

5.1.1. Phase 1 (2021 – 2024)

CONSTRUCT WEST APRON

The project will consist primarily of two main improvements that include the West Apron expansion and the relocation of Jet Stream Drive. The West Apron project will be constructed of asphalt pavement and will total approximately 83,400 square yards. Approximately 1,200 linear feet of Jet Stream Drive will be relocated north of the West Apron expansion and connect to Sunridge Heights Parkway. Construction of the relocated portion of Jet Stream Drive will include associated curbs and gutters. A portion of the existing Jet Stream Drive (approximately 760 linear feet) will be demolished as part of the relocation to accommodate the proposed West Apron expansion. In addition to the apron and roadway construction, this project will include pavement markings (airfield and roadway), drainage improvements, aircraft operating area fencing, and electrical improvements (apron edge lighting, airfield signs, apron high mast lights, and street lighting). Project bids were opened April 20, 2021, and the project was subsequently awarded to Tab Contractors, contingent upon availability of federal funding.

CONSTRUCT EXTENSION OF JET STREAM DRIVE

The RDP extends the south end of Jet Stream Drive, wrapping it around the southwest parcel of the airport, and connecting Jet Stream Drive to Raiders Way. This creates a loop with two access points to serve as required fire department access in addition to improving airport business and terminal vehicular traffic flow. This project includes the necessary environmental clearances, design, and construction of the extended roadway.

This project also reconfigures the Rocky Mountain Aviation Hangar driveway, relocating a portion further to the east and creating a new T-intersection east of the existing Raiders Way/driveway intersection. This reconfiguration allows for additional car queuing depth in accordance with City of Henderson intersection design guidelines. Approximately 670 linear feet of existing driveway will be demolished and about 710 linear feet of new two-lane road will be constructed of asphalt pavement along with associated curbs, gutters, sidewalks, landscaping, and utility relocations.

The extension of Jet Stream Drive will connect the new T-intersection with new Rocky Mountain Aviation Hangar driveway on the southwest and to the existing Jet Stream Drive near the Maverick facility to the northeast. This extension will consist of a two-lane road, approximately 2,700 linear feet in length and 30 feet wide that will be constructed of asphalt pavement along with associated perpendicular street parking, curbs, gutters, sidewalks, and landscaping. This roadway extension will include street lighting, signage, pavement markings, storm drain improvements, and utilities required to meet local standards and to complete this extension.

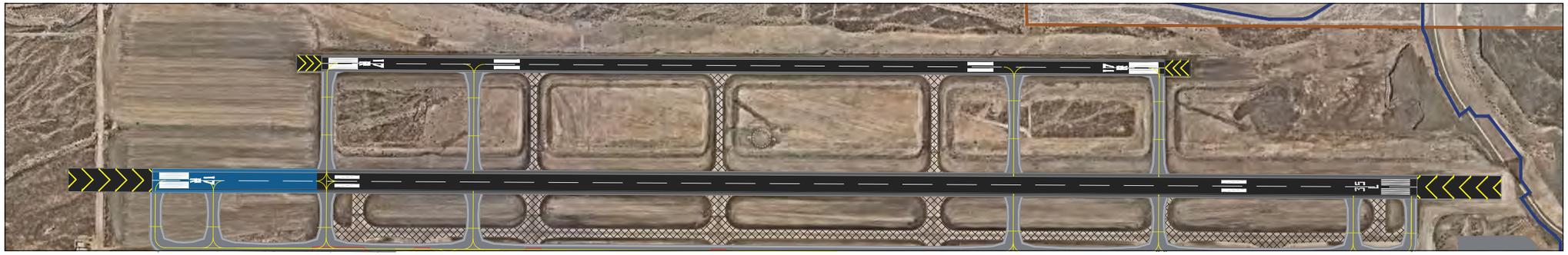
5.1.2. Phase 2 (2025 – 2029)

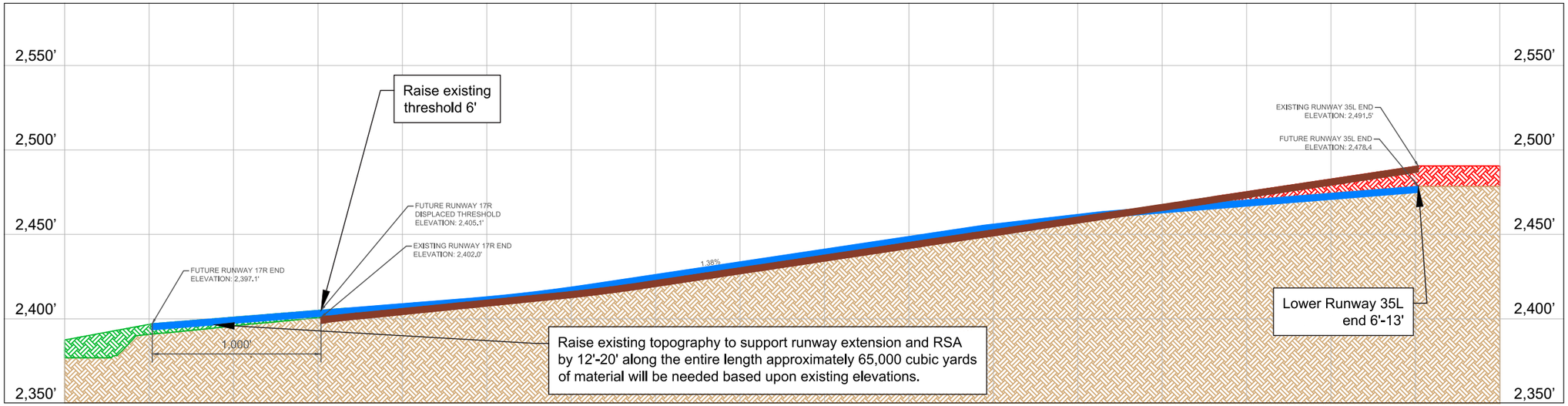
EXTEND RUNWAY 17R/35L AND UPGRADE TO AIRPORT REFERENCE CODE (ARC) D-III STANDARDS

Although the required NEPA analysis and design may begin prior to the 2025 project phasing, this project will include the necessary environmental clearances, design completion, and construction. This project is comprised of permanent and temporary improvements to the airfield. The permanent improvements will consist of the reconstruction and extension of Runway 17R/35L, approximately 1,000 feet to the north, for an overall runway length of 7,500 feet. The 7,500-foot overall runway length is required to accommodate the current mix of aircraft and the current stage lengths of existing users at the Airport. The existing runway does not meet the current FAA longitudinal grades for ARC C-II or D-III; therefore, the entire runway must be reconstructed to accommodate the extension and bring the runway into compliance with the longitudinal gradient requirements. The reconstruction/extension of the runway will be constructed of asphalt pavement and will be 7,500 feet long and 100 feet wide when completed.[1] To accommodate the longitudinal grade changes that are necessary, the elevation of both runway ends would be affected. This will include lowering the south end of the runway threshold by approximately 6 feet to 13 feet (see **Figure 5.2**). To accommodate this adjustment there will need to be improvements/modifications made to the existing detention basin, located on the southeast corner of the Airport.

1 "For airplanes with maximum certificated takeoff weight of 150,000 pounds or less, the standard runway width is 100 feet, the shoulder width is 20 feet, and the runway blast pad width is 140 feet." FAA AC 150/5300-13A, Change 1, Airport Design, Table 3-5, Footnote 12.

Figure 5.2 – *Runway 17R/35L Longitudinal Gradients*





LEGEND

- Runway Centerline Profile - Existing
- Runway Centerline Profile - Future
- Airport Property Boundary
- Existing AOA Fence
- Ground Profile - Existing / To Remain in Future
- Ground Profile - Existing / Future Cut
- Ground Profile - Future Fill
- Runway Extension
- Pavement Removal

Sources:
Nearmap
Kimley-Horn, 2020.

Notes:
Not to scale.

Currently, a portion of this detention basin is within the runway safety area (RSA) and runway object free area (ROFA), and to bring this area into compliance, a portion of the basin will need to be filled in and the basin widened to the east. This will include the excavation and embankment of approximately 20,000 cubic yards of material, excavated from one end of the basin, and embanked on the other. Modification to the basin will require extensive coordination and permitting with federal, state, and local agencies. The north end runway extension will require a significant increase to the existing grade (the existing runway threshold will be raised by approximately 6 feet and the extended end of runway will need to raise the existing elevations by approximately 12 feet to 20 feet). Approximately 65,000 cubic yards of material will need to be imported to build up the grade.

The existing Runway 17R landing threshold location will remain in the same horizontal location; however, as noted above, the vertical location will need to be modified to accommodate the new longitudinal grades. Retention of the landing threshold location results in an approximate 1,000-foot displaced threshold on Runway 17R. This displaced threshold is proposed to maintain existing air traffic and instrument approach procedure alignments from the north and prevent impacts to McCarran International Airport airspace.

Declared distances will be applied to the extended runway. Runway 35L takeoff run available (TORA) will be reduced from the extended runway length to keep the entire departure runway protection zone (RPZ) within existing airport property limits. Runway 35L TORA is estimated to be 7,255 feet.

The runway reconstruction will include the installation of new shoulders, airfield lights, airfield signs, airfield pavement markings, infield grading/stabilization, and storm drain improvements. CCDOA had a previously designed drainage project, Project #2490 – Improve HND Airport Drainage, that should be considered for inclusion as part of this project. Project #2490 will need to be updated to accommodate the new runway profile; however, the drainage calculations and storm drain design should still apply.

To accommodate the new runway longitudinal grades, the associated cross taxiways will need to be reconstructed on both the east and west side of Runway 17R/35L. This will include the removal and replacement of the existing asphalt taxiways to adjust the longitudinal grades to meet the modified runway profile and other taxiway modifications as depicted in RDP. These modifications include:

- Relocation of Taxiway B approximately 160 feet north
- Relocation of Taxiway D approximately 470 feet south
- Demolition of Taxiway E
- Relocation of Taxiway F approximately 360 feet south
- Demolition of Taxiway G
- Demolition of existing parallel Taxiway A and conversion of the existing parallel apron taxilane to a taxiway
- Extension of the new parallel taxiway to the north and construction of connector taxiways

The separations between the existing taxilane and existing apron areas will need to be updated. These updates will require new airfield pavements, taxiway filet geometry updates, airfield pavement markings, airfield lights, and airfield signs. Included with these modifications is the installation of apron control markings. A total of ten apron control markings will be installed and CCDOA will work with air traffic control in producing pilot education materials about the use of the apron control markings. The pavements on the existing taxilane are only in fair condition; therefore, when these improvements are scheduled it should be expected that the existing taxilane will be reconstructed along with the runway.

The taxiway modification portion of this project will include new airfield pavements, airfield pavement markings, airfield lights, airfield signs, grading, and drainage improvements.

This project also will seek to correct other nonstandard conditions present. As previously noted, there are several nonstandard objects located within the RSA for Runway 17R/35L. This project will relocate the precision approach path indicator (PAPI) power and control units (PCUs) and likely the power transformers outside of the RSA and ROFA to the extent practicable. The hold lines associated with the runway will be relocated to be 275 feet from the runway centerline.

Nonstandard objects within the Runway 17L/35R ROFA will be relocated outside of the ROFA, to the extent practicable as part of this project.

Lastly, the project will modify taxiway designations at the Airport to conform with current taxiway naming standards. The new parallel taxiway will continue to be designated as Taxiway A. Taxiways connecting from the parallel taxiway to the runways will be sequential from south to north, starting at the Runway 35L threshold with Taxiway A1 and terminating at the Runway 17R threshold with Taxiway A8.

The temporary improvements will consist of the temporary extension of Runway 17L/35R to the north and the addition of a new temporary parallel taxiway from the temporarily extended Runway 17L end to Taxiway H. These temporary improvements will be required to maintain operations and ensure the Airport can remain open during the phased construction of Runway 17R/35L extension and runway longitudinal grade correction work. The temporary extension of Runway 17L will be approximately 1,447 feet in length and 75 feet wide. The temporary taxiway will be 1,711 feet in length and 35 feet in width. All temporary improvements will be constructed of asphalt pavement, and value engineering will be used during design to reduce the overall cost of these temporary improvements. Similar to the Runway 17R extension, this temporary extension will require fill material to be imported to bring up the grade on the north end of the runway. Approximately 60,000 cubic yards of material is needed.

CONSTRUCT NORTH RUN UP APRON

This apron project will include environmental clearance, design, and construction of a new run up area along the west side of the new parallel Taxiway A on the north end of the airfield. This project will likely be combined with the Extend Runway 17R/35L and Upgrade to ARC D-III Standards project described above. The run up apron will be constructed of asphalt pavement, will be approximately 31,300 square feet plus associated shoulders, and will be designed to accommodate Airplane Design Group (ADG) II aircraft. The separation from the run up apron position and Taxiway A will accommodate ADG III aircraft. This project also will include airfield pavement markings, airfield lighting, airfield signs, and drainage improvements. If necessary, blast fences will be constructed to mitigate impacts of propwash to adjacent developments.

RELOCATE HANGAR ROW F

Hangar Row F is impacted by the conversion of the parallel taxilane to a taxiway. Taxiway object free areas are wider than taxilane object free areas because aircraft taxiing speeds are greater. This project relocates or replaces the impacted Hangar Row F hangars to an area just south of Double Down Aviation and encompasses approximately 136,400 square feet. This project will include environmental clearance, design, and construction of taxilane pavement, hangars, and vehicle parking. This area will be developed and constructed of asphalt pavement (approximately 55,700 square feet of taxilane pavement and approximately 47,200 square feet of vehicle parking). Hangar facilities (approximately 31,600 square feet) also will be constructed as part of this project. This will include the building, utilities (gas, water, sanitary sewer, and electrical), pavement markings, modifications to the air operations area (AOA) fence and an AOA gate, and miscellaneous items required to complete this development.

CONSTRUCT SECONDARY FUEL ISLAND

Construction of a secondary fuel island on the south general aviation apron will reduce taxi times, the potential for head-to-head traffic, and wait times at the existing facility. This project will include environmental clearance, design, and construction of a new standalone, self-serve fuel island. This project will consist of the removal of a portion of the existing asphalt apron and the installation of an aboveground storage tank, spill containment structure, and fuel pump. This project also will include the construction of a concrete fueling area around the storage tank/fuel pump area. This concrete pavement will be designed to accommodate both aircraft and fuel truck loading. In addition, the project will include electrical upgrades, area lighting, bollards, and a tank pad that includes a containment area.

5.1.3. Phase 3 (2030 – 2034)

CONSTRUCT NEW TAXILANE TO CONNECT TO SOUTHWEST PARCEL

To facilitate aircraft access to the southwest parcel, an ADG III taxilane will be constructed from Taxiway A westward to the southwest parcel. The new taxilane will be located between the existing South General Aviation Apron and north of the Rocky Mountain Aviation Hangar facility. This project will include environmental clearance, design, and construction. This taxilane will be constructed of asphalt pavement and will be designed to accommodate ADG III aircraft. In addition to the taxilane pavement, this project will include airfield pavement markings, airfield lights, airfield signs, and drainage improvements.

CONSTRUCT AIRCRAFT PARKING APRON ON SOUTHWEST PARCEL

Construction of based aircraft facilities on the southwest parcel will be accomplished in phases, building from south to north as demand dictates and as private investment is made at the Airport for based aircraft facilities. A portion of the apron construction cost is eligible for FAA AIP funding assistance. The remaining cost will be the responsibility of private developers and/or CCDOA.

This project represents the first phase of apron development to support based aircraft facilities on the southwest parcel and will include environmental clearance, design, and construction for a new apron that encompasses approximately 235,800 square feet. The new apron will be located west of the existing South General Aviation Apron and connected to the runway and taxiway system via the new taxilane constructed (see previous project). This new apron will be constructed of asphalt pavement and be designed to accommodate up to and including ADG III aircraft. In addition to the pavement, this project will include airfield pavement markings, airfield lights, airfield signs, AOA fencing, drainage improvements, and utility mains for future development including water, sanitary sewer, electrical, and gas. This project also may include the design and construction of high mast lights.

CONSTRUCT HANGARS ON SOUTHWEST PARCEL

Hangar development on the southwest parcel will be accomplished in phases, building from the south to north as demand dictates and private investment is made. This project will construct multiple hangars of various sizes, totaling approximately 60,000 square feet of hangar space, adjacent to the apron constructed in the previous project. Hangar development will be on the western edge of the southwest parcel and will have landside access from Jet Stream Drive (extended in Phase 1). These hangars will be designed and constructed to accommodate future demand for aircraft size. These hangar facilities will be complete with all utilities (water, sanitary sewer, gas, and electrical). Each facility will tie into the main utility lines and all facilities will be metered independently.

CONSTRUCT REMOTE VEHICLE SURFACE PARKING

To accommodate overflow parking during special events, a remote vehicle surface parking lot will be constructed (approximately 12,250 square feet). This will be accomplished either through grading of existing dirt or it will be paved. OPCs developed for this project assume a paved parking lot that complies with local codes and requirements. This project will consist of the parking lot, pavement markings, area lighting, drainage improvements, curbs, sidewalks, and landscaping. This parking lot will be accessed by the existing roadway system at the airport and will provide pedestrian access/crossing to the Airport's facilities. It is anticipated that CCDOA will leverage its existing shuttle bus operations at McCarran International Airport to provide temporary shuttle bus service during special events.

EXPAND TERMINAL BUILDING

This project will include environmental clearance, design, and construction to expand the terminal by approximately 15,400 square feet. To retain the views from the existing restaurant, the terminal will be extended about 107 feet to the south at the same width as the existing building (approximately 72 feet). The expanded terminal building will be two stories, matching the existing building. This project includes relocation of existing terminal support facilities, Airport vehicle parking, and the electrical vault along with modifying a vehicle gate. This terminal expansion will tie into existing utilities (water, sanitary sewer, gas, and electrical) within and serving the existing terminal building.

PROVIDE CUSTOMS FACILITY

Should demand develop, a General Aviation customs area should be provided. For the purposes of this Master Plan Update, it is assumed that the customs facility will be in a common area and CCDOA will be responsible for costs associated with providing the facility. Therefore, space will be provided within the terminal building and leased to the U.S. Customs and Border Patrol (CBP). An area will be required to process international arrival passengers, office space for CBP staff, and an interrogation/holding room. This project will consist of tenant improvements within the terminal building and airfield pavement markings on the adjacent aircraft apron to designate international arrival parking positions.

5.1.4. Phase 4 (2035 - 2039)

CONSTRUCT NORTH APRON

Similar to the apron construction on the southwest parcel, the north apron will be constructed as demand dictates and as private investment is made at the Airport for based aircraft hangar facilities. A portion of the apron construction cost is eligible for FAA AIP funding assistance. The remaining cost will be the responsibility of private developers and/or CCDOA.

This project will include environmental clearance, design, and construction for approximately 830,100 square feet of new apron. The new apron will be located west of Taxiway A and north of the Qual Air Center. This apron will be constructed of asphalt pavement and be designed to accommodate up to and including ADG III aircraft. In addition to the pavement, this project will include airfield pavement markings, airfield lights, airfield signs, AOA fencing, high mast lights, drainage improvements, and utility mains for future development (water, sanitary sewer, electrical, and gas). Airfield access to this apron will be from the extended Taxiway A. If necessary, a blast fence will be constructed adjacent to the run up apron to provide protection from jet blast/prop wash.

Included in this project is construction of an access road from Sunridge Heights and perpendicular vehicle parking adjacent to the access road. The access road and vehicle parking will support based aircraft located on the north apron and future hangar development (see next project).

CONSTRUCT HANGARS ALONG THE NORTH APRON

Hangar development along the north apron will be accomplished as demand dictates and private investment is made. This project will construct multiple hangars of various sizes, totaling approximately 120,000 square feet of hangar space, adjacent to the apron constructed in the previous project. Hangar development will be on the northwestern edge and will have landside access from the road constructed in the previous project. These hangars will be designed and constructed to accommodate the future demand, at that time, for aircraft size. These hangar facilities will be complete with all utilities (water, sanitary sewer, gas, and electrical). Utilities for these hangars will need to be run in Sunridge Heights and each facility will tie into the main utility lines constructed in Sunridge Heights and all facilities will be metered independently.

EXPAND AIRCRAFT PARKING APRON ON SOUTHWEST PARCEL

This project is the second phase of the based aircraft apron development on the southwest parcel and will be constructed as demand dictates and as private investment is made at the Airport for based aircraft facilities. A portion of the apron construction cost is eligible for FAA AIP funding assistance. The remaining cost will be the responsibility of private developers and/or CCDOA.

This project will include environmental clearance, design, and construction for a new apron that encompasses approximately 636,800 square feet. The new apron will expand the apron constructed in Phase 3 and is located west of the existing South General Aviation Apron. This new apron will be constructed of asphalt pavement and be designed to accommodate an ADG III aircraft. In addition to the pavement, this project will include airfield pavement markings, airfield lights, airfield signs, AOA fencing, drainage improvements, and utility mains for future development including water, sanitary sewer, electrical, and gas. This project may also include the design and construction of high mast lights.

CONSTRUCT HANGARS ON SOUTHWEST PARCEL

This project represents the second phase of hangar development on the southwest parcel and will be accomplished as demand dictates and private investment is made. This project will construct multiple hangars of various sizes, totaling approximately 164,000 square feet of hangar space, adjacent to the apron constructed in the previous project. Hangar development will be on the western edge of the southwest parcel and will have landside access from Jet Stream Drive (extended in Phase 1). These hangars will be designed and constructed to accommodate future demand for aircraft size. These hangar facilities will be complete with all utilities (water, sanitary sewer, gas, and electrical). Each facility will tie into the main utility lines constructed in Phase 3 and all facilities will be metered independently.

EXPAND REMOTE VEHICLE SURFACE PARKING

This project expands the remote vehicle surface parking constructed in Phase 3 and will be used to accommodate overflow parking during special events. The expanded area encompasses approximately 63,700 square feet and will be constructed to match the Phase 3 development. Therefore, OPCs developed for this project assumed a paved parking lot that complies with local codes and requirements and will consist of the parking lot, pavement markings, area lighting, drainage improvements, curbs, sidewalks, and landscaping.

CONSTRUCT AIRPORT RESCUE AND FIREFIGHTING FACILITY

The Airport does not require Aircraft Rescue and Firefighting (ARFF) equipment nor does it require an ARFF facility. To protect for a future need, an area approximately 2.5 acre in size is reserved for a future ARFF facility, located just east of the airport traffic control tower (ATCT). This facility will consist of an ARFF building with space for an ARFF vehicle storage and maintenance with pull through capabilities, crew quarters, and office and meeting room space. The facility also will have direct landside access from Jet Stream Drive, a dedicated AOA gate, and landside vehicle parking. Therefore, AOA fencing modifications will be required. Building size will be a function of the ARFF equipment to be accommodated. For purposes of this Master Plan Update, a building size of 10,000 square feet is assumed.

5.2. Environmental Clearance Strategies

It is important to have a strategy for obtaining required environmental approvals under the National Environmental Policy Act (NEPA) for the projects that comprise the RDP. It is anticipated that for certain projects, FAA approval of the Airport Layout Plan (ALP) will be conditional upon environmental review. Other NEPA-related environmental considerations may include drainage, wetlands, water quality, or hazardous materials on Airport's property.

There are three types of environmental review with an increasing level of effort and time commensurate with an increasing level of impact on the environment. These include:

- **Categorical Exclusion (CatEx).** There is a category of actions that do not individually or cumulatively have a significant effect on the human environment and, therefore, neither an environmental assessment (EA) nor an environmental impact statement (EIS) is required. The typical timeframe to document a CatEx and receive FAA approval is 6 months to 1 year.
- **Environmental Assessment (EA).** A public document that an airport sponsor prepares to provide sufficient evidence to determine whether a proposed action would require preparation of an EIS or a finding of no significant impact (FONSI). The average completion timeframe is 18 months.
- **Environmental Impact Statement (EIS).** A public document required for airport development actions that may "significantly affect the quality of the human environment."[2] The EIS describes the impacts on the environment as a result of a proposed action, the impacts of alternatives, and plans to mitigate impacts. The average completion timeframe is 3 or more years.

2 National Environmental Policy Act, Sec. 102 (C), 42 U.S.C. § 4332(2)(C)

The Council on Environmental Quality (CEQ) published a new rule effective September 14, 2020, titled *Update to the Regulations Implementing the Procedural Provisions of the National Environmental Policy Act.* Within this ruling, the CEQ indicates that EAs should be completed within 1 year and gives a presumptive limit of 2 years for EISs (longer time frames can be approved by senior agency officials). The timelines for project completion as prescribed in the ruling are misleading because the clock usually starts after a determination is made as to which level of documentation is appropriate. However, analysis is typically performed to make the determination of which level of documentation is necessary. Therefore, the overall time for environmental analysis is not expected to dramatically change and will be consistent with the timeframes noted above.



The projects included in the RDP that are anticipated to require environmental review are presented in **Table 5.1**. Environmental documentation review is listed either as individual projects or as programmatic EAs. Programmatic EAs are recommended because it is likely to make the NEPA process smoother and accelerate the projects long term. However, performing programmatic EAs will result in additional up-front efforts and costs as multiple projects are analyzed at once.

Table 5.1 – *Environmental Strategies and Potential Areas of Concern*

Project Name	Environmental Document	Suggested Approach	Potential Areas of Concern
Phase 1 (2021 – 2024)			
Construct West Apron	CatEX	Individual CatEx (approved on August 3, 2021)	None
Construct Extension of Jet Stream Drive	CatEX	Individual CatEx	None
Phase 2 (2025 – 2029)			
Extend Runway 17R/35L and Upgrade to Airport Reference Code (ARC) D-III Standards	EA	Programmatic EA	Noise
Construct North Run Up Apron	CatEx		None
Relocate Hangar Row F	CatEx		None
Construct Secondary Fuel Island	CatEx		Hazardous Materials
Phase 3 (2030 – 2034)			
Construct New Taxilane to Connect to Southwest Parcel	CatEx	Programmatic EA	Noise
Construct Aircraft Parking Apron on Southwest Parcel	CatEx		None
Construct Hangars on Southwest Parcel	CatEx		Wetlands/Water Quality
Construct Remote Vehicle Surface Parking	CatEx		None
Expand Terminal Building	CatEx		None
Provide Customs Facility	CatEx		None
Phase 4 (2035 – 2039)			
Construct North Apron	CatEx	Programmatic EA	None
Construct Hangars Along the North Apron	CatEx		None
Expand Aircraft Parking Apron on Southwest Parcel	CatEx		Wetlands/Water Quality
Construct Hangars on Southwest Parcel	CatEx		None
Expand Remote Vehicle Surface Parking			Wetlands/Water Quality
Construct Airport Rescue and Firefighting Facility	CatEx		None

Source:
Kimley-Horn, 2021.

Notes:
ARC = Airport Reference Code
CatEx = Categorical Exclusion
EA = Environmental Assessment

5.3. Funding Plan

The funding plan identifies potential funding sources for projects comprising the RDP. In support of the development of the funding plan, a Capital Improvement Program (CIP) was developed. The CIP presents funding sources expected to be available through the planning period for projects in the RDP.

5.3.1. Assumptions

This funding plan was developed according to information and assumptions that provide a reasonable basis for analysis at a level appropriate for an airport master plan. Some of the assumptions used to project funding sources may not be realized, and unanticipated events and circumstances may occur. Therefore, actual results will vary and such variations could be material.

Data presented herein is preliminary in nature and is not intended, nor is it sufficient, to be used to support the sale of bonds or to obtain any other forms of financing. More detailed cost estimates and financial analyses are required to implement individual projects. Some projects noted may be postponed if forecasted aviation activity is not realized, construction costs rise significantly, or projected funding is not available. Assumptions, funding sources, and project costs should be refined as project development becomes more imminent.

OPCs for projects in the RDP were prepared based on criteria specific to the Las Vegas metropolitan region. OPCs were based on recent project costs for other CCDOA projects and in the surrounding area. OPCs were not escalated, as current pricing reflects shortage pricing experienced with the COVID-19 pandemic. It is not known if these short-term price increases will return to normal. The current escalated prices are 2021 values and do not include any escalation over the next 20 years. For estimated escalated OPCs, add 5 percent for each year after 2021. OPCs include hard construction costs as well as soft costs, which assume the following:

- Project mobilization is 10 percent of construction costs
- Fifteen percent for soft costs including design, permitting, construction administration, environmental monitoring, and engineering and architectural services
- Environmental clearance costs are $35,000 for a CatEx and $375,000 for an EA (associated with the runway extension)
- Twenty percent for construction contingency
- All OPCs are rounded up to the nearest $1,000 increment

Conservative assumptions were used to avoid overestimating the financial capacity of CCDOA during the planning period. One key assumption was that a small portion of net revenues generated at the Airport would be available to fund capital projects. The majority of CCDOA's revenue is assumed to support McCarran International Airport throughout the course implementing the RDP. Other key planning assumptions are as follows:

- FAA AIP entitlement grants were projected assuming the annual maximum amount would be received
- AIP discretionary grants were assumed to be available for specific eligible projects at or below the average annual historical levels for projects with similar eligibility

5.3.2. Funding Sources

Potential funding sources are described below. Each funding source available to CCDOA has unique availability, specific eligibility, and time constraints. For all funding sources described, the availability of funds does not necessarily mean that all funds projected to be available will be allocated to projects in the RDP. Each project will need to compete based on merit for funding and will be balanced with funding requests by other airports. There are three primary funding sources that may be leveraged to implement the RDP including:

- FAA AIP grants
- CCDOA/local funding
- Tenant or third-party funding

FAA AIRPORT IMPROVEMENT PROGRAM GRANTS

The AIP is FAA's grant program for funding capital development at eligible airports. As was noted in **Chapter 1**, the Airport was classified in the 2019 National Plan of Integrated Airport Systems (NPIAS) as a Primary Commercial Service, Nonhub airport. The 2021 NPIAS reclassified the Airport as a Nonprimary, National Reliever Airport. AIP grant funding levels for the Airport are affected by the Airport's NPIAS classification and number of annual enplaned passengers. While the Airport had 56,182 enplanements in federal fiscal year 2020[3], it does not have scheduled service. The AIP provides annual non-primary entitlement grants to airports. Because Henderson Executive Airport had more than 10,000 enplanements from unscheduled air service, it receives $1 million annually under the AIP annual non-primary entitlement AIP grant program. When additional funding is required, the FAA may issue discretionary AIP grants to supplement entitlement funds. AIP funds can be used for most nonrevenue generating airport development. It also can be used for revenue generating projects, assuming there are no other needs at an airport and FAA agrees.

Grant-specific assumptions made for this analysis are as follows:

- **Entitlement grants.** As the operator of a non-primary airport with more than 10,000 annual enplanements, CCDOA is eligible for a $1 million AIP entitlement apportionment in each federal fiscal year in which the AIP is funded at a level of $3.2 billion or more. If AIP funding is less than $3.2 billion, the annual AIP entitlement apportionment for the Airport will be $650,000. It was assumed that the FAA's current methodology for allocating entitlements will not change and that AIP funding will remain above $3.2 billion. Accordingly, a total of approximately $20 million in AIP entitlement grants would be available during the planning period.
- **Discretionary grants.** Discretionary grants are administered by FAA for projects based on a prioritized basis. Projects associated with safety, reconstruction/rehabilitation, and capacity receive highest priority. CCDOA is qualified for 93.75 percent of eligible project costs to be financed by discretionary funds, though this percentage may differ based on the amount of available discretionary funds that are administered. It was assumed that CCDOA will receive $52.7 million during the planning period, with most of the discretionary money needed to upgrade Runway 17R/35L.

CCDOA/LOCAL FUNDING

CCDOA could fund projects and local AIP match requirements using operating revenues from the Airport and the Fixed-Base Operator (FBO) that they manage. As CCDOA operates a system of airports, consideration may also be given to pool resources to complete larger projects as needs arise. While Clark County general funds may be used, it was assumed that no general funds would be used to fund projects at the Airport.

3 National Plan of Integrated Airport Systems (NPIAS), 2021-2025 (https://www.faa.gov/airports/planning_capacity/npias/current/media/NPIAS-2021-2025-Appendix-A.xlsx)

TENANT OR THIRD-PARTY FUNDING

Much of the based aircraft development reflected on the RDP is assumed to be developed by private developers or individual tenants. This includes all future hangars shown on the RDP and portions of the associated apron areas to access the hangars. Projects that benefit individual private entities are typically not eligible for FAA AIP grants.

5.4. Capital Improvement Program

Table 5.2 summarizes the Airport's CIP by phase. Estimated capital expenditures total approximately $382 million (in 2021 dollars) for all projects in the RDP. **Table 5.2** shows that significant FAA participation is required to upgrade the Airport to meet ARC C-II standards. Hangar development, which is assumed to be funded by private entities, comprises the majority of the RDP development costs.

Table 5.2 – *20-Year Airport CIP by Funding Sources*

Project Name	Project Cost	FAA AIP Grants		Private Funding	Local Funding
		Entitlement	Discretionary		
Phase 1 (2021 – 2024)					
Construct West Apron	$4,217,000	$3,953,438	--	--	$263,563
Construct Extension of Jet Stream Drive	$2,077,000	--	--	--	$2,077,000
Phase 2 (2025 – 2029)					
Extend Runway 17R/35L and Upgrade to Airport Reference Code (ARC) D-III Standards	$41,600,000	$4,000,000	$35,000,000	--	$2,600,000
Construct North Run Up Apron	$1,700,000	$1,593,750	--	--	$106,250
Relocate Hangar Row F	$77,404,000	$1,000,000	--	$73,475,000	$2,929,000
Construct Secondary Fuel Island	$2,795,000	--	--	--	$2,795,000
Phase 3 (2030 – 2034)					
Construct New Taxilane to Connect to Southwest Parcel	$1,551,000	$1,455,000	--	--	$96,000
Construct Aircraft Parking Apron on Southwest Parcel	$3,941,000	$3,695,000	--	--	$246,000
Construct Hangars on Southwest Parcel	$33,155,000	--	--	$33,155,000	--
Construct Remote Vehicle Surface Parking	$267,000	--	--	--	$267,000
Expand Terminal Building	$7,211,000	--	--	--	$7,211,000
Provide Customs Facility	$3,140,000	--	--	--	$3,140,000
Phase 4 (2035 – 2039)					
Construct North Apron	$17,955,000	$4,000,000	$12,832,000	--	$1,123,000
Construct Hangars Along the North Apron	$66,275,000	--	--	$66,275,000	--
Expand Aircraft Parking Apron on Southwest Parcel	$9,506,000	$4,000,000	$4,911,000	--	$595,000
Construct Hangars on Southwest Parcel	$91,115,000	--	--	$91,115,000	--
Expand Remote Vehicle Surface Parking	$1,125,000	--	--	--	$1,125,000
Construct Airport Rescue and Firefighting Facility	$16,595,000	--	--	--	*$16,595,000*

Source:
Kimley-Horn, 2021.

Notes:
CIP = Capital improvement plan
FAA AIP = Federal Aviation Administration Airport Improvement Program
ARC = Airport Reference Code

Table 5.3 summarizes OPCs for the RDP projects in the CIP grouped by funding source and phase. Approximately 6 percent of total project costs could be funded by FAA entitlement grants, 14 percent by FAA discretionary grants, 69 percent by private sources, and 11 percent by local funds. Of the anticipated discretionary grant funding, $35 million is in support of the runway upgrade. Phase 4 discretionary grants are a lower priority in FAA's ranking. While these projects may be eligible for discretionary grant funding, it is unlikely that this will be a viable funding source. Therefore, either CCDOA will be required to provide more matching funds or pool entitlement money from its system of airports to support this development.

Table 5.3 – *Summary of Opinion of Probable Cost Estimates by Phase and Funding Sources*

Project Name	Project Cost	FAA AIP Grants		Private Funding	Local Funding
		Entitlement	Discretionary		
Phase 1 (2021 – 2024)	$6,294,000	$3,953,438	--	--	$2,340,563
Phase 2 (2025 – 2029)	$123,499,000	$6,593,750	$35,000,000	$73,475,000	$8,430,250
Phase 3 (2030 – 2034)	$49,265,000	$5,150,000	--	$33,155,000	$10,960,000
Phase 4 (2035 – 2039)	$202,571,000	$8,000,000	$17,743,000	$157,390,000	$19,438,000
Totals	$381,629,000	$23,697,188	$52,743,000	$264,020,000	$41,168,813

Source:
Kimley-Horn, 2021.

Note:
FAA AIP = Federal Aviation Administration Airport Improvement Program

A. APPENDIX A – FACILITIES REQUIREMENTS

A.1. Airfield Capacity

A.1.1. Airfield Capacity Calculation Factors

Runway Configuration and Usage

Henderson Executive Airport has two parallel runways, 700 feet apart.

An airfield's capacity is directly related to the number and orientation of runways available during various operating conditions. An airfield may have multiple operating configurations dependent on weather conditions, time of day, and/or the type of approach procedures available. Henderson Executive Airport features two parallel runways in a north/south orientation. Runway 17R/35L is 6,501 feet long and 100 feet wide; Runway 17L/35R is 5,000 feet long and 75 feet wide. The two runways are separated 700 feet (centerline-to-centerline) from each other and are served by several connector taxiways, which are described in greater detail in the subsequent section.

Runway 17R/35L accommodates all aircraft types at the Airport and is operational for daytime and nighttime activity. Runway 17L/35R also is operational for daytime and nighttime activity and can accommodate most activity at the Airport. The length and pavement strength of Runway 17L/35R limits some medium and large jet operations; however, it is typically used for flight training activity to maximize the capacity of Runway 17R/35L.

Airport traffic control tower (ATCT) personnel indicated that Runway 17R/35L serves the majority of total operations at the Airport and that the predominant south flow is used approximately 60 percent of the time (north flow is typically used in winter months and periodically during spring and fall months).

Location of Exit Taxiways

Runway 17R/35L has a full parallel taxiway. Both runways feature multiple runway exit options.

The location and number of exit taxiways affect airfield capacity because they directly relate to runway occupancy time. Runway capacities are highest when runways are complimented with full-length, parallel taxiways, ample runway entrance and exit taxiways, and no active runway crossings. These components reduce the amount of time an aircraft remains on the runway. At Henderson Executive Airport, Runway 17R/35L is equipped with a full-length parallel taxiway (Taxiway A) and eight connector taxiways (Taxiways A, B, C, D, E, F, G, and H). For the purposes of the annual service volume analysis, Runway 17L/35R is not equipped with a full-length parallel taxiway but is accessible via five connector taxiways (Taxiways C, D, E, F, and H).

Meteorological Conditions

Visual Flight Rule conditions occur 99 percent of the time at the Airport.

Meteorological conditions influence the utilization of an airport's runway. Variations in the weather resulting in reduced visibility minimums typically reduces airfield capacity. Airfield capacity can be diminished when visibility and cloud ceilings are lower as aircraft spacing increases under poor conditions. As noted in **Chapter 1**, the Airport experiences visual flight rule (VFR) conditions more than 99 percent of the time, with marginal VFR conditions, instrument flight rule (IFR) conditions, and low IFR conditions occurring less than 1 percent of the time. During IFR conditions, only Runway 17R/35L has the requisite instrumentation and published approach procedures to allow operations.

Percentage of Touch-and-Go Operations

A touch-and-go operation is defined as a landing followed by an immediate takeoff without coming to a stop or exiting the runway. It is a practice maneuver typically associated with flight training activity. While each touch-and-go operation accounts for two runway operations (one landing and one takeoff), this procedure typically takes less time to complete than separate arrivals or departures. Therefore, airports with a high percent of touch-and-go operations will have a greater airfield capacity than an airport with less training activity. All touch-and-go operations occur within 20 miles of the Airport and therefore are considered local operations. As was noted in **Chapter 2**, local operations represent approximately 14 percent of total airport operations. Based on feedback provided by ATCT personnel, it is estimated that approximately 75 percent of local operations at Henderson Executive Airport in 2019 were touch-and-go, which equates to approximately 10 percent of total operations, as detailed in **Table A.1** below. As local operations are projected to decrease in the 20-year planning horizon, touch-and-go operations, as a percentage of total operations also are expected to diminish. In 2039, touch-and-go operations are anticipated to account for 7.5 percent of total operations.

Table A.1 – *Touch-and-Go Operations Forecast*

Year	Total Operations	Local Operations	Touch-and-Go Operations
2019	72,644	10,345	7,759
2024	84,597	11,124	8,343
2029	93,632	11,325	8,494
2034	99,491	10,983	8,238
2039	109,429	10,925	8,194
AAGR 2019-2039	2.53%	0.28%	0.28%

Sources:
FAA Air Traffic Activity Data System.
Kimley-Horn, 2020.

Note:
AAGR = average annual growth rate

Airspace Limitations

As noted in **Chapter 1**, arriving IFR traffic must fly on the east side of the airfield to account for McCarran International Airport's traffic, and that terrain south of the airfield results in a relatively steep descent path for approaches on Runway 35L.

Aircraft Fleet Mix

Due to differing performance characteristics, the size of aircraft operating at an airport have a significant impact on an airfield's capacity. This is because heavier aircraft generate wake turbulence, and air traffic control must provide increased spacing between large and small aircraft while flying into the airport to ensure safety. The increased spacing reduces the total number of aircraft that can takeoff or land over a period of time. As seen below, the FAA has designated four categories of aircraft for capacity determinations that are based on the maximum certified takeoff weight, the number of engines, and wake turbulence. It should be noted these categories are unrelated to aircraft approach category, airplane design group, and Airport Reference Code (ARC).

- **Class A:** 12,500 pounds (lbs.) or less, single-engine.
- **Class B:** 12,500 lbs. or less, multiengine.
- **Class C:** 12,500 to 300,000 lbs., multiengine.
- **Class D:** more than 300,000 lbs., multiengine.

For the purposes of a demand-capacity analysis, mix index is calculated by adding the percentage of Class C aircraft to three-times the percentage of Class D aircraft (expressed as C+3D). Calendar year 2019 aircraft operations by aircraft weight class data were collected from the FAA's Traffic Flow Management System Counts database to develop mix index calculations. According to the database, there were approximately 9,158 operations conducted by Class C aircraft in 2019, which represented 12.6 percent of total operations. There were no Class D operations conducted at the Airport in 2019. Forecast Class C operations were based on fleet mix projections used for the development of future noise contours presented in the Airport Layout Plan (ALP). In 2019, approximately 19 percent of Class C operations were conducted by turboprop aircraft, and 81 percent were conducted by jet aircraft. By 2039, turboprop activity is anticipated to account for approximately 16 percent of Class C operations, and jet activity is expected to account for 84 percent of Class C operations. Existing and forecast fleet mix indices are presented in **Table A.2**.

Table A.2 – *Aircraft Fleet Mix for Demand-Capacity Analysis*

Aircraft Class	2019 (existing)	2024	2029	2034	2039
Classes A and B	87.4%	85.4%	83.4%	81.2%	80.0%
Class C	12.6%	14.6%	16.6%	18.8%	20.0%
Class D	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%
Mix Index (C+3D)	12.6	14.6	16.6	18.8	20.0

Sources:
FAA Traffic Flow Management System Counts Database.
FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2020.

Percent Arrivals

Typically, a lower percentage of arrivals increases hourly airfield capacity because arriving aircraft must slow down to use exit taxiways, whereas departing aircraft are generally prepared for takeoff once they enter an active runway. For the purposes of the demand/capacity analysis, it was assumed that arrivals accounted for 50 percent of total operations.

A.1.2. Airfield Capacity Analysis

Based on factors impacting airfield capacity at the Airport, application of methodologies and guidance reported in FAA AC 150/5060-5 were used to determine peak hour capacity and annual service volume.

Determination of hourly capacity and annual service volume first requires selection of the proper airfield configuration depicted in **Figure 3-2** of FAA AC 150/5060-5. The appropriate configuration (Drawing No. 2) and fleet mix for the Airport (0-20) results in an unconstrained VFR hourly capacity of 197 operations, an IFR hourly capacity of 59 operations, and an annual service volume of 355,000 operations. These values are then adjusted based on factors identified above to calculate airfield capacity for a specific airport. The following assumptions were incorporated into the hourly capacities and annual service volume calculations:

- Touch-and-go factor equals 1.0 for VFR conditions and 1.0 for IFR conditions.
- Taxiway exit factor equals 0.9 for VFR conditions and 1.0 for IFR conditions.
- Demand ratios for calculations of annual service volumes used annual operations, peak month operations, and peak hour operations described in **Table A.2**, and peak month average day operations (peak month divided by 31).
- Percentage of arrivals and departures were assumed to be split 50 percent/50 percent.
- Mix indices from **Table A.3** were used.

Existing and forecast hourly VFR and IFR capacities and annual service volume are presented in **Table A.3.** As shown, the Airport's VFR and IFR hourly capacities are anticipated to remain constant throughout the 20-year planning horizon at 177 and 59, respectively. Annual Service Volume is expected to decrease slightly through 2039, which is attributed to a higher proportion of Class C operations and more pronounced peak periods of activity.

Table A.3 – *Airfield Capacity Summary*

Item	2019 (existing)	2024	2029	2034	2039
Annual Operations	72,644	84,597	93,632	99,491	109,429
Peak Month Operations	6,717	8,020	9,100	9,914	11,180
Peak Month Average Day Operations	217	259	294	320	361
Peak Hour Operations	47	56	64	69	78
Touch-and-Go Factor (T)	1	1	1	1	1
Visual Flight Rule Taxiway Exit Factor (E)	0.9	0.9	0.9	0.9	0.9
Instrument Flight Rule Taxiway Exit Factor (E)	1	1	1	1	1
Annual Demand/Average Daily Demand Ratio (D)	335.3	327.0	319.0	311.1	303.4
Average Daily Demand/Peak Month Average Day Ratio (H)	4.6	4.6	4.6	4.6	4.6
Weighted Hourly Visual Flight Rule Capacity (Cw)	**177**	**177**	**177**	**177**	**177**
Weighted Hourly Instrument Flight Rule Capacity (Cw)	**59**	**59**	**59**	**59**	**59**
Annual Service Volume (Cw*D*H)	**275,120**	**268,344**	**261,735**	**255,288**	**249,001**

Sources:
FAA Advisory Circular 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2020.

A.1.3. Aircraft Delay

FAA AC 150/5060-5 provides guidance to calculate annual aircraft delay in terms of minutes per aircraft operation. This is an important component because it highlights impacts of potential airfield constraints compared with expected activity and identifies if capacity enhancing improvements may be needed. Delay is calculated based on the ratio of existing and forecast operations to annual service volume.

Table A.4 presents the relationship between the ratio of annual demand to annual service volume and the subsequent average minutes of delay per aircraft operation.

Forecast annual operations and expected average aircraft delay (minutes per operation) and total annual aircraft delay (hours) are depicted in **Table A.5.** As shown, it is anticipated that the Airport will incur approximately 620 hours of total aircraft delay by 2039.

Table A.4 – *Annual Service Volume and Aircraft Delay*

Ratio of Annual Operations to Annual Service Volume	Average Annual Aircraft Delay (Minutes per Operation)
10%	--
20%	0.1
30%	0.2
40%	0.3
50%	0.4
60%	0.5
70%	0.7
80%	0.9
90%	1.4
100%	2.6

Sources:
FAA AC 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2020.

Table A.5 – *Annual Service Volume, Capacity, and Annual Aircraft Delay*

Year	Annual Operations	Annual Service Volume	Ratio of Operations to Annual Service Volume	Delay per Aircraft Operation (minutes)	Total Annual Delay (hours)
2019	72,644	275,120	26%	0.15	182
2024	84,597	268,344	32%	0.21	296
2029	93,632	261,735	37%	0.27	421
2034	99,491	255,288	39%	0.29	481
2039	109,429	249,001	44%	0.34	620

Sources:
FAA AC 150/5060-5, Airport Capacity and Delay.
Kimley-Horn, 2020.

A.2. FAA Design Standards

A.2.1. Runway Design Code

As described in **Chapter 1**, the ARC is comprised of two components: the aircraft approach category (AAC) and the airplane design group (ADG). AAC and ADG also are two components of an Airport's RDC, along with a third component, the approach visibility. As shown in **Table A.6**, approach visibility refers to a runway's visibility minimums expressed by runway visual range (RVR) in terms of feet.

Table A.6 – *Visibility Minimums*

Runway Visibility Range (feet)	Flight Visibility Category (statute miles)
VIS	Visual approaches only
5,000	Not lower than 1 mile
4,000	Lower than 1 mile, but not lower than ¾ mile
2,400	Lower than ¾ mile, but not lower than ½ mile
1,600	Lower than ½ mile, but not lower than ¼ mile
1,200	Lower than ¼ mile

Source:
FAA Advisory Circular 150/5300-13A, Airport Design.

The Airport's most recent published procedures indicate that visibility minimums for both Runway 17L/35R and Runway 17R/35L support 1¼ mile visibilities. The GPS approach procedures are congruent with RVR 5000 category; therefore, after combining the Airport's existing and future ARCs with visibility minimums, the applicable RDCs are C-II-5000 (existing) and D-III-5000 (future) for Runway 17R/35L and B-II-5000 (existing and future) for Runway 17L/35R.

Table A.7 compares existing runway dimensions with design and separation standards based on the existing and future RDCs. A review also was performed against the draft AC 150/5300-13B. However, it was determined that there were no changes in the airport design standard requirements for Henderson Executive Airport.

Table A.7 – *FAA Runway Design and Separation Standards*

Design Criteria	Runway 17R/35L			Runway 17L/35R	
	Existing Conditions	FAA C-II-5000 Standards	FAA D-III-5000 Standards	Existing Conditions	FAA B-II-5000 Standards
Runway Design					
Runway Width	100’	100’	100’ [1]	75’	75’
Shoulder Width	10’ [2]	10’	20’ [1]	10’ [2]	10’
Blast Pad Width	140’	120’	140’ [1]	95’	95’
Blast Pad Length	500’	150’	200’	150’	150’
Runway Protection					
Runway Safety Area (RSA)	Length Beyond Runway End	1,000’	1,000’	1,000’	300’
	Length Prior to Threshold	600’	600’	600’	300’
	Width	500’	500’ [3]	500’	150’
Runway Object Free Area	Length Beyond Runway End	1000’	1,000’	1,000’	300’
	Length Prior to Threshold	600’	600’	600’	300’
	Width	800’	800’	800’	500’
Runway Obstacle Free Zone	Length Beyond Runway	200’	200’	200’	200’
	Width	400’	400’	400’	400’
Approach Runway Protection Zone	Length	1,700’	1,700’	1,700’	1,000’
	Inner Width	500’	500’	500’	500’
	Outer Width	1,010’	1,010’	1,010’	700’
	Acres	29.465	29.465	29.465	13.770
Departure Runway Protection Zone	Length	1,700’	1,700’	1,700’	1,000’
	Inner Width	500’	500’	500’	500’
	Outer Width	1,010’	1,010’	1,010’	700’
	Acres	29.465	29.465	29.465	13.770
Runway Separation					
Holding Position	200’	250’	275’ [4]	125’	200’
Parallel Taxiway Centerline	300’	300’	400’	N/A	240’
Aircraft Parking Area	400’	400’	500’	N/A	250’

Sources:
February 2020; FAA DRAFT AC 150/5300-13B, Airport Design.
Kimley-Horn, 2020.

Notes:
Red text denotes unmet standards.
Black text denotes satisfied standards.
1 For airplanes with maximum certificated takeoff weight of 150,000 pounds or less, the standard runway width is 100 feet, the shoulder width is 20 feet, and the runway blast pad width is 140 feet.
2 Nonpaved shoulders. The FAA recommends paved shoulders for runways accommodating Aircraft Design Group III aircraft.
3 An RSA width of 400 feet is permissible.
4 This distance is increased 1 foot for each 100 feet above sea level.

A.2.2. Taxiway Design Group

Applicable design standards for TDG are found in **Table A.8**.

Table A.8 – *FAA Taxiway Design Group Standards*

Design Criteria	Taxiway Design Group 2
Taxiway Width	35’
Taxiway Edge Safety Margin	7.5’
Taxiway Shoulder Width	15’
Taxiway Fillet Dimensions	Table 4-5of AC 150/5300-13A

Sources:
FAA Advisory Circular 150/5300-13A, Airport Design.
Kimley-Horn, 2020.

Note:
Paved taxiway shoulders are recommended for Aircraft Design Group (ADG)-III aircraft; turf aggregate-turf, soil cement, lime or bituminous stabilized soil are recommended adjacent to paved surfaces accommodating ADGs I and II aircraft.

Taxiway protection and separation standards are determined by the ADG. Applicable standards for ADGs II and III are found in **Table A.9**. ADG II taxiway design standards apply to the taxiways between the parallel runways and Taxiway R.

Table A.9 – *FAA Taxiway Design Standards*

Design Criteria	Airplane Design Group II	Airplane Design Group III
Taxiway Protection		
Taxiway Safety Area	79’	118’
Taxiway Object Free Area	131’	186’
Taxilane Object Free Area	115’	162’
Taxiway Separation		
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	105’	152’
Taxiway Centerline to Fixed or Movable Object	65.5’	93’
Taxilane Centerline to Parallel Taxilane Centerline	97’	140’
Taxilane Centerline to Fixed or Movable Object	57.5’	81’
Wingtip Clearance		
Taxiway Wingtip Clearance	26’	34’
Taxilane Wingtip Clearance	18’	22’

Sources:
FAA Advisory Circular 150/5300-13A, Airport Design.
Kimley-Horn, 2020.

In draft AC 150/5300-13B, there are some significant changes to the taxiway design standards. First is a further subdivision of TDG 2 into 2A and 2B. TDG 2A represents aircraft with outer-to-outer main gear widths between 15 and 20 feet and cockpit to main gear distances between 0 and 40 feet. TDG 2B represents aircraft with outer-to-outer main gear widths between 0 and 20 feet and cockpit to main gear distances between 40 and 60 feet. Using these updated definitions, TDG 2A is applicable for taxiways between the parallel runways and Taxiway R, and TDG 2B is applicable to the remaining taxiway segments. However, while TDG 2 is further subdivided into 2A and 2B, there is no difference in taxiway widths, taxiway edge safety margins, nor taxiway shoulder widths between them nor are there any differences from current TDG design standards.

Taxiway design standards associated with the ADG have been updated in draft AC 150/5300-13B (see **Table A.10**). Except for the Taxiway Safety Area (TSA), which does not change, requirements are slightly reduced. These reductions were determined through additional analysis of taxiing operations and now are generally more in line with International Civil Aviation Organization (ICAO) standards.

Table A.10 *– FAA Taxiway Design Standards per Draft AC 150/5300-13B*

Design Criteria	Airplane Design Group II	Airplane Design Group III
Taxiway Protection		
Taxiway Safety Area	79’	118’
Taxiway Object Free Area	124’	171’
Taxilane Object Free Area	110’	158’
Taxiway Separation		
Taxiway Centerline to Parallel Taxiway/Taxilane Centerline	105’	144’
Taxiway Centerline to Fixed or Movable Object	62’	86’
Taxilane Centerline to Parallel Taxilane Centerline	94’	138’
Taxilane Centerline to Fixed or Movable Object	55’	79’
Wingtip Clearance		
Taxiway Wingtip Clearance	23’	27’
Taxilane Wingtip Clearance	16’	20’

Sources:
FAA Draft Advisory Circular 150/5300-13B, Airport Design.
Kimley-Horn, 2020.

A.3. Airside Facilities

A.3.1. Runway Requirements

Runway Orientation

According to FAA guidance, when a runway orientation provides less than 95 percent wind coverage for the aircraft that are forecast to use the airport on a regular basis, a crosswind runway may be required.[1] With a forecast future ARC of D-III, the Airport's runway configuration should provide availability of at least 95 percent on the basis of the crosswind component not exceeding 16 knots. A crosswind coverage analysis for Runway 17/35 was performed in **Chapter 1**, which used available wind data from the NOAA National Climate Data Center as recorded by the Airport's Automated Weather Observing Station (AWOS) for the years 2010 through 2019. This analysis showed that the existing runway orientation of 17/35 provides wind coverage for the D-III aircraft category (16 knots) that exceeds the FAA's 95 percent recommendation under IFR, VFR, and all-weather conditions. However, IFR wind coverage for the crosswind component of 13 knots as well as all wind coverages for the crosswind components of 13 and 10.5 knots, are below the 95 percent threshold. For reference, the results of the analysis are displayed below in **Table A.11**.

Table A.11 *– Crosswind Coverage for Runway 17/35 (true headings of 180°, 0°)*

Crosswind	VFR Wind Coverage	IFR Wind Coverage	All Weather Coverage
10.5 knots	93.15%	90.38%	93.14%
13 knots	96.63%	93.12%	96.61%
16 knots	98.82%	95.91%	98.79%
20 knots	99.73%	98.21%	99.72%

Sources:
FAA Wind Rose Generator 2019 (true runway headings of 180°, 0°).
NOAA National Climate Data Center Henderson Executive Airport (2010-2019) (total 83,576 observations).
Kimley-Horn, 2020.

Notes:
VFR = Visual Flight Rules
IFR = Instrument Flight Rules
Red text = wind coverage does not meet the FAA's 95 percent recommendation.

The wind data was used to determine if a realignment of the runway may obtain 95 percent coverage for VFR, IFR, and all-weather wind coverage for all crosswind components. As presented below in **Table A.12**, the results of this analysis show that a clockwise rotation of the runway by 10 degrees would provide at least 95 percent wind coverage for the 13-, 16-, and 20-knot crosswind components in VFR, IFR, and all weather conditions. However, it would not satisfy the 95 percent recommendation for the IFR wind coverage for 10.5 knots.

1 FAA Advisory Circular 150/5300-13A, Change 1, Airport Design, 2014.

Table A.12 – *Crosswind Coverage – 10-Degree Clockwise Rotation of the Runway*

Crosswind	VFR Wind Coverage	IFR Wind Coverage	All Weather Coverage
10.5 knots	95.43%	92.45%	95.42%
13 knots	98.05%	95.04%	98.03%
16 knots	99.43%	97.10%	99.42%
20 knots	99.89%	98.69%	99.88%

Sources:
FAA Wind Rose Generator 2019 (true runway headings of 180°, 0°).
National Oceanic and Atmospheric Administration National Climate Data Center Henderson Executive Airport (2010-2019) (total 83,576 observations).
Kimley-Horn, 2020.

Notes:
VFR = Visual flight rules
IFR = Instrument flight rules
Red text = wind coverage does not meet the FAA's 95 percent recommendation.

A third analysis was completed using the updated wind data to find the optimal runway orientation at the Airport. As shown in **Table A.13**, a 30-degree clockwise rotation of the runway would meet the 95-percent threshold for all wind coverages and crosswind components except for the IFR crosswind component of 10.5 knots. The crosswind coverage for 10.5 knots in IFR conditions is much closer to the 95 percent recommendation; however, it is not met. This orientation of the runway provided the best possible wind coverage for a single runway alignment.

Table A.13 – *Crosswind Coverage – 30-Degree Clockwise Rotation of the Runway*

Crosswind	VFR Wind Coverage	IFR Wind Coverage	All Weather Coverage
10.5 knots	96.25%	94.41%	96.24%
13 knots	98.28%	96.38%	98.27%
16 knots	99.49%	97.88%	99.48%
20 knots	99.91%	98.76%	99.90%

Sources:
FAA Wind Rose Generator 2019 (true runway headings of 180°, 0°).
National Oceanic and Atmospheric Administration National Climate Data Center Henderson Executive Airport (2010-2019) (total 83,576 observations).
Kimley-Horn, 2020.

Notes:
VFR = Visual flight rules
IFR = Instrument flight rules
Yellow text = wind coverage falls between 94 percent and 95 percent.

Based upon the analysis conducted, no runway orientation provides 95 percent coverage for the IFR 10.5-knot crosswind component. IFR conditions represent approximately 0.6 percent of recorded observations at the Airport.[2] This low percentage of IFR conditions, coupled with the fact that, generally, smaller aircraft that are susceptible to these low crosswind components will not be operating in IFR conditions, suggests that a major realignment of the runway will likely not be beneficial and could also be very impactful to on- and off-airport facilities. Therefore, while a 30-degree clockwise rotation provides the optimal runway alignment, it is likely not feasible. A minor clockwise rotation, in the order of 10 degrees, appears to provide satisfactory wind coverages for all users of the Airport 99.4 percent of the time.

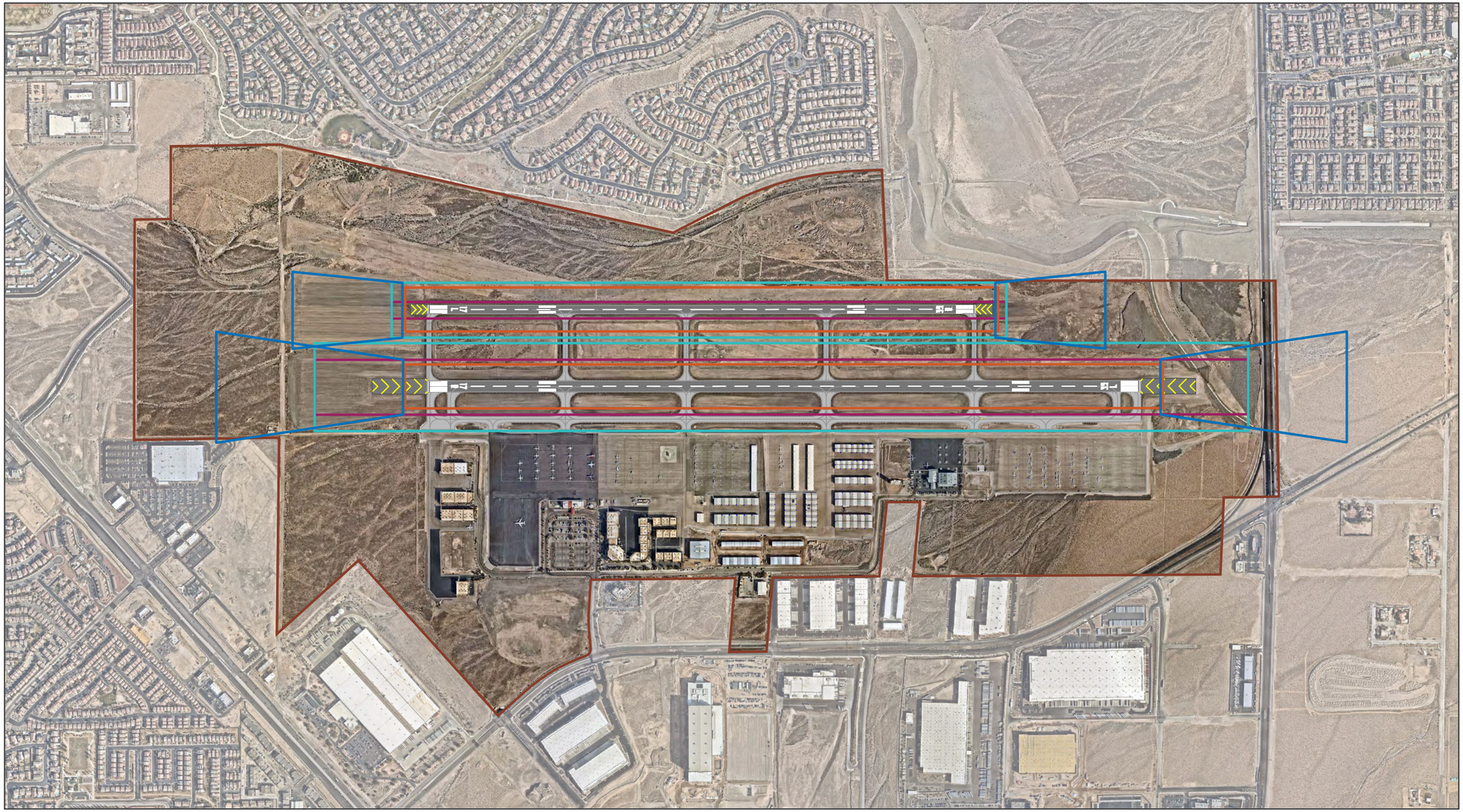
Runway Safety Areas

The runway safety area (RSA) is a two-dimensional designated surface on the ground surrounding a runway to reduce the risk of damage to an aircraft in the event of an undershoot, overshoot, or excursion from the runway. The RSA must be cleared and graded, have no hazardous surface variations, and be free of all objects except for those needed for air navigation or aircraft ground maneuvering. While it is desirable not to have any objects in RSAs, it has been determined that the location of some NAVAIDs is critical for proper functioning. In this case, a "fixed-by-function" designation is given to certain NAVAIDs and allows them to be located within RSAs. **Table 6.1** in FAA AC 150/5300-13A provides a list of fixed-by-function NAVAIDs. Additionally, NAVAIDs located within the RSA must meet frangibility requirements. According to the FAA, "frangible" refers to an object that retains its structural integrity but, on impact from a greater load, breaks, distorts, or yields in such a manner as to present the minimum hazard to aircraft.

RSA design standards are also published in FAA AC 150/5300-13A and are a function of RDC. These standards cannot be modified through a modification of standards (MOS) process and should be continually evaluated for all practicable alternatives to improve any substandard RSAs. This section presents a review of RSAs for each runway at Henderson Executive Airport based on airport geospatial information systems (AGIS) and aerial data. Additionally, **Figure A.1** below highlights standard and nonstandard objects within the RSAs. Ultimately, all objects without a fixed-by-function designation should be removed from the Airport's RSAs.

2 As defined in **Chapter 1**, instrument flight rule (IFR) conditions occur when the cloud ceiling is less than 1,000 feet above ground level and/or the visibility is less than 3 statute miles. Only properly trained and equipped pilots operating aircraft using navigational systems that provide lateral and/or vertical path guidance based on specific meteorological conditions are permitted to fly under IFR conditions.

Figure A.1 – *RSAs/ROFAs/OFZs/RPZs at Henderson Executive Airport*



LEGEND

- Airport Boundary
- Runway Object Free Area
- Runway Obstacle Free Zone
- Runway Safety Area
- Runway Protection Zone

0 800 1600 Feet

Source:
Kimley-Horn, 2020.

Runway 17R/35L

The RSA for an RDC C-II-5000 runway is 500 feet wide and extends 1,000 feet beyond the departure end of the runway. FAA AC 150/5300-13A notes that it is permissible to reduce the RSA width to 400 feet. However, since the RSA width for an RDC D-III-5000 runway is also 500 feet, it is recommended to not reduce the RSA width requirement in the short term. Objects inside the RSA that have fixed-by-function designations include runway and taxiway lights, airfield signs, runway end identifier lights (REILs), and precision approach path indicators (PAPIs).

Hold lines along Runway 17R/35L need to be relocated outside of the RSA. PAPI power and control units, and a portion of the detention basin is within the RSA. Manhole covers within the RSAs should be aircraft rated and consideration given to relocate them outside of the RSA.

A review of the RSA reveals multiple nonstandard conditions. While PAPIs have a fixed-by-function designation within the RSA, **Table 6.1** in FAA AC 150/5300-13A lists PAPI-associated equipment as not being fixed-by-function. PAPI lighting is present on both runway ends, each with an adjacent power and control unit (PCU) within the Runway 17R/35L RSA, located approximately 155 feet from the runway centerline. Since these PCUs are considered associated equipment and are not fixed-by-function, it is recommended the PCUs are relocated outside of the RSA.

As previously stated, the runway's hold lines are not properly located as they neither meet the required 250-foot (RDC C-II-5000) nor the 275-foot (RDC D-III-5000) distance from runway centerline. Because of this, all 13 hold lines associated with Runway 17R/35L are within the RSA. Additionally, approximately 652 feet of the RSA extends into a portion of the detention basin south of Runway 35L that is not graded to standard. If this area cannot be graded, the FAA may authorize the use of declared distances as an alternative means of meeting RSA standards.

ADG III aircraft, those with wingspans greater than 100 feet, will have a portion of the aircraft inside the RSA. All portions of an aircraft are to remain out of the RSA unless it has been cleared to use the runway. The segmented circle is partially within the RSA. However, as this comprised of flush mounted painted concrete pads, it does not intrude upon the RSA.

Several utility vaults and manhole covers are located within the RSA that are flush with the ground. Although not on the FAA's fixed-by-function list, since they are flush with the ground, they do not interfere with the RSA's function. CCDOA should ensure that the manhole covers are aircraft rated to withstand the critical design aircraft. Consideration should also be given to relocating these facilities outside of the RSA to enable maintenance to occur within these facilities without requiring runway closures.

Alternatives to mitigate the Runway 17R/35L RSA will be presented in the next phase of this Master Plan Update.

Runway 17L/35R

With an existing and future RDC of B-II-5000, the Runway 17L/35R RSA is 150 feet wide and extends 300 feet beyond the runway departure end. Runway lights and airfield signage are present within the RSA, each having fixed-by-function designations. Like the Runway 17R/35L RSA, several manhole covers are located within the Runway 17L/35R but are flush with the ground and do not interfere with the RSA's function. CCDOA should ensure that the manhole covers are aircraft rated to withstand the critical design aircraft for Runway 17L/35R and consideration should be given to relocating the manholes outside of the RSA to enable maintenance to occur within these facilities without requiring runway closures. No prohibited objects are located within the RSA and the ground on which the RSA resides is properly graded. Therefore, the Runway 17L/35R RSA meets FAA design standards for existing and forecast operations and no mitigative action is required.

Runway Gradient

As the AAC increases, the requirements for longitudinal and traverse gradients become more stringent. It is also important to note that FAA standards have also evolved over time. Ideally, runways are crowned, enabling water to flow off the runway pavement and towards airfield drainage facilities placed in the infields. Published in FAA AC 150/5300-13A, runway grading requirements are described in **Table A.14** below:

Table A.14 – *Runway Grading Requirements*

FAA Standards	AACs: A and B (Runway 17L/35R1)	AACs: C, D, and E (Runway 17R/35L2)
Maximum Longitudinal Grade	±2.0%	±1.50%
Other Longitudinal Grade Standards	Vertical curves for longitudinal grade changes are parabolic. The length of the vertical curve is a minimum of 300 feet for each 1.0 percent of change.	Longitudinal grades may not exceed ±0.80% in the first and last quarter, or first and last 2,500 feet, whichever is less, of the runway length.
Maximum Allowable Grade Change	±2.0%	±1.50%
Other Grade Change Standards	-	No grade changes are allowed in the first and last quarter of the runway length.
Transverse Gradients	Between 1% and 2%	Between 1% and 1.5%

Source:
Kimley-Horn, 2020.

Notes:
1 = Runway 17L/35R has a forecast AAC of B
2 = Runway 17R/35L has a forecast AAC of D
AAC = Aircraft approach category

As part of this Master Plan Update, new topographic data was collected for the airport to determine if the runway gradients meet FAA design standards:

- **Runway 17R/35L:** The middle portion of Runway 17R/35L has a longitudinal gradient of 1.49 percent. However, the north and south quarters of the runway have longitudinal gradients of 1.03 and 1.5 percent, respectively, which exceeds the 0.8 percent maximum gradient for a runway's first and last quarters. Transverse gradients also exceed the FAA standard (maximum of 1.5 percent) for 97 percent of the runway's north quarter, 90 percent of the south quarter, and 100 percent of the middle portion.
- **Runway 17L/35R:** Runway 17L/35R has a longitudinal gradient of 1.39 percent, which is within FAA design standards. However, approximately 60 percent of the runway exceeds the FAA's maximum transverse gradient of 2 percent.

Since both runways do not meet current FAA design standards for runway gradient, it is recommended that gradient corrections are incorporated as part of the D-III airfield redesign project.

Runway Obstacle Free Zones

The runway obstacle free zone (ROFZ) is a volume of airspace centered above the runway centerline, above a surface whose elevation at any point is the same as the elevation of the nearest point on the runway centerline, and extends up to 150 feet above the airport elevation. In the case of Henderson Executive Airport, the ROFZ for both runways extend to 2,642 feet MSL. Additionally, each runway's ROFZ extends 200 feet beyond the runway ends and is 400 feet wide (see **Figure A.4**). The ROFZ must be kept clear during aircraft operations, with the exception of frangible NAVAIDs that need to be located in the ROFZ because of their function. Like RSAs, the modification to standards process does not apply to ROFZs.

Runway 17R/35L

There are NAVAIDs, airfield lighting, and directional signage located within the Runway 17R/35L ROFZ. While these objects are permitted within the ROFZ, CCDOA should ensure that they meet FAA frangibility standards. As previously mentioned, PAPI lighting is present on both runway ends, each with an adjacent PCU. While associated with the functionality of the PAPIs, these PCUs are not permitted within the ROFZ and relocation of the units is recommended. Relocation of the PCUs outside of the RSA also will remove this nonstandard condition.

Runway 17L/35R

The hold lines associated with Runway 17L/35R do not meet FAA separation standards and require relocation. Due to the proximity between the hold lines and runway centerline, aircraft stopped at the hold lines are within the ROFZ, which is not permissible. This nonstandard condition will be mitigated upon the relocation of the runway hold lines. Like the Runway 17R/35L ROFZ, there also are NAVAIDs, airfield lighting, and directional signage located within the Runway 17L/35R ROFZ, all of which are permissible so long as the NAVAIDs are frangible, as described above.

Runway Object Free Areas

The ROFA is an area centered about the runway centerline and should not have any above ground objects protruding above the nearest point of the RSA, including parked aircraft, agricultural operations, and other fixed objects. ROFA dimensions are determined based on the runway's RDC. Like the RSA, objects such as NAVAIDs that are fixed-by-function are to be frangible and are permitted inside the ROFA. Both the Runway 17R/35L and Runway 17L/35R ROFAs contain NAVAIDs, airfield lighting, and signage that are fixed-by-function and do not require relocation. Additionally, several utility vaults and manhole covers are located within the ROFAs. Although not on FAA's fixed-by-function list, the utility vaults and manhole covers are flush with the ground and do not interfere with the ROFA's function. While construction and maintenance activities are less restricted inside the ROFA than in the RSA, consideration may be given to relocating these facilities outside of the ROFA so maintenance can occur within these facilities with minimal impacts to the runways.

As described below, several nonstandard conditions exist within both the Runway 17R/35L and Runway 17L/35R ROFAs. Alternatives to mitigate these nonstandard conditions will be presented in the alternatives analysis of this Master Plan Update.

Runway 17R/35L

The existing ROFA for an RDC C-II-5000 runway is 800 feet wide, centered about the runway, and extends 1,000 feet beyond the runway ends. While the RDC changes to D-III-5000 in the future, it has the same dimensions.

Several nonstandard objects penetrate the Runway 17R/35L ROFA: the Airport's primary wind cone (located south of Taxiway E, east of Runway 17R/35L); two supplemental wind cones (one located south of Taxiway C and one located north of Taxiway F, both east of the runway); the Airport's AWOS (located south of Taxiway C and east of the runway); two supplemental wind sensors (one located between Taxiways H and F, one located south of Taxiway E and adjacent to the segmented circle and wind cone); and the PAPI PCUs for both runway ends. It is recommended these facilities be relocated outside of the ROFA. While the segmented circle is within the ROFA, it is comprised of flush, painted, concrete pads and does not extend above the edge of the RSA elevation. Therefore, the segmented circle does not need to be relocated.

Additional nonstandard objects include a utility box located east of the Runway 17R blast pad, another utility box located south of the AWOS, and a temporary storage area west of the Runway 35L blast pad. The functions of these utility boxes should be identified and relocated outside of the ROFA. Approximately 444 feet south of Runway 35L is a 6-foot-tall chain-link fence that serves as the airport operation area perimeter fence and as a divider between the airfield and the detention basin that is within the Runway 17R/35L ROFA. While a detention basin is permissible within the ROFA, it should not be a wildlife attractant; therefore, the fence should be relocated outside of the ROFA to the extent practical.

Runway 17L/35R

The ROFA for an RDC B-II-5000 runway is 500 feet wide, centered upon the runway, and extend 300 feet beyond the runway ends. There are three nonstandard objects that penetrate the Runway 17L/35R ROFA: a wind sensor (located east of the runway and south of Taxiway F) and the PCUs for the runway's PAPIs (both ends). These objects should be relocated outside of the ROFA.

Runway Protection Zones

According to the FAA, the realization of the RPZ's function is best achieved through Airport control over the area within the RPZs, preferably in fee title, and clearing of above ground objects and incompatible land uses. Examples of compatible and incompatible land uses are found in **Table A.15**. Although the FAA recognizes Airport sponsors may not fully control land within the RPZ, the FAA expects all possible measures to be taken to remove or mitigate existing incompatible land uses and prevent incompatible land uses from occurring.

RPZs have two distinct areas: the central portion of the RPZ and the controlled activity portion of the RPZ. The central portion is defined by an extension of the ROFA to the outer edge of the RPZ. The area outside of the extended ROFA is the controlled activity portion of the RPZ. There are no additional or unique land use guidelines for these distinct areas of the RPZ; however, it is generally understood that the central portion should be free and clear of all objects and some limited objects may be permissible in the controlled activity portion. Any new development within the RPZ should be reviewed and approved by the Airport sponsor with the FAA providing technical assistance and guidance as to whether the proposed development impedes upon the protection of people and property on the ground.

CCDOA land ownership and RPZ land use will be considered in future runway length and orientation alternatives.

Table A.15 – *Runway Protection Zone Land Use Compatibility*

Compatible Land Uses*	Incompatible Land Uses
Farming that meets airport design standards	Buildings and structures (examples include, but are not limited to, residences, schools, churches, hospitals or other medical care facilities, commercial/industrial buildings, etc.)
Irrigation channels that meet the requirements of FAA AC 150/5200-33 and FAA/USDA manual Wildlife Hazard Management at Airports	Recreational land use (examples include, but are not limited to, golf courses, sports fields, amusement parks, or other places of public assembly, etc.)
Airport service roads as long as they are not public roads and are directly controlled by the Airport operator	Transportation facilities (examples include, but are not limited to, rail facilities, public roads/highways, vehicular parking facilities, etc.)
Underground facilities as long as they meet other design criteria, such as RSA requirements, as applicable	Fuel storage facilities (above and below ground)
Unstaffed NAVAIDs and facilities, such as equipment for airports that are considered fixed-by-function in regard to the RPZ	Hazardous material storage (above and below ground)
	Wastewater treatment facilities
	Above ground utility infrastructure (i.e., electrical substations) including any type of solar panel installations

Sources:
FAA AC 150/5300-13A.
FAA, Interim Guidance on Land Uses Within a Runway Protection Zone, 2012.

Notes:
USDA = U.S. Department of Agriculture
RSA = Runway safety area
NAVAID = Navigational aid
RPZ = Runway protection zone
**Compatible land uses noted are those that are permissible without further evaluation.*

Runway 17R/35L

Dimensions for the RPZs were presented in **Table A.7**. The size of the existing and future RPZs for Runway 17R/35L remain the same and encompass approximately 29.47 acres.

The RPZ north of Runway 17R end is almost entirely within Airport property. Approximately 0.1 acres of the northwestern corner of the RPZ extends beyond the Airport property into the Costco Wholesale property and includes about four vehicle parking spaces. The Costco Wholesale development is a newer development, and the area within the RPZ represents less than 0.5 percent of the RPZ and is not in the central portion of the RPZ. Consideration may be given by the County to acquire this land in fee title, or at a minimum, obtain avigation easements. No other incompatible land uses exist within the Runway 17R end RPZ.

The City of Henderson desires to extend Sunridge Heights Parkway to Raiders Way through the Airport property from its current terminus at South Maryland Parkway. A portion of this road is under construction in early 2020 and extends from Raiders Way towards the Quail Aviation Center. Connecting this new portion of Sunridge Heights Parkway to the existing portion would place a public road within the existing C-II RPZs associated with the Runway 17R end. This is an incompatible land use; therefore, the road should either be depressed or aligned such that it is not in the existing or planned RPZs.

RPZs located south of the Runway 35L end extends beyond the Airport's southern boundary and into Bureau of Land Management (BLM) owned land. Approximately 47 percent (13.9 acres) of the RPZ extends onto BLM land. The County has an agreement with the BLM that was originally executed September 7, 1999 and was subsequently amended September 6, 2005, June 29, 2006, and August 2, 2010. This agreement grants BLM management of 110 acres of undeveloped land at North Las Vegas Airport which includes Las Vegas Bearpoppy Habitat and the BLM agrees to keep 102 acres adjacent to Henderson Executive Airport undisturbed and undeveloped as a noise attenuation and safety buffer. The term of the agreement is for 30 years from the original agreement and will automatically renew for a term of ten years unless a termination action is taken by one or both parties. Termination action requires one-year advance notice.

Roughly 7 acres (24 percent) of the RPZ is occupied by the detention basin immediately south of Runway 35L. According to FAA AC 150/5200-33, detention areas can serve as wildlife attractants since they are designed to collect stormwater and control runoff. Therefore, the FAA recommends that detention areas have a maximum detention period of 48 hours for the region's design storm. The basin south of the runways is able to drain 90 percent of storm water volume within 46.5 hours and completely empties in 72 hours. CCDOA should maintain the detention basin in a manner that keeps it free of vegetation and wildlife to maintain the safety of arriving and departing aircraft.

The southerly RPZ also is bisected by Volunteer Boulevard. This existing public road is an incompatible land use, but since it is a preexisting condition, it can remain. However, any modifications to the southerly end of the runway that could affect the location and amount of public roadway within the RPZ will require coordination with the FAA.

Runway 17L/35R

Existing and future RPZs for Runway 17L/35R remain the same size (see **Table A.7**) and encompass approximately 13.77 acres. The RPZ north of the Runway 17L end is entirely on Airport property, features compatible land uses, and is free and clear of above ground objects. Therefore, the RPZ associated with the approach end of Runway 17L meets FAA design standards.

The RPZ south of the Runway 35R end extends beyond Airport property into the BLM-owned land. CCDOA has an agreement with BLM to protect the property (described above).

A portion of the RPZ (encompassing 1.1 acres or approximately 8 percent of the RPZ) features a portion of the same detention pond that is located south of Runway 35L. Except for a 6-foot-tall chain-link fence associated with the adjacent detention basin, the RPZ is free and clear of all above ground objects. The fence is located on the edge of the extended ROFA (or the edge of the central portion of the RPZ). While the Airport does not have ownership or controlling interest of this land, the current land use is compatible and protects against incompatible development.

A.4. Taxiway Requirements

A.4.1. Runway Exit Location Analysis

Analysis Using FAA AC 150/5300-13A

Table 4-13 in FAA AC 150/5300-13A documents exit taxiway cumulative utilization percentages. In other words, the table demonstrates the usefulness of the taxiway and helps to determine if there are more desirable locations for taxiways based upon the fleet mix utilizing a particular airport. An excerpt is shown below (**Table A.16**). In FAA AC 150/5300-13A, aircraft are categorized by weight. This becomes challenging at airports like Henderson Executive Airport, where the heavier aircraft in the fleet mix falls into the lower weight category of "Large" aircraft (which are aircraft greater than 12,500 pounds but less than 300,000 pounds). The business jet aircraft currently using, and forecast to use, the Airport are typically 100,000 pounds or less. Therefore, exit probabilities may be understated when applied to Henderson Executive Airport.

Table A.16 – *Exit Taxiway Cumulative Utilization Percentages*

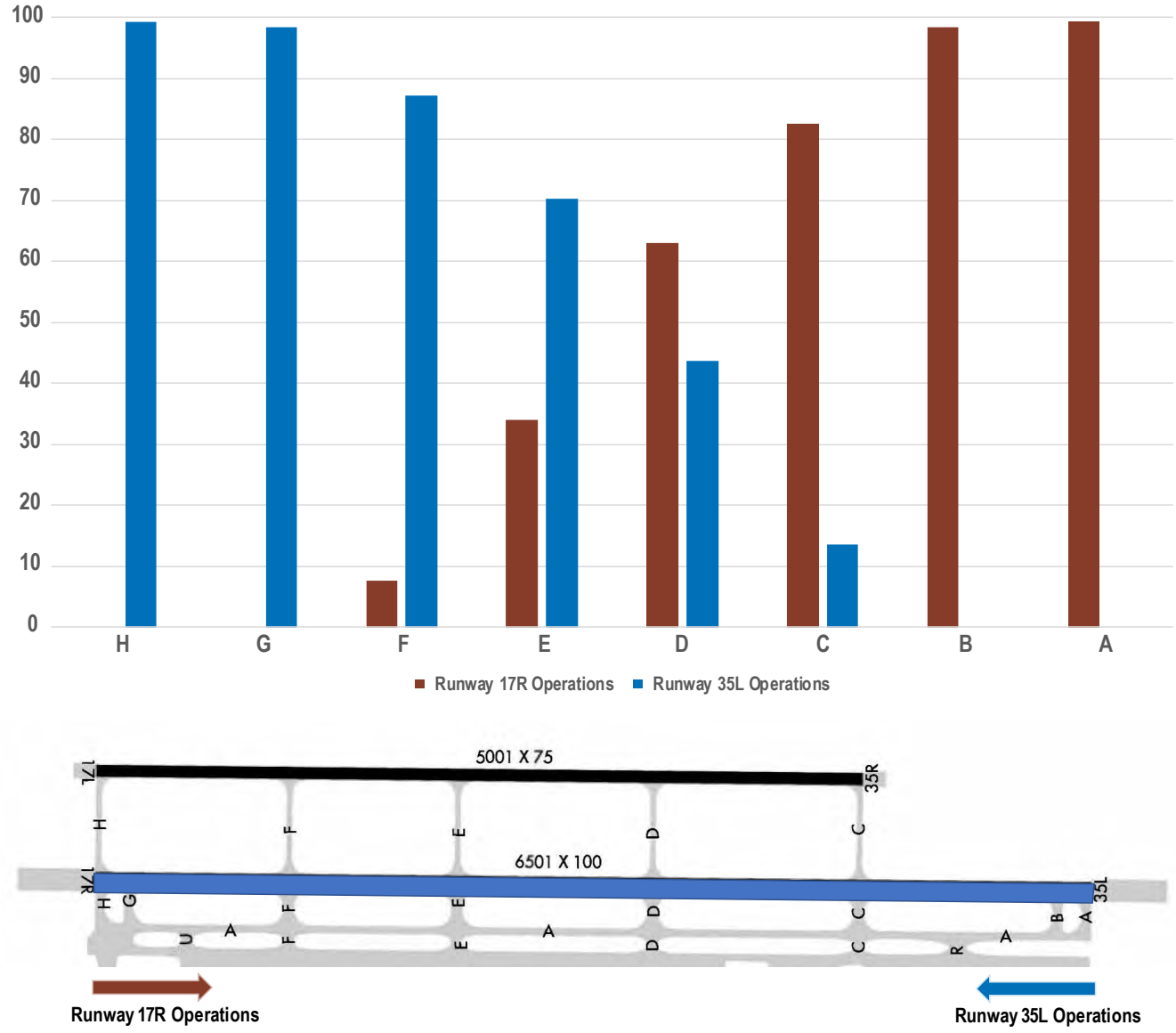
Distance from Landing Threshold to Exit	Small Single Engine (12,500 pounds or less)	Small Twin Engine (12,500 pounds or less)	Large (12,500 pounds to 300,000 pounds)
0'	0%	0%	0%
500'	0%	0%	0%
1,000'	6%	0%	0%
1,500'	39%	0%	0%
2,000'	84%	1%	0%
2,500'	99%	10%	0%
3,000'	100%	39%	0%
3,500'	100%	81%	2%
4,000'	100%	98%	8%
4,500'	100%	100%	24%
5,000'	100%	100%	49%
5,500'	100%	100%	75%
6,000'	100%	100%	92%
6,500'	100%	100%	98%

Source:
FAA Advisory Circular 150/5300-13A, Table 4-13.

Figure A.2 and **Figure A.3** illustrate the exit taxiway cumulative percentages for Runway 17R/35L and Runway 17L/35R, respectively. The Runway 17R/35L results assume the entire fleet mix on the runway and Runway 17L/35R analysis assumed only small aircraft, single-engine and twin-engine. As can be seen from these illustrations, Taxiways A, B, C, F, G, and H are most useful exits for Runway 17R/35L as each of these has a cumulative capture rate of more than 80 percent. For Runway 17L/35R, Taxiways C, D, F, and H capture a cumulative rate of more than 90 percent of the fleet mix using the runway.

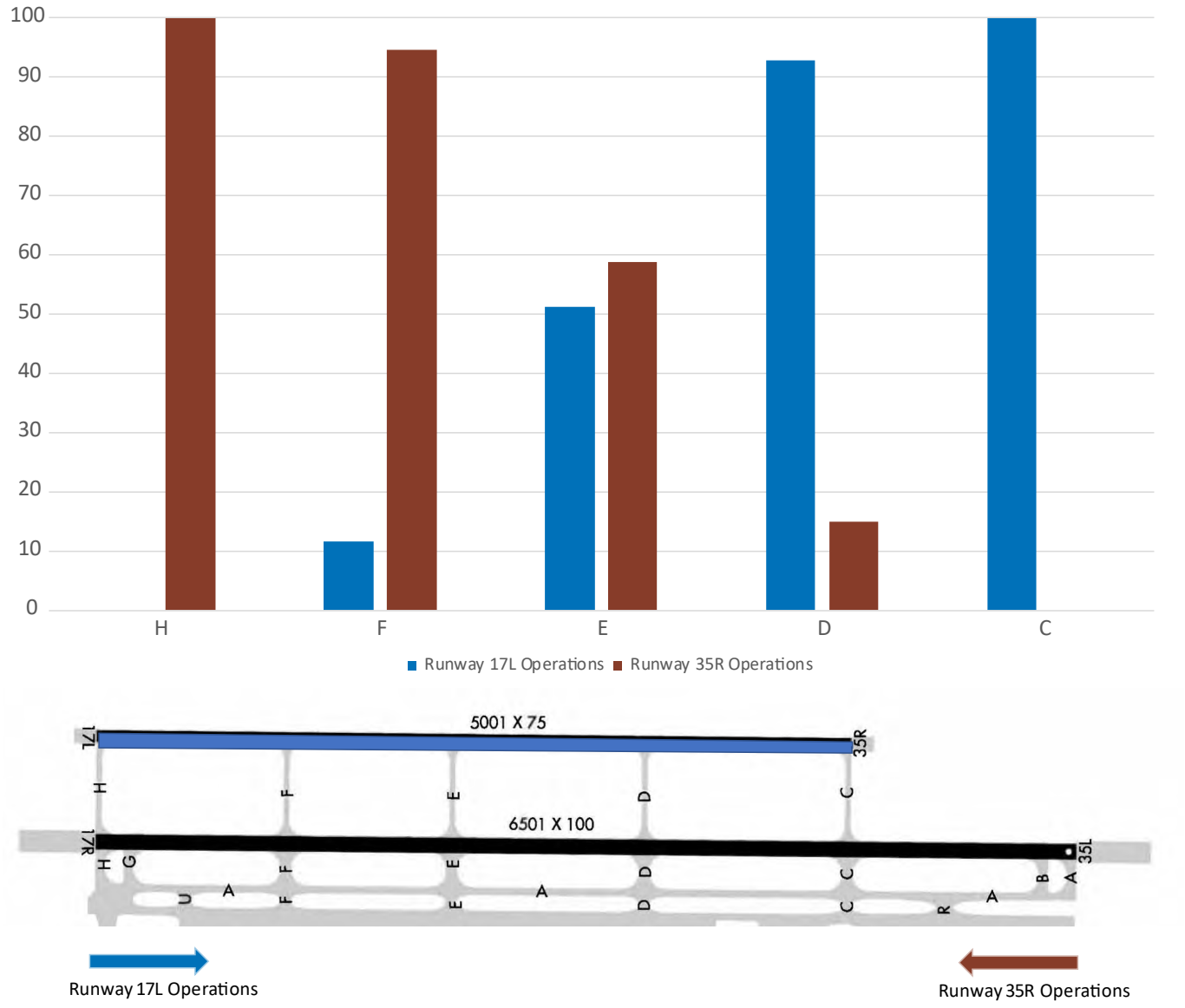
The analysis using FAA AC 150/5300-13A criteria identifies the potential usefulness of runway exit locations and the ability of those exits in enabling aircraft to safely exit the runway. These data do not indicate actual percentages of aircraft using the taxiways to exit the runway. Additionally, runway exits may be placed specifically for lower performance aircraft to enable them to exit the runway faster, reducing runway occupancy time (ROT), and enabling more operations during peak times.

Figure A.2 – *Runway 17R/35L Exit Taxiway Cumulative Utilization Percentages*



Source:
Kimley-Horn, 2020.

Figure A.3 – *Runway 17L/35R Exit Taxiway Cumulative Utilization Percentages*



Source:
Kimley-Horn, 2020.

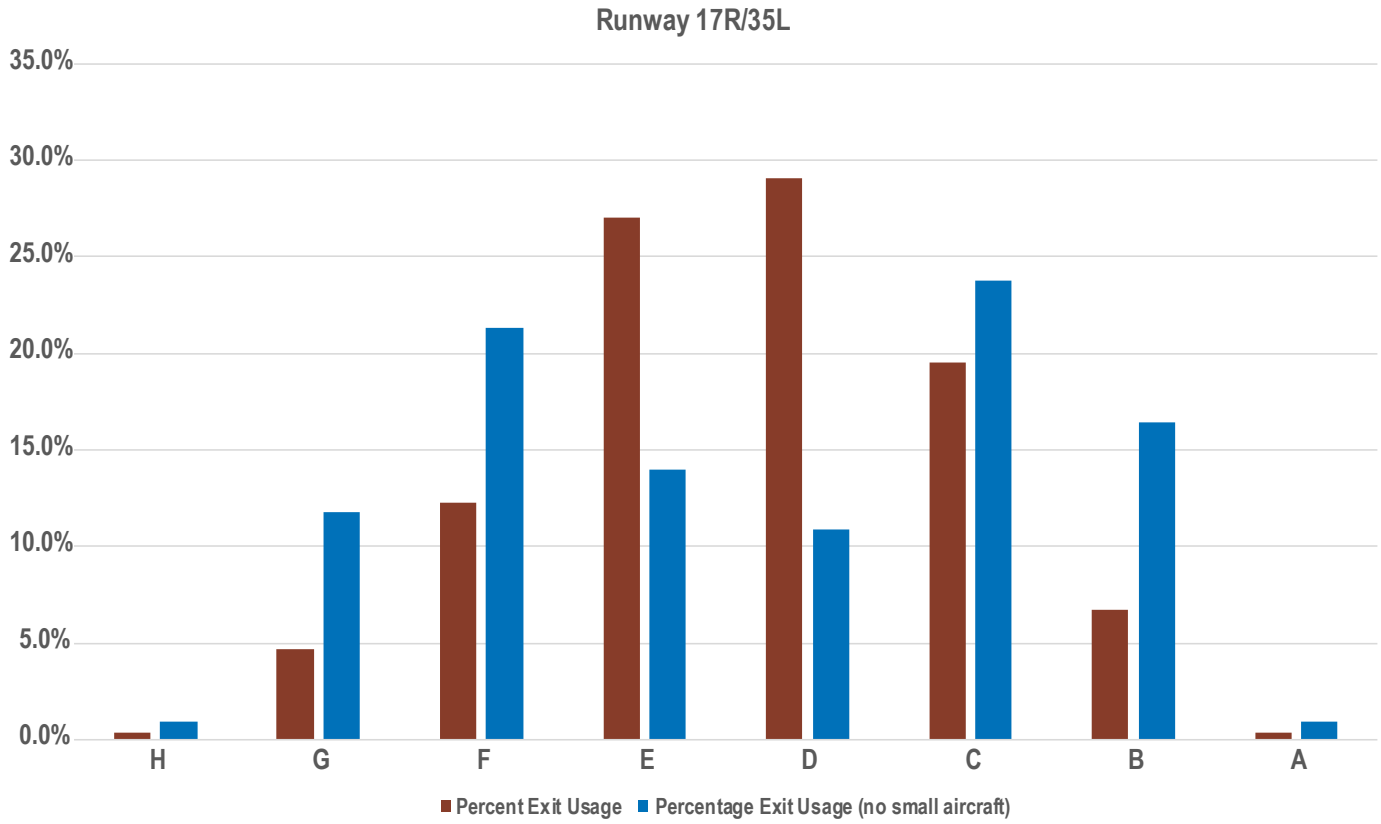
Analysis Using Draft FAA AC 150/5300-13B

The draft version of FAA AC 150/5300-13B sought to update the data in **Table 4-13** of FAA AC 150/5300-13A. This was done using new research data and by segregating the exit probabilities by ADG and AAC. After a careful review of these tables, it was determined that there were some errors in the draft data. Therefore, analysis using the draft AC was not used in determining the functionality of existing runway exits at Henderson Executive Airport.

Analysis Using the Runway Exit Design Interactive Model

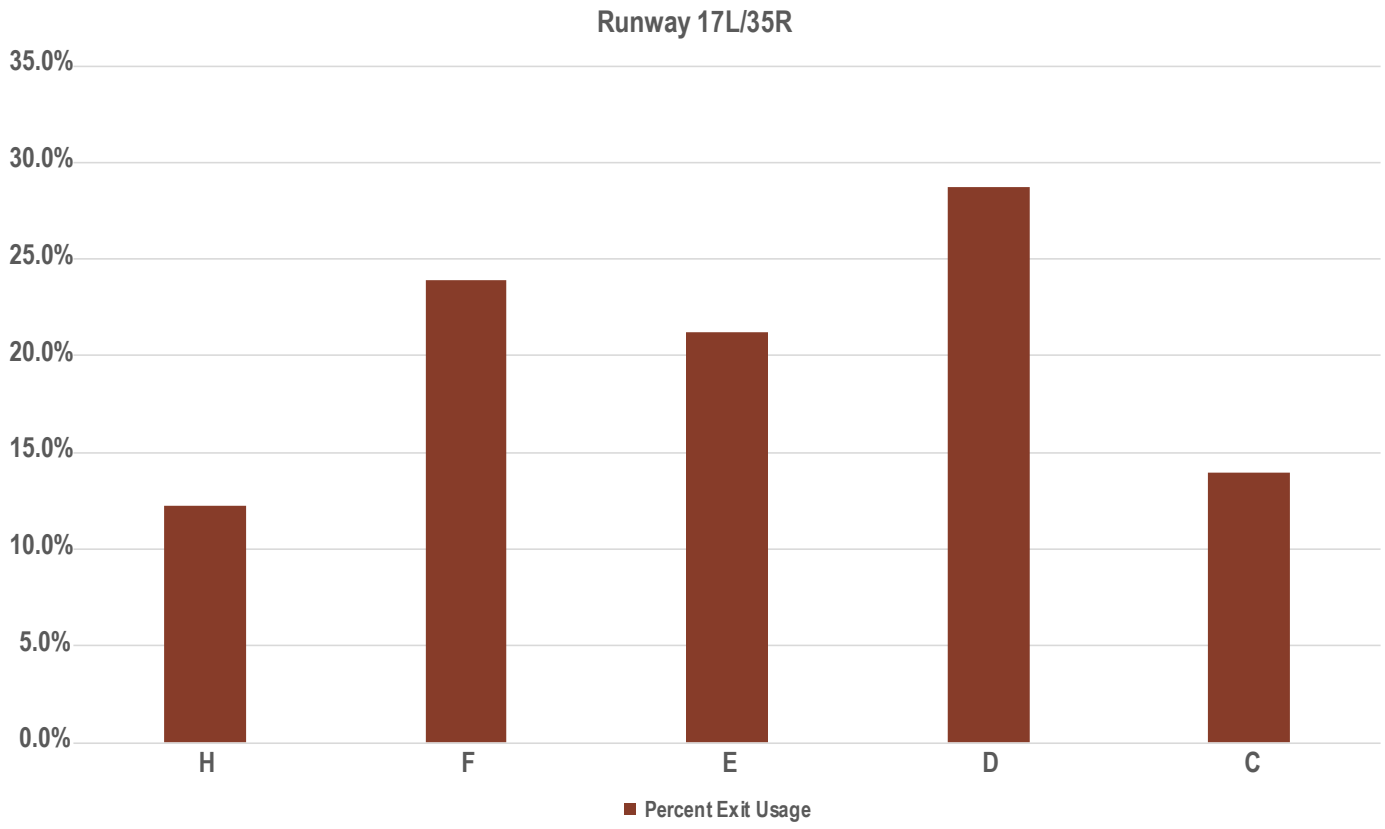
In June 2020, the Air Transportation Systems Laboratory at Virginia Polytechnic Institute and State University published its third release of REDIM. This modeling tool was updated in support with the FAA and is used to help determine appropriate runway exit points. To perform this analysis, some basic airport information such as airport elevation, temperature, and percentage of the time that the runways would be wet was used in conjunction with runway specific data. Taxiway locations, along with runway length, and the aircraft fleet mix using the runway also are inputted into the model. The fleet mix used for this analysis is the same as was used in **Chapter 2** and for the noise modeling analyses. Results of this analysis is presented in **Figure A.4** and **Figure A.5**.

Figure A.4 *– Runway 17R/35L Exit Taxiway Utilization Percentages*



Source:
Kimley-Horn, 2020.

Figure A.5 – *Runway 17L/35R Exit Taxiway Utilization Percentages*



Source:
Kimley-Horn, 2020.

Similar to the analysis performed using the FAA AC 150/5300-13A criteria, the entire fleet mix was assumed on Runway 17R/35L and only the small aircraft were assumed on Runway 17L/35R. Because of the large percentage of operations by the smaller aircraft, the results indicate the middle taxiways of Runway 17R/35L to be highly utilized. Removing the small aircraft from the model for Runway 17R/35L is shown in blue on **Figure A.4** and gives a better indication of critical runway exits for the higher performance aircraft using the Airport.

FAA AC 150/5060-5 Exit Factors

FAA AC 150/5060-5 provides guidance as to which runway exits are useful from a capacity perspective based on the fleet mix. This analysis only reviewed VFR exit factors because IFR conditions occur less than 1 percent of the time at the Airport. As noted previously in this Appendix, the calculated mix index ranges from 12.6 percent in 2019 to 20 percent 2039. As 20 percent represents the top end of the mix index classification in FAA AC 150/5060-5, it is worthwhile to also examine the next mix index, which ranges from 21 percent to 50 percent. From **Figure 3-4** in FAA AC 150/5060-5, for an even split of arrivals and departures, the exit range is 2,000 feet to 4,000 feet from the landing threshold for a mix index between 0 and 20 percent and 3,000 feet to 5,500 feet for a mix index between 21 to 50 percent.

Having two or three exits within the exit range results in the highest exit factor possible for the hourly capacity analysis in FAA AC 150/5060-5. As seen in **Table A.17**, Runway 35L landing operations only provides one exit within 2,000 feet and 4,000 feet from the landing threshold. Taxiway E is just outside this span, measuring 4,139 feet from the Runway 35L threshold. All other runway landing operations have two exits within the exit range.

Table A.17 – *Hourly Capacity Runway Exit Factor*

Landing Operation	Exit Range (Number of Exits)	Small Twin Engine (12,500 pounds or less)
	Between 2,000 feet and 4,000 feet (Mix Index 0 to 20)	Between 3,000 feet and 5,500 feet (Mix Index 21 to 50)
Runway 17R	2	2
Runway 35L	1	2
Runway 17L	2	N/A
Runway 35R	2	N/A

Sources:
Mapping acquired as part of this Master Plan Update.
Kimley-Horn, 2020.

Note:
Distances are measured from the landing threshold to the perpendicular point of the intersecting taxiway.

From an operational perspective, the runway exits for both runways are well placed. Additional runway exits are not required. Further optimization of the taxiways may be reviewed as part of the alternatives analysis and/or may be modified to address other concerns of the airfield, such as runway incursion mitigation (RIM) criteria. For example, to limit crossings in the middle third of the runway, it would be beneficial to close Taxiway E between the runways. Doing this would increase the ROT for Runway 17L/35R landings and reduce the hourly throughput of the runway.

Taxiway Geometry and Runway Incursion Mitigation

The FAA analyzed over six years of runway incursion data to determine how best to proactively mitigate runway incursions. There were two results of these efforts that are pertinent to this Master Plan Update: 1) a focused RIM program across the U.S., and 2) updated taxiway guidance in FAA AC 150/5300-13A. Some key design principles noted in FAA AC 150/5300-13A are listed below.

- **Three-Node Concept.** Design taxiway intersections so that the pilot is presented with only three options; ideally, left, right, and straight.
- **Standard Intersection Angles.** Design turns to be 90 degrees wherever possible. Preferred intersection angles are 30, 45, 60, 90, 120, 135, and 150 degrees.
- **Avoid Wide Expanses of Pavement.** Taxiway to runway interface encompassing wide expanses of pavement is not recommended as it requires placement of signs far from a pilot's eye and reduces the conspicuity of other visual cues.
- **Limit Runway Crossings.** Reducing runway crossings reduces opportunities for human error and helps reduce ATCT workload.
- **Avoid "High Energy" Intersections**. Runway crossings within the middle third of runway occur within the high energy portion of the runway. In this portion of the runway, pilots have the least maneuverability to avoid a collision.
- **Increase Visibility.** Right angle intersections, both between taxiways and between taxiways and runways, provide the best visibility to the left and right for the pilot. Acute angled taxiways should not be used as a runway entrance or crossing point.

» **Avoid "Dual Purpose" Pavements.** Runways used as taxiways and vice versa can lead to confusion. Runways should always be used as a runway only.

» **Indirect Access.** Taxiways should not lead directly from an apron area to the runway. Ideally, a pilot exiting the apron would turn parallel with the runway, proceed to the runway end, turn perpendicular to the runway, and then enter the runway with another 90-degree turn to initiate a takeoff.

A.4.2. Aircraft Storage Hangar Requirements

Hangar requirements were calculated for various based and itinerant aircraft types, and for both conventional hangars and commercial hangars. Conventional hangars are traditional "box" hangars, while commercial hangars include additional space for non-parking uses such as office space.

Currently, 117 of the Airport's 266 based aircraft are stored in conventional or commercial hangars, and the hangars are at capacity with some tenants noting waiting lists. The storage hangar requirements analysis assumed any future increase in the number of based aircraft at Airport would require additional hangar space. Currently, there are no dedicated hangars for itinerant aircraft parking, however, it was assumed that there would be space to accommodate up to three itinerant aircraft in hangars by 2039. The percent of based and itinerant aircraft demanding hangar spaces is shown in **Table A.18**.

Table A.18 – *Count (Percent) of Based Aircraft Demanding Hangar Spaces by Year*

Aircraft Type	2019			2039		
	Based Aircraft	Conventional Hangar	Commercial Hangar	Based Aircraft	Conventional Hangar	Commercial Hangar
Single-Engine Piston	177	54 (31%)	4 (2%)	168	56 (33%)	6 (4%)
Multiengine Piston	23	10 (43%)	1 (4%)	41	19 (46%)	10 (24%)
Single-Engine Turbo	20	6 (30%)	--	40	16 (40%)	10 (25%)
Multiengine Turbo	6	4 (67%)	--	12	7 (58%)	3 (25%)
Small Jet	22	10 (45%)	10 (45%)	48	23 (48%)	23 (48%)
Medium Jet	10	--	10 (100%)	22	6 (27%)	16 (73%)
Large Jet	5	--	5 (100%)	11	3 (27%)	8 (73%)
Rotorcraft	3	3 (100%)	--	12	7 (58%)	5 (42%)
Total	266	87 (33%)	30 (11%)	354	137 (39%)	81 (23%)
Itinerant Aircraft	--	--	--	--	--	3 (3%)

Source:
Kimley-Horn, 2020.

Future additional hangar space needs were based on forecast growth in based aircraft and the following assumptions about aircraft storage:

- Fifty percent of all new based aircraft would be stored in conventional box hangars; fifty percent in commercial hangars.
- Any decrease in based aircraft of a particular aircraft type would result in a decrease in demand for apron parking, not hangar parking.
- Three new commercial hangar spaces would be needed for itinerant aircraft.
- All new itinerant aircraft hangars would be commercial hangars.

Based aircraft conventional hangar storage assumptions were determined using typical wingspan and length measurements by aircraft types (piston, turboprop, jet, rotorcraft). For commercial based aircraft hangars, it was assumed that an additional 20 percent of space would be required for office and administrative space and for commercial itinerant hangars, an additional 10 percent was factored for similar uses. The resulting hangar parking area assumptions are shown in **Table A.19**.

Table A.19 *– Aircraft Hangar Space Assumptions*

Aircraft Type	Based Aircraft		Itinerant Aircraft
	Conventional Hangar	Commercial Hangar	Commercial Hangar
Single-Engine Piston (SF)	1,450	1,750	1,560
Multiengine Piston (SF)	1,800	2,150	1,950
Single-Engine Turbo (SF)	1,800	2,150	1,950
Multiengine Turbo (SF)	2,150	2,600	2,340
Small Jet (SF)	3,600	4,300	3,900
Medium Jet (SF)	6,000	7,200	6,500
Large Jet (SF)	10,800	12,950	11,700
Rotorcraft (SF)	1,200	1,450	1,300
Total	266	87 (33%)	354
Itinerant Aircraft	--	--	--

Sources:
Federal Aviation Administration Aircraft Characteristics Database.
Kimley-Horn, 2020.

Note:
SF = square feet

As discussed in **Chapter 2** and summarized above, the number of based aircraft is forecast to increase from 266 in 2019 to 354 in 2039. Based on this projected growth, the assumed split in storage type, and the assumed spatial requirements, the change in the number of based aircraft for each type of storage was calculated along with the resulting change in hangar storage space required. While all itinerant aircraft currently park on the apron, given the continued forecast growth in corporate activity, CCDOA, or a private investor may want to provide itinerant hangar parking and associated amenities at some point during the 20-year planning horizon. Therefore, this analysis assumed the construction of three itinerant aircraft commercial hangar spaces by 2039. **Table A.20** shows the number of hangar parking spaces and the resulting hangar space requirements by hangar type for both based and itinerant aircraft.

Table A.20 – *Aircraft Hangar Space Required by Year*

	2024	2029	2034	2039
Additional Aircraft Requiring Hangar Storage (number)				
Conventional Hangar	11	22	34	50
Commercial Hangar	11	22	35	51
Itinerant Aircraft Commercial Hangar	--	1	2	3
Total	**22**	**45**	**71**	**104**
Additional Storage Space Required (SF)				
Conventional Hangar	29,050	67,200	111,000	163,550
Commercial Hangar	42,300	82,250	134,400	197,350
Itinerant Aircraft Commercial Hangar	--	11,700	18,200	24,700
Total	**71,350**	**161,150**	**263,600**	**385,600**

Sources:
Federal Aviation Administration Aircraft Characteristics Database.
Kimley-Horn, 2020.

Notes:
SF = square feet
Does not include increases or decreases in aircraft tie-down spaces or additional apron space required for hangar movement areas and the resulting surplus or deficit of apron space.

In early 2020, construction was completed on a full-service aircraft maintenance and repair facility that included 16 T-hangar spaces plus 9 commercial hangars encompassing 40,950 square feet. These additional hangars were not considered in the analysis above as they were built to accommodate current, unmet demand.

A.4.3. Aircraft Parking Apron and Tie-Down Requirements

With some exceptions during periods of peak activity, based aircraft and itinerant aircraft at the Airport use different aprons. As such, aircraft parking requirements for based aircraft and itinerant aircraft demand were calculated separately.

Based Aircraft Apron Requirements

Future changes in apron parking demand for based aircraft were calculated using planning factors for the amount of space needed for individual aircraft types and circulation requirements by similar aircraft. Currently 56 percent of based aircraft at the Airport are parked on an apron, with a higher proportion of small aircraft stored on tie-down spaces and no medium or large jets parked on an apron (see **Table A.21**). As the Airport is projected to experience a continued decline in smaller piston-powered based aircraft, and increases in larger turboprop and jet aircraft, it is anticipated there will be a greater demand for hangar parking compared to apron parking.

Table A.21 also includes apron space assumptions by aircraft type. The apron area required was determined by typical aircraft type wingspan and length. An additional 75 percent of apron area was factored to provide for taxilane and movement areas for T-shade and tie-down spaces.

Table A.21 – *Apron Space Assumptions and Count (Percent) of Based Aircraft Demanding Apron Parking by Year*

Aircraft Type	Apron Space Required (SF)	2019			2039		
		Existing Based Aircraft	Tie-Down	T-Shade	Forecasted Based Aircraft	Tie-Down	T-Shade
Single-Engine Piston	2,280	23	6 (26%)	6 (26%)	41	6 (10%)	6 (15%)
Multiengine Piston	2,850	20	10 (50%)	4 (20%)	40	8 (20%)	4 (10%)
Single-Engine Turbo	2,850	6	2 (33%)	--	12	2 (17%)	--
Multiengine Turbo	3,420	22	2 (9%)	--	48	2 (4%)	--
Small Jet	5,700	10	--	--	22	--	--
Medium Jet	9,500	5	--	--	11	--	--
Large Jet	17,100	3	--	--	12	--	--
Rotorcraft	1,900	266	94 (35%)	55 (21%)	354	81 (23%)	55 (15%)
Total	**--**	**--**	**--**	**--**	**--**	**--**	**3 (3%)**

Sources:
Federal Aviation Administration Aircraft Characteristics Database.
Kimley-Horn, 2020.

Note:
SF = Square feet

Tenant interviews during the inventory process revealed that aircraft owners are increasingly wanting to protect aircraft from the elements and have them stored in a hangar. To reflect this change, any forecast increase in based aircraft was assumed to require hangar storage, while any decrease in based aircraft of a particular type was assumed to reduce based apron parking demand. Tenants also identified a desire for additional T-shade spaces; however, such structures are expensive to construct, have very long returns on investment, limit apron use flexibility, and pavement rehabilitation beneath the structures is not typically eligible for FAA funding. As such, additional T-shade structures were excluded from this analysis.

Apron demand for based aircraft requiring tie-downs was determined by multiplying forecast tie-down spaces by the apron space required for those aircraft types. In addition, it was assumed that any increase in demand for conventional or commercial hangar space for based aircraft (presented previously in **Table A.20**) would require 75 percent of a structure's footprint to provide a buffer for aircraft maneuvering. The resulting apron space required, and the net apron space available, is shown in **Table A.22**.

Although the number of tie-down spaces needed is anticipated to decrease over time, additional apron space is required for circulation to access new hangars. Based on the results of the analysis, the Airport should plan to accommodate a minimum of 241,035 SF of additional aircraft parking apron for based aircraft by 2039. This analysis did not consider if existing apron areas were in optimal locations for operational functionality.

Table A.22 – *Based Aircraft Apron Space Required by Year*

	2024	2029	2034	2039
Change in Apron Tie-Down Space Demand	0	(1)	(5)	(13)
Change in Tie-Down Apron Required (SF)1	0	(2,280)	(11,400)	(29,640)
Change in Based Aircraft Hangar Demand (SF)	71,350	149,450	245,400	360,900
Change in Based Aircraft Hangar Apron Required (SF)	53,513	112,088	184,050	270,675
Total Change in Apron Required (SF)1	53,513	109,808	172,650	241,035
Existing Apron Available (SF)	1,801,069	1,801,069	1,801,069	1,801,069
Total Apron Required (SF)	**1,854,582**	**1,910,877**	**1,973,719**	**2,042,104**

Sources:
Clark County Department of Aviation.
Federal Aviation Administration Aircraft Characteristics Database.
Kimley-Horn, 2020.

Notes:
SF = Square feet
1 Apron space required includes space for aircraft parking plus taxilane and movement areas.

Itinerant Aircraft Apron Requirements

Peak periods of activity occur frequently at the Airport and are driven by numerous events that are unique to the Las Vegas area. Itinerant aircraft are parked on the West Apron during normal operations, and overflow parking during peak periods of activity is accommodated on South Terminal Apron and the Midfield Apron. Based aircraft on these aprons are usually relocated to the South GA Apron or other portions of the airfield as needed during special events. CCDOA regularly tracks operational data during special events including number of aircraft requiring apron parking space, type of aircraft, and duration of stay for itinerant aircraft. As such, itinerant apron demand utilized historical data obtained from CCDOA that profiled the busiest 36 days that occurred in 2019. Assumptions for itinerant apron needs are detailed below and it should be reiterated that the although the Northwest Apron project will satisfy a portion of itinerant aircraft parking needs, the new apron areas were not included as existing conditions in this analysis.

The following assumptions were used to determine itinerant apron demand:

- Itinerant parking should be available to meet design day itinerant operations, which were calculated using the average of the 36 busiest days in 2019.
- Design day itinerant operations were projected to increase at the same growth rate as the annual operations forecast presented in **Chapter 2**.

- Itinerant aircraft are typically parked on the West Apron; overflow parking is accommodated on the South Terminal Apron during peak events. These aprons provide approximately 1,552,000 square feet of aircraft parking and movement space, and include 97 marked tie-down spaces, equating to 16,000 square feet of pavement per aircraft space. This figure was applied to forecast design day itinerant operations to determine future apron needs.
- It was assumed that the Airport is currently at capacity for itinerant aircraft parking and that any additional design day aircraft would require new apron.
- At some point in the future, three itinerant aircraft hangar spaces (6,500-11,700 square feet each) would be available, reducing the need for tie-down spaces; all other itinerant aircraft would be parked on the apron.

Based on these assumptions, the forecast change in demand for apron parking spaces for itinerant aircraft is shown in **Table A.23**. The assumed figure of 16,000 square feet per design day aircraft was applied to calculate the change in apron space required for itinerant aircraft parking (see **Table A.24**).

Table A.23 – *Change in Itinerant Aircraft Demand for Apron Parking Spaces by Year*

	2019	2024	2029	2034	2039
Annual Itinerant Operations	62,299	73,473	82,307	88,508	98,503
Itinerant Design Day Operations	239	278	308	327	360
Change in Itinerant Aircraft Demand for Apron Parking (number)	--	39	69	88	121

Source:
Kimley-Horn, 2020.

Note:
Assumes one hangar space available for itinerant aircraft in 2029, two in 2034, and three in 2039.

Table A.24 – *Itinerant Aircraft Apron Space Required*

	2024	2029	2034	2039
Additional Itinerant Aircraft	62,299	73,473	82,307	88,508
Apron Spaces (number)	39	69	88	121
Additional Itinerant Apron Required (SF)	624,000	1,088,000	1,376,000	1,888,000
Additional Itinerant Hangar Apron Required (SF)	--	8,775	13,650	18,525
Total Additional Itinerant Apron Required (SF)	624,000	1,096,775	1,389,650	1,906,525

Source:
Kimley-Horn, 2020.

Note:
SF = square feet

As shown, it is expected that the Airport will require approximately 1,888,000 square feet of itinerant apron parking and an additional 18,525 square feet of itinerant hangar apron space by 2039.

A.5. Landside Facilities

A.5.1. General Aviation Administration Building

Airport Cooperative Research Program (ACRP) Report 113, Guidebook on General Aviation Facility Planning, provides a formula for estimating space requirements for a terminal building:

Building square footage = (peak-hours operations) x (2.5) x (100 to 150 SF)

This formula assumes an average aircraft occupancy of 2.5 and a square footage range meant to reflect variations in the anticipated functions of different facilities. At Henderson Executive Airport, aircraft occupancy is regularly higher than 2.5 persons due to the high proportion of corporate flights, and the existing terminal building uses that include services such as a restaurant, which require more space per customer. Therefore, the more aggressive assumption of 150 square feet was used to calculate future terminal building spatial needs, though the actual figure may still be higher.

Using the formula and assumptions above, the estimated space requirement for the Airport's main terminal building was calculated based on forecast design hour operations. The results of this calculation are shown in **Table A.25**.The ACRP Report 113 formula is intended to provide general guidance, and actual needs may vary based on the building's interior layout and efficiency of use. Based on this calculation, the existing main terminal building is adequate to accommodate existing demand, but additional space may be needed in the future. As such, the Airport should consider preserving an area for potential building expansion and monitor building adequacy and potential chokepoints to determine future need.

Table A.25 – *Terminal Building Space Requirements*

	Year	2024	2029	2034	2039
	2019	2024	2029	2034	2039
Design Hour Operations	63	75	85	93	105
Estimated Space Required (SF)	23,625	28,125	31,875	34,875	39,375
Existing Main Terminal Space (SF)	24,000	24,000	24,000	24,000	24,000
Net Need (SF)	375	-4,125	-7,875	-10,875	-15,375

Source:
Kimley-Horn, 2020.

Note:
SF = Square feet

A.5.2. Surface Transportation

Airport Access Roadways

The Airport is currently served by one primary access point, which is the intersection of Raiders Way (formerly Executive Airport Drive) with Executive Terminal Drive. As of July 2020, this intersection is unsignalized, with the Executive Terminal Drive westbound approach being stop-controlled. As described in **Chapter 1**, Executive Terminal Drive connects to Jet Stream Drive, the Airport's north-south internal circulation roadway that provides access to most landside facilities. Based on field observations, Executive Terminal Drive and Jet Stream Drive satisfactorily serve on-airport roadway traffic with additional capacity to accommodate growth landside development on the west side of the Airport. However, as landside development continues on Airport property, a second access point along Raiders Way should be considered toward the south to shift some demand from the primary access point of Executive Terminal Drive, spread out demand along Jet Stream Drive, and ultimately improve the customer experience. This secondary access point is also needed to satisfy City of Henderson requirements.

In addition to anticipated growth in Airport traffic, other private developments (not directly associated with the Airport) are anticipated along Raiders Way and within the vicinity of the Airport. As a result, growth in total traffic along Raiders Way and the surrounding roadway network will likely exceed Airport-specific traffic growth. From a cursory review of traffic impact studies performed for the West Henderson Master Plan and the Henderson West mixed-use development, several intersection and roadway improvements are currently planned along Raiders Way and its intersections with surrounding roadways. In addition to improvements identified in these traffic impact studies and other traffic studies for nearby private developments, the City of Henderson has identified several infrastructure improvements in its 2019 Capital Improvement Plan, as summarized in **Chapter 1**. Additionally, the Henderson Strong Comprehensive Plan has identified Raiders Way to be transformed into a complete street. Any future Airport landside development should consider the Henderson Strong Comprehensive Plan, the City's Capital Improvement Plan, and any planned roadway improvements identified in other traffic impact studies for surrounding non-Airport developments. The planned roadway and intersection improvements should enable continued, acceptable traffic operations along Raiders Way, thus benefitting the Airport's access and egress.

It should be noted that as of July 2020, a new roadway called Sunridge Heights, near the northwestern side of the Airport, is under construction. The roadway connects to Raiders Way at the southwestern end and dead ends at the northeastern end. The City of Henderson desires to extend this new road northeasterly to join the South Maryland Parkway/Sunridge Heights Parkway intersection. Such an extension would place a public road inside the RPZ, which is an incompatible land use. An opportunity may exist for a tunnel or depressed roadway within the RPZ, however the City's efforts will need to be coordinated closely with CCDOA and the FAA after completion of this master plan. This new roadway could serve as a future access point to the Airport if additional development occurs north of the existing Terminal Building but would only be required if Jet Stream Drive cannot be extended accordingly.

It also should be noted that there is currently no Airport development on the east side of the Airport or any landside access point. If future development occurs on the east side of the Airport, an additional access point should be considered. Access may be provided from Sunridge Heights Parkway and/or Volunteer Boulevard and may be considered as part of the landside and airfield alternatives analysis, if applicable.

In summary, on-Airport circulation roadways (Executive Terminal Drive and Jet Stream Drive) are anticipated to adequately serve Airport landside development on the west side of the Airport through the planning horizon, but a secondary access point to the south is required. Additionally, any future Airport development should review the Henderson Strong Comprehensive Plan, the City's Capital Improvement Plan, and any recent traffic impact studies in the vicinity of the Airport and consider any planned roadway or intersection improvements.

Airport Parking

There are several vehicle parking lots located throughout the Airport property. **Chapter 1** summarized the seven existing parking lots at the Airport. The primary vehicle parking location for the public is the main terminal lot located adjacent to the terminal building. Additional smaller lots primarily service specific uses and locations throughout the Airport such as the Quail Air Center and the ATCT. It should be noted that vehicle parking requirements for Maverick Aviation Group were excluded from this analysis because the business uses buses to transport many of their clients and is expected to expand vehicle parking as demand warrants.

Currently, all regular demand for vehicle parking at the Airport is being met, though CCDOA has noted that the main terminal lot and other parking lots can be filled to capacity during peak periods of activity. Therefore, it was assumed that all increases in demand for terminal space, hangars and apron parking will require additional vehicle parking.

ACRP Report 113, Guidebook on General Aviation Facility Planning, provides recommended numbers of parking spaces for different types of facilities. Based on that report, the following assumptions were used to calculate future requirements for vehicle parking spaces:

- Conventional hangar: 1 space per 1,000 square feet.
- Commercial hangar: 1 space per 1,000 square feet of hangar space plus 1 space per 400 square feet of office space:
  - The ACRP Report recommends 1 space per 200 square feet of office space, but based on anticipated uses at the Airport, it was determined that 1 space per 400 square feet of office space is a more appropriate planning factor.
- T-shade – single: 1 space per 2 units.
- T-shade – twin: 1 space per 2 units.
- Tie-down: 1 space per 2 units, for based aircraft only.
- Administrative and Public: 2.5 spaces per design hour operation plus 1 space per 200 square feet of terminal building office space.

Changes in future demand for vehicle parking in hangar and apron areas were based on the forecast change in aircraft parking requirements for based aircraft (apron and hangars) and the construction of new commercial itinerant aircraft hangar spaces, as discussed above. Changes in future demand at the main terminal were based on the forecast change in design hour operations.

Additional future vehicle parking demand is summarized in

Table A.26. As shown, an additional 592 vehicle parking spaces will be required at the Airport by 2039 due to the forecast increase in aircraft storage hangars and terminal building space.

Table A.26 – *Additional Vehicle Spaces Required by Year*

	2019	2024	2029	2034	2039
Hangar and Apron Parking					
Conventional Hangar	0	30	68	111	164
Commercial Hangar	0	54	103	169	247
T-Shade	0	0	0	0	0
Tie-Down	0	0	-6	-13	-17
Itinerant Commercial Hangar	0	0	16	25	34
Total	0	84	181	292	428
Existing Spaces Available	0	0	0	0	0
Net Spaces Available/-Required	0	-84	-181	-292	-428
Main Terminal Parking					
Administrative / Public	0	51	95	130	164
Total	0	51	95	130	164
Existing Spaces Available	0	0	0	0	0
Net Spaces Available/-Required	0	-51	-95	-130	-164
Vehicle Parking Summary					
Total Spaces Available/-Required	0	-135	-276	-422	-592

Source:
Kimley-Horn, 2020.

A.6. Support Facilities

A.6.1. Utility Infrastructure

Water

The Airport is served by the City of Henderson's water system. The existing network provides adequate capacity for existing demand at the Airport; however, additional waterline infrastructure will need to be constructed for future demand at the Airport. There are several City of Henderson waterlines in the surrounding roadway system that future improvements/services could be connected to. There will be a need for new waterline loop systems to be constructed for developments to the new north and south apron areas of the airfield. It also was noted the current system is not a loop and is also a private waterline system that serves the Airport and current tenants. Current City of Henderson standards require a loop waterline system for all new developments to provide capacity for fire suppression systems.

Sanitary Sewers

The Airport does have direct access to the City of Henderson sewer system, which has sufficient capacity for both existing and anticipated demand, not only for the airport but for future developments around the Airport. However, it should be noted that most of the existing laterals, that currently run from developments at the Airport, from the mainline are at capacity; therefore, future developments may have to install new laterals to handle the capacity needs for future development.

Drainage

The existing offsite drainage infrastructure, designed and constructed by the Regional Flood Control District, has been constructed with future development in mind. This infrastructure will provide enough capacity for not only future developments at the airport, but also for future developments surrounding the airport. However, the existing on-site drainage infrastructure needs upgrades to convey both current and future storm drain flows. This is a known challenge for the Airport and there has been a drainage study completed and a project designed to improve the airfield's infield drainage system. Once this new drainage infrastructure is constructed, there will be more than enough capacity for future developments at the airport. In addition, there is currently no major storm drain improvements located in the Raiders Way. As the Airport continues to grow and be developed, there may be a need to install a storm drain system to assist in conveying water from developments to the Regional Flood Control District facilities, to keep water from running down Raiders Way.

Electrical Service

Electrical service is provided by NV Energy. NV Energy maintains the electrical service infrastructure at the Airport and provides power. The last electrical feed improvements were completed in 2007, when the Airport paid for the installation of two conduit express feeders . These feeders were constructed with future growth in mind and have capacity for additional development.

Most new development at the Airport would need to include infrastructure to tie into the existing feeders. Additionally, there are currently no electrical service feeds to the east side of the airfield. Therefore, if future developments were planned here, there would be an upfront expense to provide electrical service to this area.

As noted in **Chapter 1**, CCDOA is currently negotiating a 15-year master plan community development agreement with NV Energy to provide additional electrical service to the Airport environs. While the agreement has not yet been fully executed, the negotiated capacity should be sufficient for the 15-year timeframe and the anticipated Airport electrical demand within that period.

Natural Gas

Natural gas service is provided to the Airport by Southwest Gas Corporation. There is currently one natural gas line serving the Airport via Executive Terminal Drive, which was identified as adequate for the Airport's needs. The line does not extend the full length of the airfield, but if necessary, additional areas of service would be provided via tenant or developer-funded lateral extensions of the main line.

Communications

All communications services at the airport are provided by AT&T. There are no concerns about the current infrastructure meeting anticipated demand. Feeder lines may be required to serve new facilities.