Reno-Tahoe Airport Authority

DECEMBER 2018

Reno-Tahoe International Airport
MASTER PLAN

CHAPTER 1:
Inventory of Existing Conditions

INVENTORY OF EXISTING CONDITIONS

The Inventory forms the foundation for the Master Plan and answers the question, ***"What do we have?"*** *and provides a baseline for analysis. Data gathering efforts included site visits in October and December of 2016 and review of Reno-Tahoe Airport Authority (RTAA) and other agency records. The inventory, combined with aviation activity forecasts, is used to determine facility requirements, which answers the question,* ***"What do we need?"*** *Improvement alternatives are developed to address the requirements, and a financial plan will evaluate how preferred improvements will be funded. The Plan culminates in an Airport Layout Plan, which is a graphical depiction of the future airfield layout.*

The last Reno-Tahoe International Airport (RNO or the Airport) Master Plan was completed in 1991. Since that time, targeted planning studies to address particular areas of concern had been initiated. However, in the 25 years since, many changes have occurred on the local, regional, national, and international level that influence Airport development and operation which at this time require a comprehensive analysis. The Transportation Security Administration (TSA) has reshaped airport security. Airlines have consolidated, including locally based Reno Air, and growing popularity of low-cost carriers has sparked decoupling services that were previously included in the price of a ticket. Ride-sharing services such as Uber and Lyft have transformed how passengers access the Airport, changing surface transportation technologies. Cell phones, coupled with the internet are now the primary mode of communication and information sharing. The RNO Airport Master Plan (the Plan) will investigate how changing aviation dynamics, socioeconomic and demographic trends, new technologies, and the direction of the aviation industry will influence facility needs of RNO over the next 20 years.

The Inventory Chapter is organized in the following sections.

- Background
- Setting
- Socioeconomic Profile
- Airport Operations
- Existing Airport Facilities
- Environmental Overview
- Sustainability Initiatives
- Land Use, Zoning, and Local Planning Studies
- Financial Overview

Background

The Airport is the second busiest commercial service airport in the state, serving scheduled commercial passenger and cargo service, military aviation, air taxi, general aviation, and emergency services. In 2017, RNO was the 63rd busiest airport in the United States. RNO is a Customs and Border Protection (CBP) Port of Entry to process international arrivals and is home to the Nevada Air National Guard (NVANG) 152nd Airlift Wing.

RNO is an economic driver for Northern Nevada and the Lake Tahoe Region. RNO is also a gateway for tourists and business travelers, a cargo hub, and home to aviation businesses that serve customers worldwide. Travelers use RNO to access the City of Reno, Carson City, the Lake Tahoe Region, ski areas in Tahoe and Truckee California Regions, Burning Man, conventions, casinos, Reno Air Races and other local events. Total economic impact, which includes businesses located on the Airport and involved directly and indirectly with aviation activities, is estimated by RTAA at $3.2 billion annually, and these businesses support over 2,500 jobs at the Airport and many more through both direct and indirect means.

Setting

Airport Location

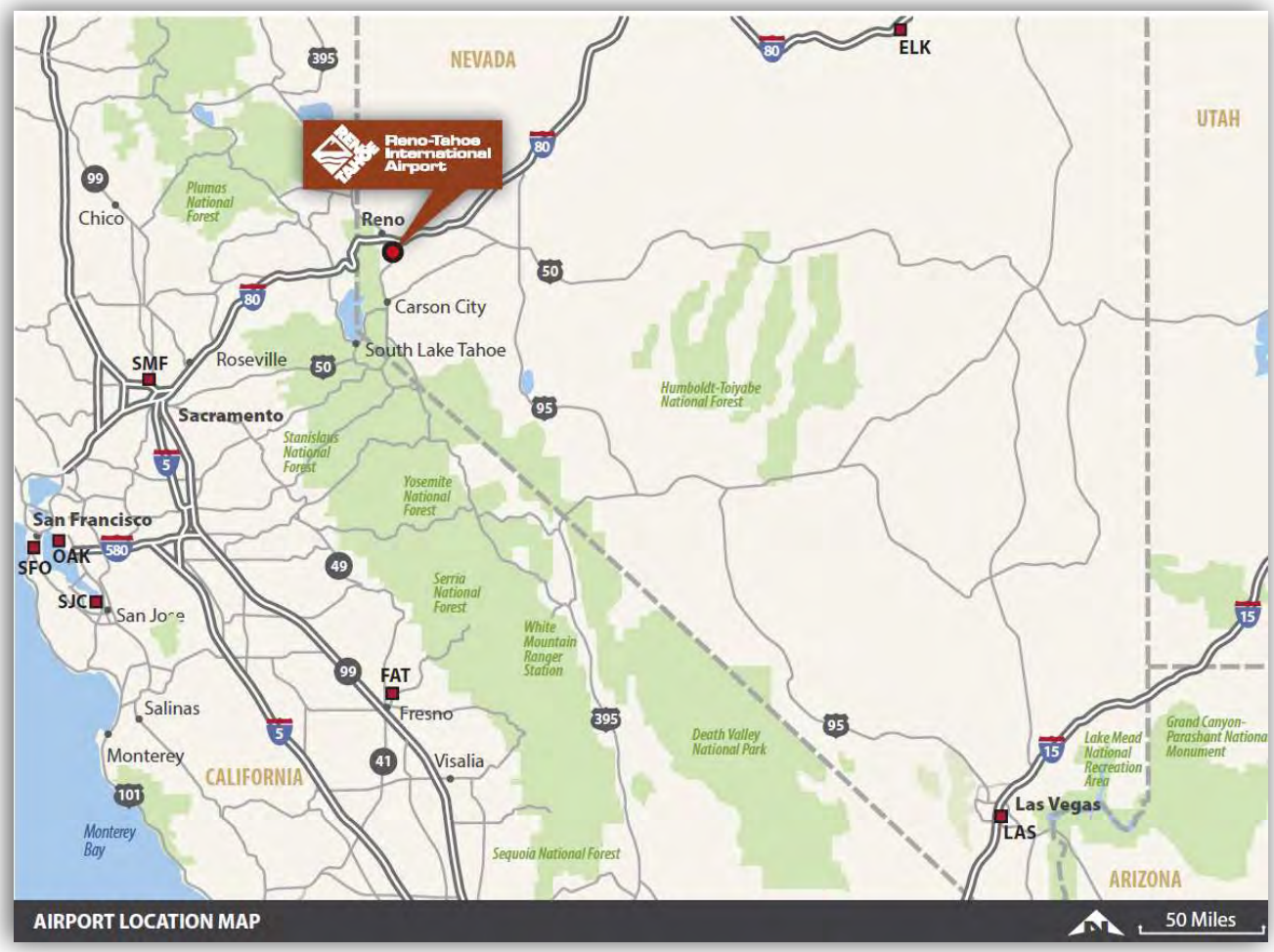
The Airport is located in the City of Reno, Nevada. Reno is the seat of Washoe County in northwestern Nevada. Downtown Reno is about 22 miles north of the state capital Carson City, 25 miles northeast of Lake Tahoe and about 14 miles from the California state line via Interstate 80. Interstate 80 crosses the city in an east-west direction, and U.S. Highway 395 (also Interstate 580) traverses the city north-south. The City of Sparks borders Reno's northeast boundary. See **Figure 1-1** for a vicinity map of RNO and **Figure 1-2** for a location map for Reno.

Figure 1-1: Airport Vicinity

Airport Setting

Reno is located in the high desert on the east edge of the Sierra Nevada. The summit of Mount Rose, at 10,776 feet, is located about 13 miles southwest of RNO. A series of mountain peaks to the east of Reno includes Clark Mountain, at 7,198 feet; Castle Peak, at 6,531 feet; and Mount Davidson, at 7,864 feet. Reno is located between these parallel ranges, which create the Truckee Meadows valley, named after the Truckee River that flows into the area from Lake Tahoe.

Figure 1-2: Airport Location Map



Airport Management

The RTAA owns and operates RNO. The RTAA was established in 1977 by the Nevada State Legislature, and was formerly known as the Airport Authority of Washoe County until the name changed to RTAA in 2005. RTAA is a quasi-municipal corporation with its own fire and police departments and administrative functions. RTAA has eminent domain powers but is without the power to levy taxes or directly control land use through zoning and permits. However, enabling legislation does provide some limited ability to assess property owned by the Authority. RTAA receives no revenues from local, sales, and property taxes. Rather, RTAA operates on revenues generated by RNO and general aviation (GA) Reno-Stead Airport (RTS).

Figure 1-3 illustrates the location of RNO within its environs. The Airport is situated in an urban environment as the city has grown around RNO property over time. The Airport is bound on the north by the Truckee River and City of Sparks, on the east by South Rock Boulevard and Longley Lane, on the south by Airway Drive and on the west by Airway Drive and Terminal Way. The Airport is ±1,540 total acres at an elevation of 4,415 feet, defined by the high point on the runways, above mean sea level (MSL).

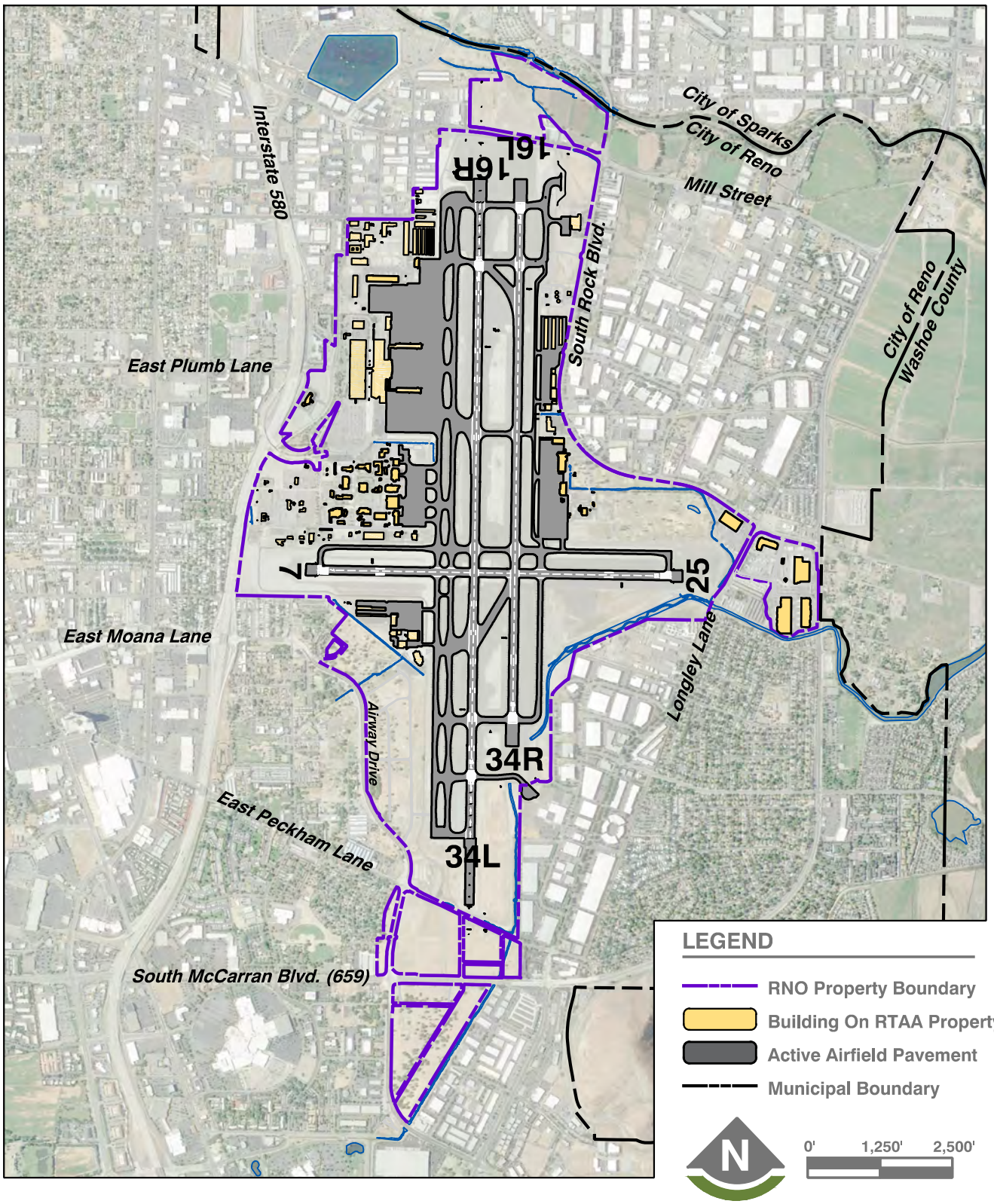


Figure 1-3
Airport Environs

RTAA is responsible for the daily operation of RNO and RTS through these lines of business/departments:

- Chief Executive Officer (CEO), Chief Operating Officer (COO) and Executive Senior Leadership Team
- Air Service Development
- Finance and Administration
- Operations and Public Safety
- Airport Fire
- Airport Police
- Planning, Engineering, and Environmental Management
- Facilities and Maintenance
- Airport Economic Development
- Marketing and Public Affairs
- Technology and Information Systems
- Human Resources
- Reno-Stead Airport

The RTAA is directed and governed by the RTAA Board of Trustees. The Board of Trustees consists of nine members appointed by the City of Reno, City of Sparks, Washoe County, and the Reno-Sparks Convention and Visitors Authority. Members' terms are for four years. Members may be reappointed for one additional four-year term. The Board of Trustees meets monthly.

Airport History and Milestones

RNO was constructed in 1929 as Hubbard Field, and has since undergone numerous upgrades to runways, taxiways, the passenger terminal, air traffic control tower (ATCT) and other facilities over time. Milestones and major facility improvements in RNO's history are listed in **Table 1-1**.

Role and Design

The Federal Aviation Administration (FAA) and State of Nevada recognize RNO as a critical hub of the regional and national air transportation network. RNO is designated as a small-hub, primary commercial service airport in the FAA's *National Plan of Integrated Airport Systems (NPIAS) 2017-2021 Report*. The NPIAS identifies airports in the national system that are eligible for federal grant funding based on the role the airport serves. A primary commercial service airport in the NPIAS is defined as a public airport receiving scheduled air carrier service with 10,000 or more enplaned passengers per year. A small-hub airport is defined in the NPIAS as an airport that enplanes 0.05 percent to 0.25 percent of total U.S. passenger enplanements. The 2017-2021 NPIAS Report recognized 72 small-hub airports, which together account for almost 9 percent of all enplanements within the U.S. The NPIAS Report also notes that less than 25 percent of the runway capacity at a small-hub airport is used by airline operations. Other small-hub, primary airports in the Western U.S. include: Boise (BOI), Eugene (EUG), Fresno (FAT), Palm Springs (PSP), Spokane (GEG), and Tucson (TUS).

The Nevada Department of Transportation (NDOT) recognizes RNO as a Commercial Service Primary-Airport, with more than 10,000 annual enplaned passengers, in the 2004 Nevada Airport System Plan (System Plan). The System Plan provides an outline for potential state and municipal decisions to invest in public-use airports and protect airports from non-compatible development and land uses.

Table 1-1: Airport History and Major Milestones

1929	Hubbard Field constructed by Boeing Transport Inc. to meet needs for trans-continental air mail route.
1936	Airport is sold by Boeing Transport to United Airlines.
1953	Airport is sold by United Airlines to City of Reno.
1960	New passenger terminal constructed for the 1960 Winter Olympics in Squaw Valley.
1977	Airport Authority of Washoe County (AAWC) established by State of Nevada.
1978	Airlines serving RNO grow from three to twelve due to casino expansion and airline deregulation.
1979	RNO became the fastest growing airport in the U.S. with a 46 percent increase in total enplanements (1.33 million).
	Increased activity spurred completion of Airport Noise Control and Land Use Compatibility Study. This prompted a Relocation Feasibility Study that concluded Airport relocation was not feasible.
	Airport allotted $44.5 million from Airport Improvement Revenue Bonds for development through land acquisition, terminal expansion, runway and taxiway improvements, parking and landside access, and other ancillary projects.
1981	Passenger terminal expanded with the addition of two concourses and ticketing facilities.
1990	RNO surpassed 3 million passengers annually and generated a local economic impact of $1 billion.
1991	FAR Part 150 Study and Last Airport Master Plan approved by FAA.
1993	Runway 16L/34R extended from a 5,000' asphalt runway to a 9,000' concrete air carrier runway.
1994	Formal facility name changed from Reno Cannon International Airport to Reno-Tahoe International Airport.
1995	Sound Insulation Program initiated.
1996	Terminal passenger baggage claim facilities expanded.
1997	Construction of three level parking structure.
	Major flood event.
1998	South Apron reconstruction.
1999	Runway 16R/34L extended 1,000' to current length of 11,001'.
2000	Runway 7/25 reconstruction.
2001	September 11, 2001, Terrorist Attack.
2002	Terminal Area Master Plan completed.
2004	Runway 7/25 west end runway safety area upgrades.
	FAR Part 150 Noise Compatibility Study Update approved by FAA.
2005	Formal name change from AAWC to Reno –Tahoe Airport Authority (RTAA).
2006	Replacements of Runway 16R/34L Instrument Landing System.
	Reconstruction of Surface Parking Lot.
2008	Runway Safety Area improvements for all runways completed.
	New ATCT constructed on airfield's east side. New ATCT provides controllers unobstructed views to the passenger terminal, and meets TSA security regulations.
	Development of Hyatt Place Hotel at Terminal Way.
	New ARFF facility constructed.
2009	Airport baggage check-in reconfiguration and construction.
	Terminal Program Study completed.
2010	Airport Noise and Operations Monitoring System operational.
	Snow Removal Equipment Building constructed.
2013	Completed the Gateway Project: consolidation of the TSA Check Point and upgrades to Concessions.
	Construction of new Atlantic Aviation Facility.
2014	Reconstruction of Runway 16L/34R touchdown areas.
	Modernization of Federal Inspection Service Facility.
	Direct international service resumed.
2015	Completion of the multi-year Noise Mitigation Program (Mitigating over 5,100 residential units and schools).
2016	Taxiway C redesign and reconstruction.

Source: RTAA

Climate

Reno is located in the rain shadow of the Sierra Nevada range and receives an average total of 7.3 inches of precipitation annually. The area is classified as a steppe, or semi-arid climate (**Figure 1-4**). **Table 1-2** summarizes the total precipitation and snow, average high and low temperatures, humidity, and prevailing winds for each month.

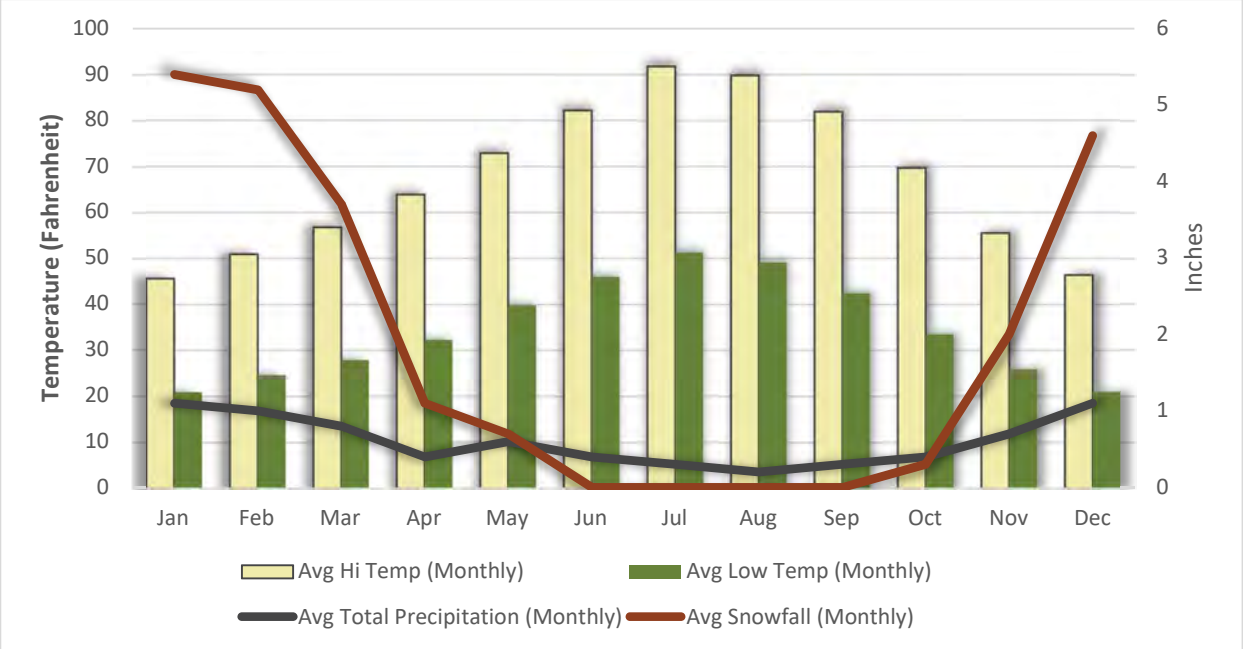
Table 1-2: Climate Summary

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg Hi Temp (F - Monthly)	45.6°	50.9°	56.8°	63.9°	72.9°	82.2°	91.7°	89.8°	81.9°	69.7°	55.5°	46.4°
Avg Low Temp (F -Monthly)	20.9°	24.6°	27.9°	32.3°	39.8°	46.0°	51.3°	49.1°	42.4°	33.5°	25.9°	21.0°
Avg Total Precipitation (Monthly)	1.1"	1.0"	0.8"	0.4"	0.6"	0.4"	0.3"	0.2"	0.3"	0.4"	0.7"	1.1"
Avg Precipitation (Daily)	0.04"	0.03"	0.03"	0.01"	0.02"	0.01"	0.01"	0.01"	0.01"	0.01"	0.02"	0.04"
Avg Snowfall (Monthly)	5.4"	5.2"	3.7"	1.1"	0.7"	0.0"	0.0"	0.0"	0.0"	0.3"	2.0"	4.6"
Avg Snowfall (Daily)	0.18"	0.17"	0.12"	0.04"	0.02"	0.00"	0.00"	0.00"	0.00"	0.01"	0.07"	0.15"
Avg Relative Humidity (%)	64.5	57.0	51.5	47.5	46.5	44.0	41.0	43.0	45.5	49.5	58.5	64.5
Prevailing Wind	South	South	West	West	West	West	West	West	West	South	South	South
Density Altitude[1] (MSL)							7,700'					

Source: Western Regional Climate Center, RNO Airport, Station #266779. Period of Record: 03/01/1937 to 06/09/2016.

1. Density Altitude: A measure that compares air density at a point in time and specific location to International Standard Atmosphere and is a critical component of aircraft performance calculations. Calculated for the hottest month. See Runway Extension Feasibility located in Appendix E for more information and calculations.

Figure 1-4: Monthly Climate Summary



Wind Data

FAA runway design criteria states that runway orientation must satisfy 95 percent wind coverage based on annual wind conditions. If analysis of wind data shows that the 95 percent coverage is not satisfied for a runway, than an additional crosswind runway with different orientation (e.g. perpendicular to the primary runway) may be justified to satisfy the 95 percent wind coverage for the combined runways. RNO wind coverage is shown for each runway alignment and combined runways during three different weather conditions identified in the **Table 1-3** below. These weather conditions include all weather, or all recorded observations; visual flight rules (VFR), which are observations during conditions of ceiling greater than or equal to 1,000 feet and visibility greater than or equal to three statute miles; and instrument flight rules (IFR), which is a ceiling of less than 1,000 feet and visibility less than three statute miles, but ceiling greater than or equal to 200 feet and visibility greater than or equal to one-half statute mile.

Table 1-3: RNO 10-Year Wind Data Analysis

All Weather Wind Coverage				
Runway	10.5 knots (12 mph)	13 knots (15 mph)	16 knots (18.5 mph)	20 knots (23 mph)
16/34	89.51%	93.31%	97.32%	99.41%
7/25	92.40%	94.87%	97.26%	98.78%
Combined	99.05%	99.71%	99.93%	99.99%
Number of Observations: 95,108			Calm 0-3 knots: 49.5%	
Visual Flight Rules (VFR) Wind Coverage				
Runway	10.5 knots (12 mph)	13 knots (15 mph)	16 knots (18.5 mph)	20 knots (23 mph)
16/34	89.44%	93.27%	97.32%	99.42%
7/25	92.50%	94.94%	97.27%	98.79%
Combined	99.06%	99.71%	99.93%	99.99%
Number of Observations: 86,347			Calm 0-3 knots: 49.8%	
Instrument Flight Rules (IFR) Wind Coverage				
Runway	10.5 knots (12 mph)	13 knots (15 mph)	16 knots (18.5 mph)	20 knots (23 mph)
16/34	91.13%	93.90%	96.95%	99.01%
7/25	89.76%	93.07%	96.83%	98.63%
Combined	98.95%	99.66%	99.92%	99.99%
Number of Observations: 3,181			Calm 0-3 knots: 46.1%	
Source: NOAA Station #724880, 2006-2016				

When calculated individually, neither runway alignment alone provides 95 percent coverage for operations during 10.5 and 13 knots in all three weather conditions. However, the combined alignment provides over 98 percent coverage during each weather condition, which justifies the crosswind runway.

Socioeconomic Profile

The socioeconomic profile describes the population that lives near the Airport and the diversity of industries in the community. Understanding the makeup of the population and the industries that drive the economy will inform the aviation activity forecasts in **Chapter 2.** RNO is a regional asset; therefore, the socioeconomic profile considers the industries of metropolitan statistical area (MSA) and the counties in northwest Nevada, and the population of the MSA, northwest Nevada, and nearby communities in eastern California. **Table 1-4** depicts the historical population of the Reno-Sparks MSA, Northwest Nevada, and Eastern Sierra areas. **Table 1-5** identifies the top five industries within the Reno-Sparks MSA.

Table 1-4: Population Profile

Historical Population	2000	2005	2010	2015
Reno-Sparks MSA	345,426	400,856	421,613	445,930
Northwest Nevada[1]	188,844	216,824	219,746	215,512
Eastern Sierra[2]	91,727	92,313	92,092	90,905
Total	**625,997**	**709,993**	**733,451**	**752,347**
Source: Nevada State Demographer, U.S. Census Bureau/ESRI (Eastern Sierra)				
Projected Population[3]			**2015**	**2020**
Reno Sparks MSA			445,930	473,889
Northwest Nevada			215,512	220,263
Source: Nevada State Demographer 1: Northwest Nevada numbers are less Reno-Sparks MSA. 2: Eastern Sierra includes California communities from Lake Almanor to Mono Lake, east of the Sierra Crest. 3: The Census Bureau does not provide population projections for the cities and towns in the eastern Sierra.				

Table 1-5: Industry Profile

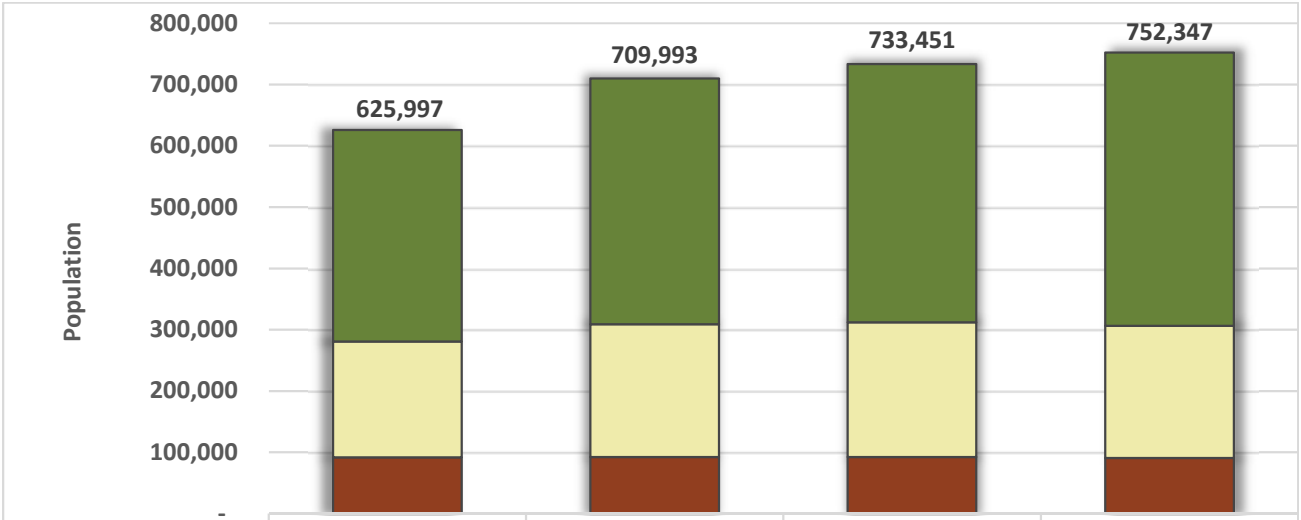
Basis of Economy				
The Reno-Sparks MSA enjoys a diverse economy in terms of its industry mix. Leading industries capitalize on the attraction visitors have to the convention, entertainment, and recreational opportunities in the area. Growing industries include manufacturing and professional services.				
Top 5 Industries in MSA	**2015**		**2020**	
Industry	**Jobs [%]**	**Businesses [%]**	**Jobs [%]**	**Businesses [%]**
Educ., Health., Social Serv.[1]	20.5%	10.6%	19.6%	10.4%
Ent., Accom., Food Service[2]	18.6%	9.2%	17.4%	8.7%
Retail Trade	11.4%	10.2%	10.5%	9.8%
Professional Services	5.2%	14.4%	5.0%	15.7%
Fin., Insurance, Real Estate[3]	4.7%	10.6%	4.6%	10.9%
Total number of:	187,217	13,758	215,447	15,110
Source: Department of Employment, Training, and Rehabilitation 1: Education, Healthcare, Social Services 2: Entertainment, Accommodation, Food Services 3: Finance, Insurance, and Real Estate				

Summary

Population

According to the Nevada State Demographer, the population of the Reno-Sparks MSA is 445,930 in 2015. Additionally, population in Northwest Nevada as of 2015 is 215,512 and the Easter Sierra (California) is 90,905. **Figure 1-5** shows population for the three regions and totals.

Figure 1-5: Population Summary



	2000	2005	2010	2015
Reno-Sparks MSA	345,426	400,856	421,613	445,930
Northwest NV	188,844	216,824	219,746	215,512
Eastern Sierra	91,727	92,313	92,092	90,905

Population growth in the Reno-Sparks MSA has not recovered to pre-recession levels, with 2015 estimates reporting a growth rate of 1.2 percent per year since the end of the recession. Between 1990 and 2009, population growth rates in the MSA were in the range of 2.0 to 4.0 percent per year. The Nevada State Demographer is projecting population growth rates of 1.2 to 1.3 percent per year in the Reno-Sparks MSA through 2020. At this rate the MSA is expected to add 5,000 to 6,000 new persons every year through 2020.

Despite the slower pace of population growth, the community has continued to attract employers. The disparity between employment growth and population growth is expected to restrain access to skilled labor. In November 2016 the Reno-Sparks MSA unemployment rate was 4.2 percent. According to the Federal Reserve Bank of St. Louis, the national unemployment rate is currently 4.8 percent. As a result, employers looking to grow in the MSA may find a shortage of skilled labor, requiring migration to fill the new positions.

Population growth in northwest Nevada outside of the Reno-Sparks MSA is flat. The 2015 population growth rate for the eight counties outside the MSA is negative 0.3 percent per year. This decline reduces the overall growth rate for the RNO service area in Nevada to 0.7 percent per year. The Nevada State Demographer is projecting that the rural counties will begin to add population in 2016; however, four-year growth rate projections are expected to be in the range of 0.2 to 0.3 percent per year.

Based on topography and distances to other commercial airports, RNO is estimated to serve an additional 90,905 residents in California communities near the Nevada border that are within an approximate two-hour drive to the Airport. **Chapter 2 – Aviation Activity Analysis and Forecast** includes an estimate of the True Market Area that defines the Airport's catchment area and the corresponding population it serves. The exact catchment area will be evaluated and identified in **Chapter 2**. Detailed population records and forecasts are included in **Appendix C**.

Industry

The Reno-Sparks MSA and northwest Nevada enjoy a diversified economy. The most common industries in terms of number of establishments are the Professional Services industry, and the Finance, Insurance, and Real Estate industries. Over the last five years, the number of establishments grew at a rate of 2 percent per year in the MSA and in northwest Nevada. Based on site visits conducted by the Economic Development Authority of Western Nevada (EDAWN), industries expecting to expand in the region include the Professional Services and Manufacturing industries including distribution, software, manufacturing, services, and data centers.

The Washoe County Manager's Office concluded that the industries in Washoe County that grew faster than the national average over the last 25 years include Administrative and Support Services, Warehousing & Storage, Motor Vehicles & Parts (retail), Miscellaneous Manufacturing, and Truck Transportation.

Employment

Employment in the Reno-Sparks MSA continues to lead the economic recovery in the region. Although many sources attribute the recovery to new companies that have relocated to the area, such as Tesla Motors, Switch, Petco and their ancillary industries, business relocations and employment growth occurred across the region since 2014, in tandem with the Tesla announcement. Annual average employment increased at a pace of 4 percent between January and November 2016, a rate that has been exceeded only three times in the last 25 years. As of November 2016, there are 224,700 jobs located in the Reno-Sparks MSA. Expanding the region to include other northwest Nevada counties that rely on the RNO, the job total increases to 296,824 as of the second quarter 2016.

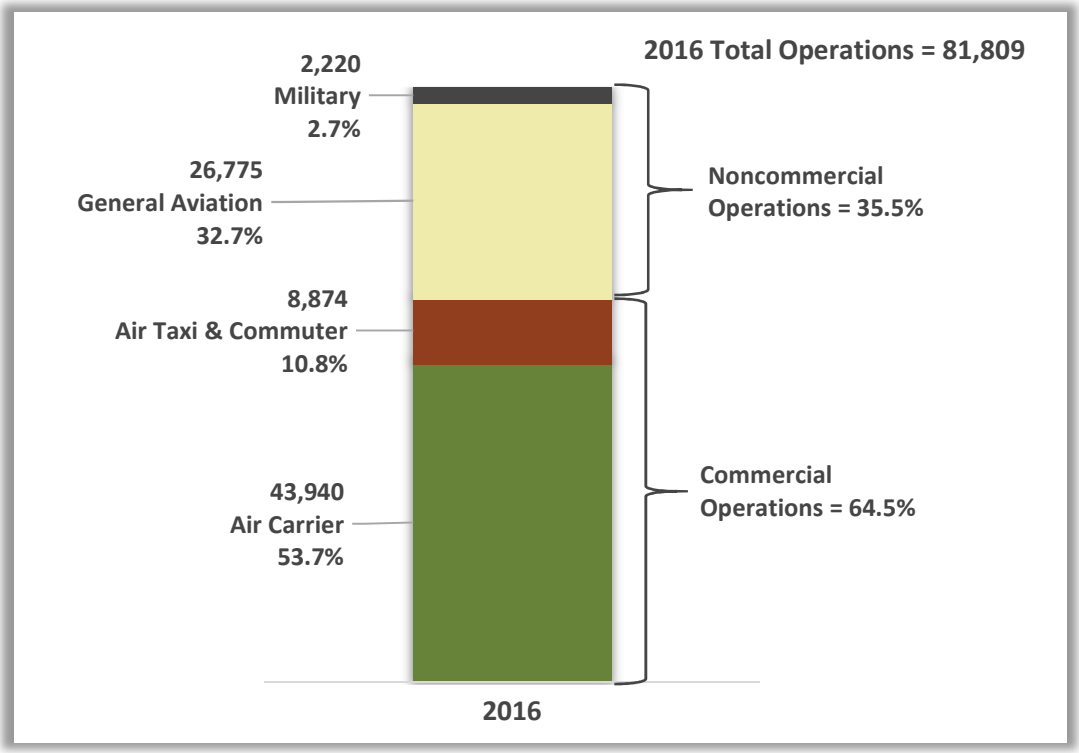
Within the Reno-Sparks MSA, which includes Storey County and its Tahoe Reno Industrial Center, the fastest growing industries in terms of jobs are Professional and Business Services, followed by Transportation & Warehousing and Construction. Health Care is currently the leading employer in Washoe County and continues to grow.

The Nevada state employment office expects that future employment growth will continue at a rate of 4 percent through 2020. The Department of Employment, Training, and Rehabilitation expects that Construction, Leisure & Hospitality, and Professional & Business Services industries will lead employment growth into 2017 in the Reno-Sparks MSA. EDAWN expects Distribution, Software, and Manufacturing industries to lead job relocations in the near term, and Distribution, Manufacturing, and Professional & Business Services in the long term. Detailed industry and employment records and forecasts are included in **Appendix C**.

Airport Operations

As of November 2016, a total of 81,162 aircraft operations (take offs and landings) took place at the airport. Commercial operations accounted for the large majority with 64.8 percent, consisting of air carrier operations at 51.4 percent and air taxi and commuter operations at 13.4 percent (**Figure 1-6**)**.** By the FAA's classification, the air carrier category includes passenger aircraft with 60 or more seats and all-cargo aircraft of comparable size. The air taxi and commuter category includes passenger aircraft with less than 60 seats and all-cargo aircraft of comparable size. Noncommercial operations accounted for the remaining 35.2 percent, consisting of GA operations at 32.5 percent and military operations at 2.7 percent.

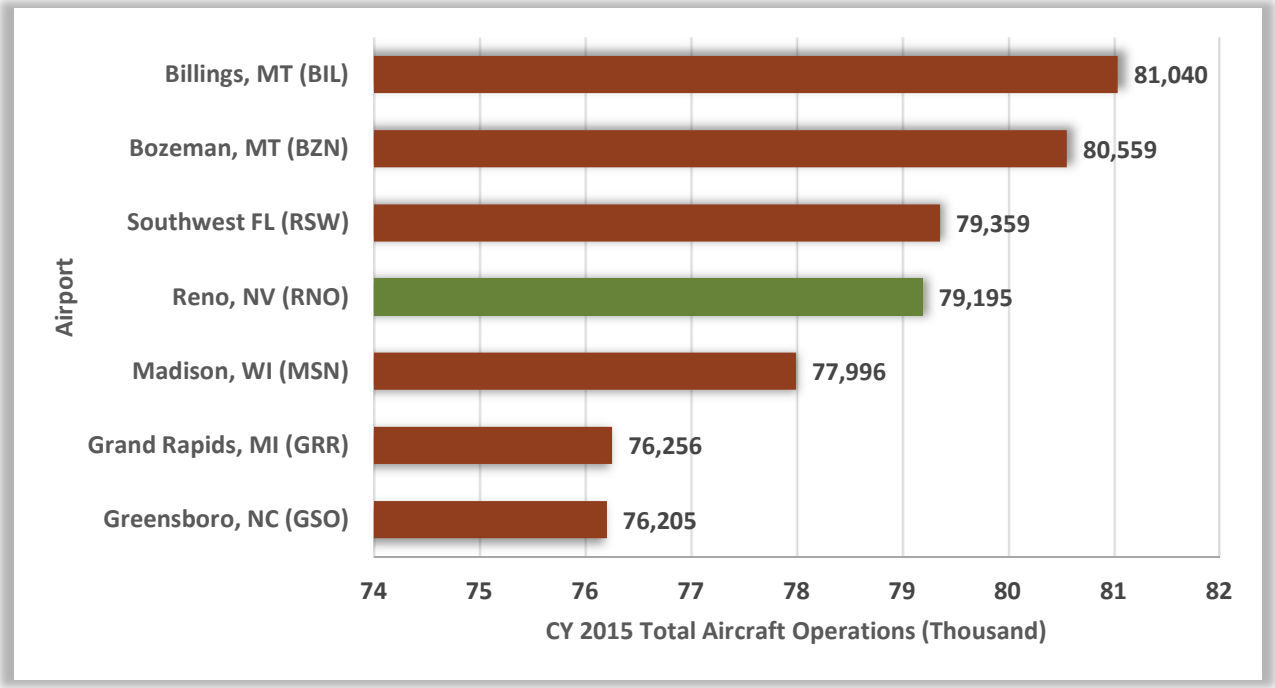
Figure 1-6: Distribution by Aircraft Category



Source: FAA Air Traffic Data System (ATADS)

In 2015, the Airport Council International-North America (ACI-NA) ranked RNO 110th among U.S. airports by total aircraft operations. The airports that are closest in ranking to RNO are: Bozeman Yellowstone International Airport in Montana, ranked 108th; Southwest Florida International Airport in Florida, ranked 109th; Dane County Regional Airport in Wisconsin, ranked 111th; and Gerald R. Ford International Airport in Michigan, ranked 112th (**Figure 1-7**).

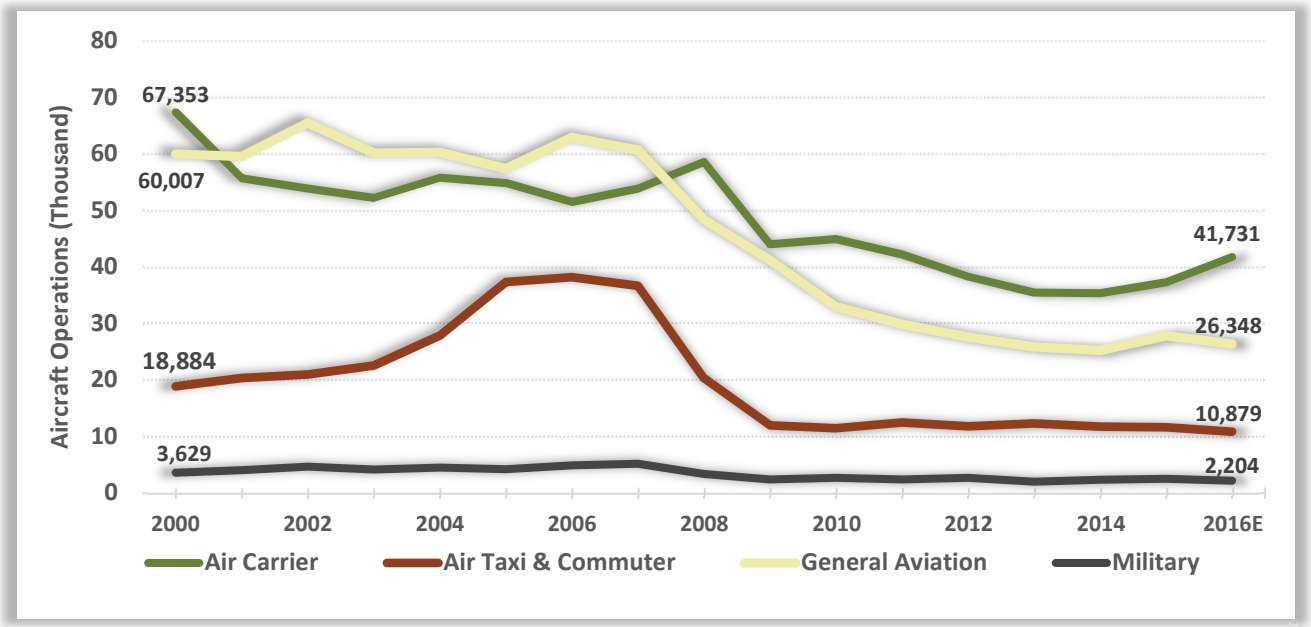
Figure 1-7: Comparable Airports to RNO, Total Aircraft Operations in 2015

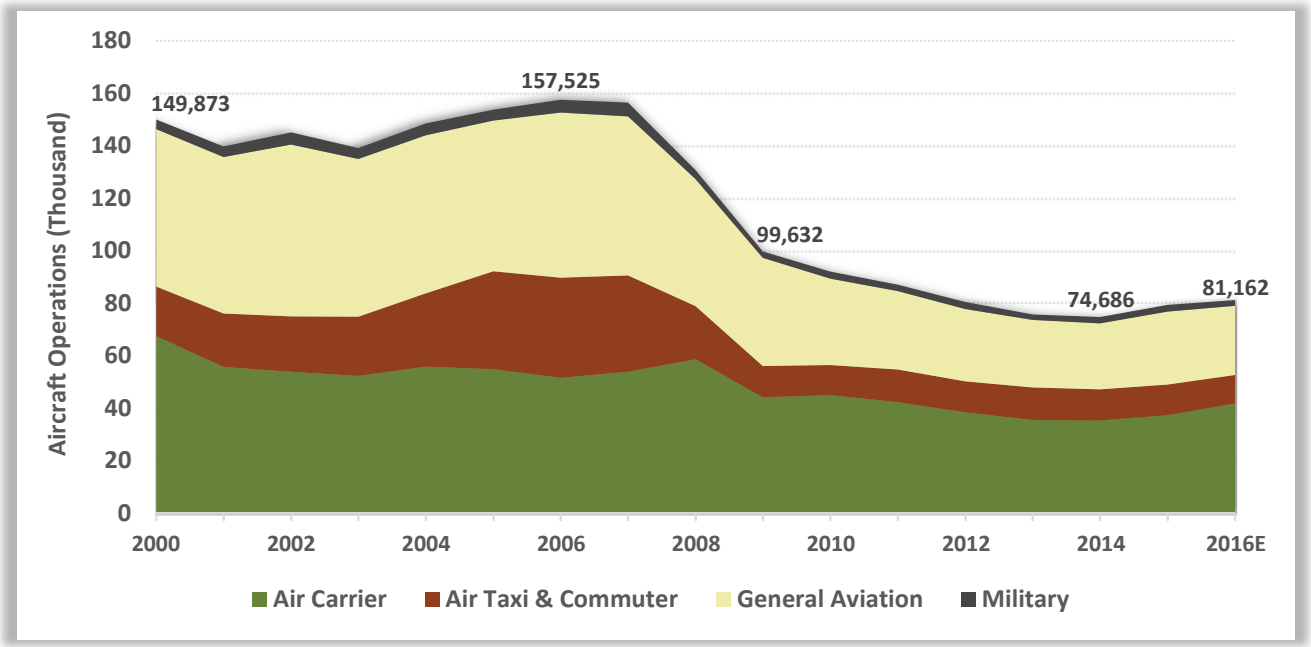


Source: Airports Council International-North America

Figure 1-8 shows the FAA Air Traffic Activity Data System (ATADS) counts of aircraft operations at RNO by aircraft category from 2000 through 2016. Total operations have decreased 46 percent since 2000. Operations in all categories have been on a downward trend. Air carrier operations have decreased by 48 percent; air taxi and commuter operations, by 42 percent; GA operations, by 56 percent; and military operations, by 39 percent. The downward trend appears to have reversed in 2015, particularly for air carrier and GA operations.

Figure 1-8: RNO Tower Counts by Aircraft Category, 2000-2015

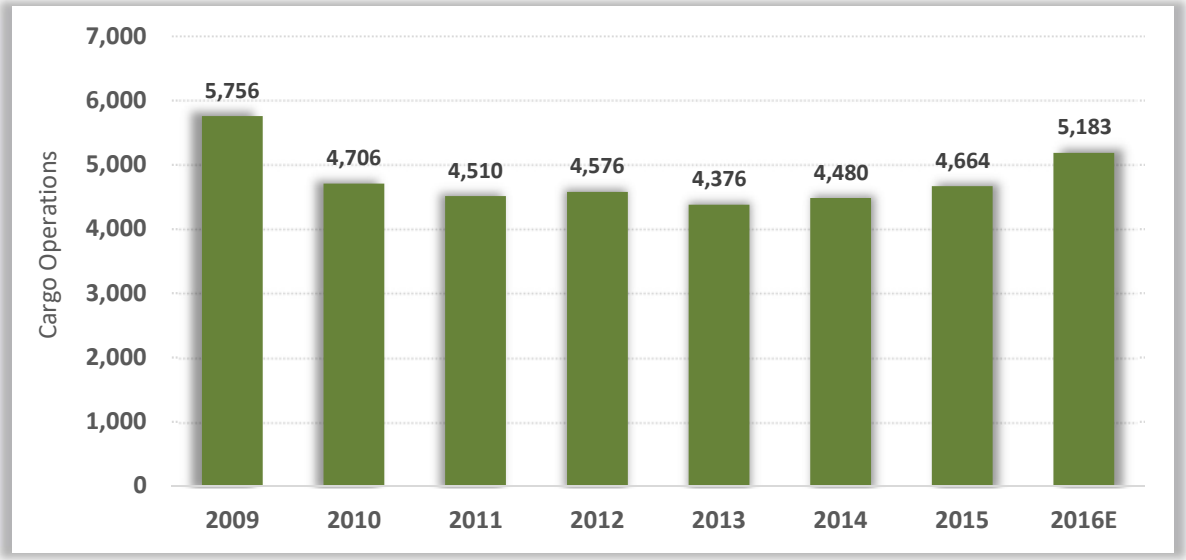




Source: FAA Air Traffic Data System (ATADS)

The FAA ATADS, the data source for aircraft operations, does not break out all-cargo operations. RTAA records show that all-cargo operations total less than 6,000 annually (**Figure 1-9**). In 2016, they totaled approximately 5,200, representing 10 percent of commercial aircraft operations, which is the sum of air carrier and air taxi and commuter categories, or 6 percent of total aircraft operations. This figure shows estimated total data for 2016, based on January-September data.

Figure 1-9: RNO All-Cargo Aircraft Operations, 2009-2016



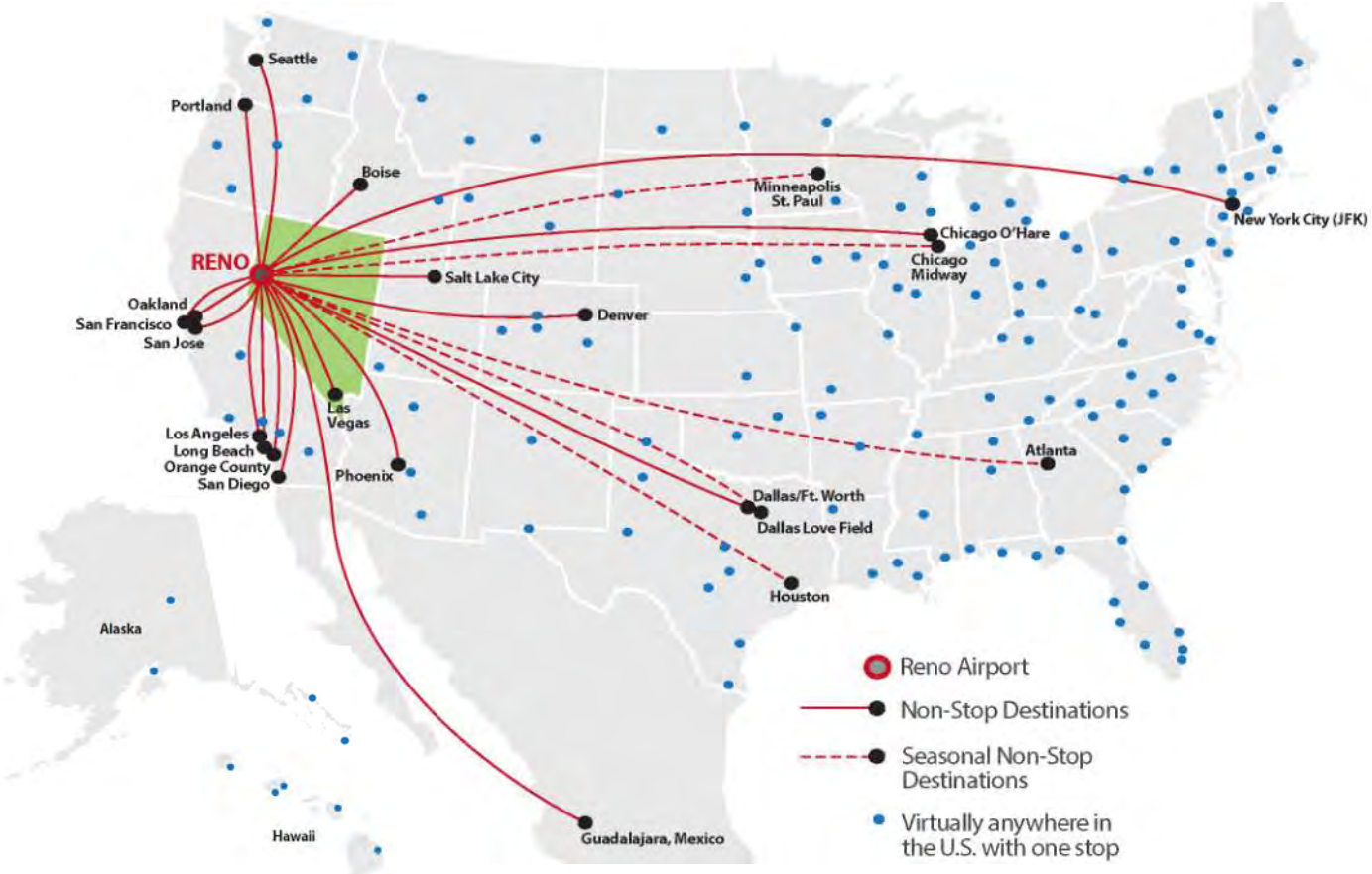
Source: Airport Statistics

Scheduled Commercial Service

Commercial air service is vital to the Reno-Tahoe region, bringing visitors and driving economic growth. In December 2016, eight scheduled commercial service airlines serve RNO. These airlines serve major hub airports across the U.S. and provide non-stop service to Mexico. Most major cities in the world can be reached in one stop on the airlines that serve RNO and their global airline codeshare partners. Non-stop routes are illustrated in **Figure 1-10**.

- Alaska
  - Boise (BOI)
  - Portland (PDX)
  - San Jose (SJC)
  - Orange County (SNA)
  - Seattle (SEA)
- Delta
  - Atlanta (ATL)
  - Minneapolis (MSP)
  - Salt Lake (SLC)
- Volaris
  - Guadalajara, MX (GDL)
- Southwest
  - Dallas (DAL)
  - Denver (DEN)
  - Las Vegas (LAS)
  - Los Angeles (LAX)
  - Chicago (MDW)
  - Oakland (OAK)
  - Phoenix (PHX)
  - San Diego (SAN)
  - San Jose (SJC)
- Allegiant
  - Las Vegas (LAS)
- American
  - Chicago (ORD)
  - Dallas (DFW)
  - Phoenix (PHX)
  - Los Angeles (LAX)
- Jet Blue
  - Long Beach (LGB)
  - New York (JFK)
- United
  - Denver (DEN)
  - Los Angeles (LAX)
  - Houston (IAH)
  - San Francisco (SFO)

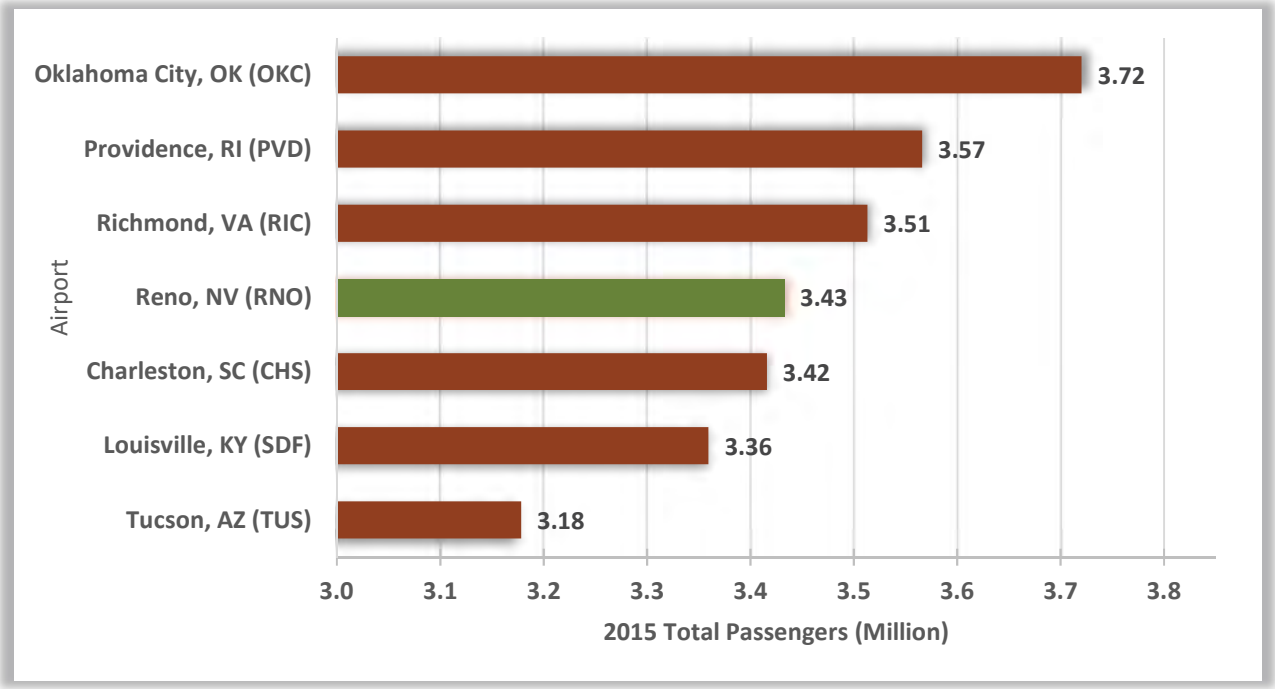
Figure 1-10: Route Map



RNO draws passengers from a wide catchment area throughout Northern Nevada and the Sierra Counties in California. In addition to scheduled airlines, charter airlines such as Xtra Airways serve RNO for purposes of tourism, gaming, and convention organizations. Scheduled and charter airlines use the passenger terminal for arrivals and departures, with the exception of international arrivals, which are processed by CBP at a dedicated facility north of the terminal building. More information on the passenger terminal, concourses, and gates is presented in the **Terminal Building Section.**

RNO accounts for around 0.2 percent of all U.S. passenger enplanements, serving over 3.4 million passengers in 2015, placing RNO in the FAA's small-hub designation as described in the **Airport Role Section**. The ACI-NA ranked RNO as the 65th busiest airport nationally by total passengers. This rank puts RNO behind T.F. Green Airport in Rhode Island, ranked 63rd; and Richmond International Airport in Virginia, ranked 64th; and ahead of Charleston International Airport in South Carolina, ranked 66th; and Louisville International Airport in Kentucky, ranked 67th (**Figure 1-11**).

Figure 1-11: Airports Most Comparable to RNO in Total Passengers



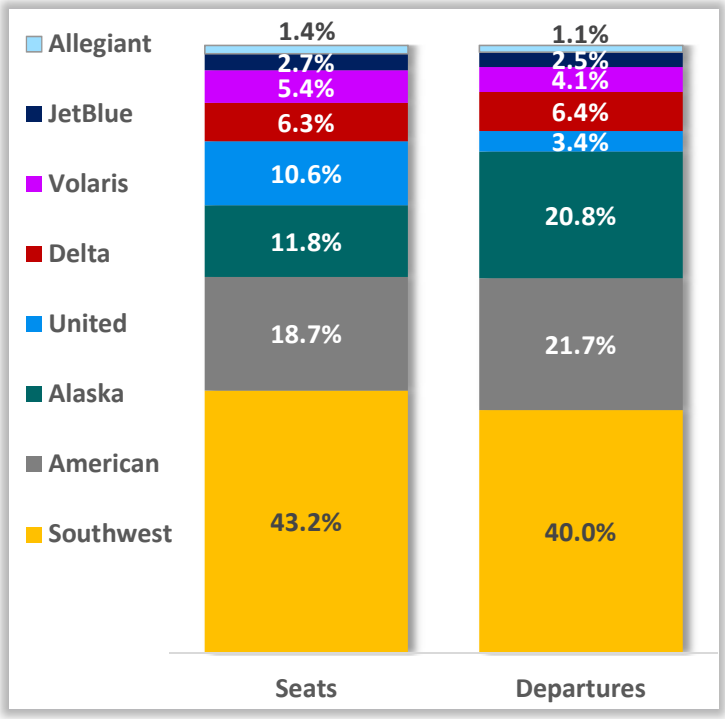
Source: Airports Council International-North America

The closest major airports to RNO are Sacramento International Airport, which has an ACI-NA ranking of 42nd by total passengers, and Oakland International Airport, which has an ACI-NA ranking of 36th by total passengers, both in California. Although much larger than RNO by total passengers, both airports are more than 150 miles away in driving distance.

Scheduled Service in 2016

In 2016, eight published carriers provided scheduled commercial passenger airline service at RNO (**Table 1-6**). These airlines scheduled a total of 2.3 million seats on 19,600 flights out of RNO over the entire year, or an average of 6,354 seats on 54 flight departures per day. Southwest accounted for the largest share. Three airlines, Southwest, American, and Alaska, provided 74 percent of seats and 83 percent of flights (**Figure 1-12**).

Figure 1-12: Airline Shares of Scheduled Seats and Aircraft Departures, 2016



Source: OAG Schedules Analyzer

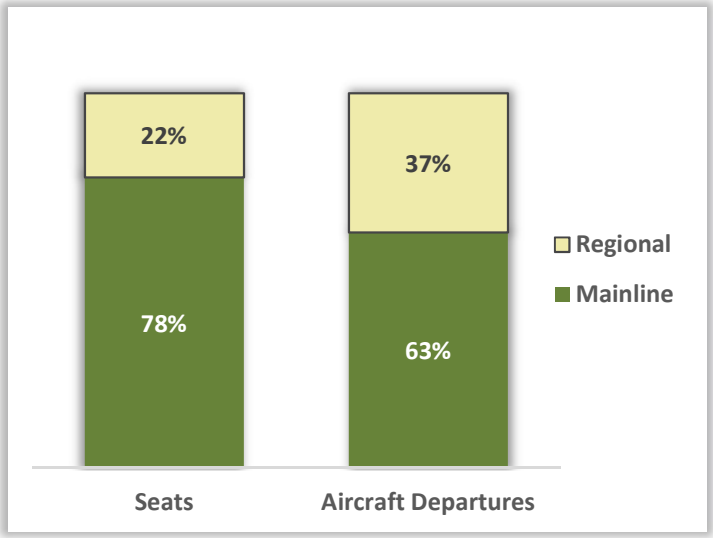
Table 1-6: Scheduled Passenger Airlines Serving RNO in 2016

Published Carrier		Regional Affiliate	
Code	Name	Code	Name
AS	Alaska Airlines	QX	Horizon Air
G4	Allegiant Air	None	
AA	American Airlines	CP	Compass Airlines
		YV	Mesa Airlines
		OO	SkyWest Airlines
DL	Delta Air Lines	OO	SkyWest Airlines
B6	JetBlue Airways	None	
WN	Southwest Airlines	None	
UA	United Airlines	YV	Mesa Airlines
		OO	SkyWest Airlines
Y4	Volaris	None	

Source: OAG Schedules Analyzer

Allegiant, JetBlue, Southwest, and Volaris provided mainline service exclusively. Alaska's service was provided entirely by its regional affiliate, Horizon Air. American, Delta, and United provided both mainline and regional service. These three airlines operate a hub and spoke network, with RNO serving as a spoke feeding traffic to their major hubs. Overall, mainline service accounted for the large majority of scheduled service, with 78 percent of seats and 63 percent of aircraft departures (**Figure 1-13**). Airlines operate relatively larger aircraft out of RNO. Mainline service averaged 146 seats on each flight, while regional service averaged 71 seats on each flight, which is greater than the FAA's averages for the industry for domestic service that has mainline at 133 seats, and regional at 61 seats.[1]

Figure 1-13: Allocation of Service from RNO between Mainline and Regional Carriers, 2016

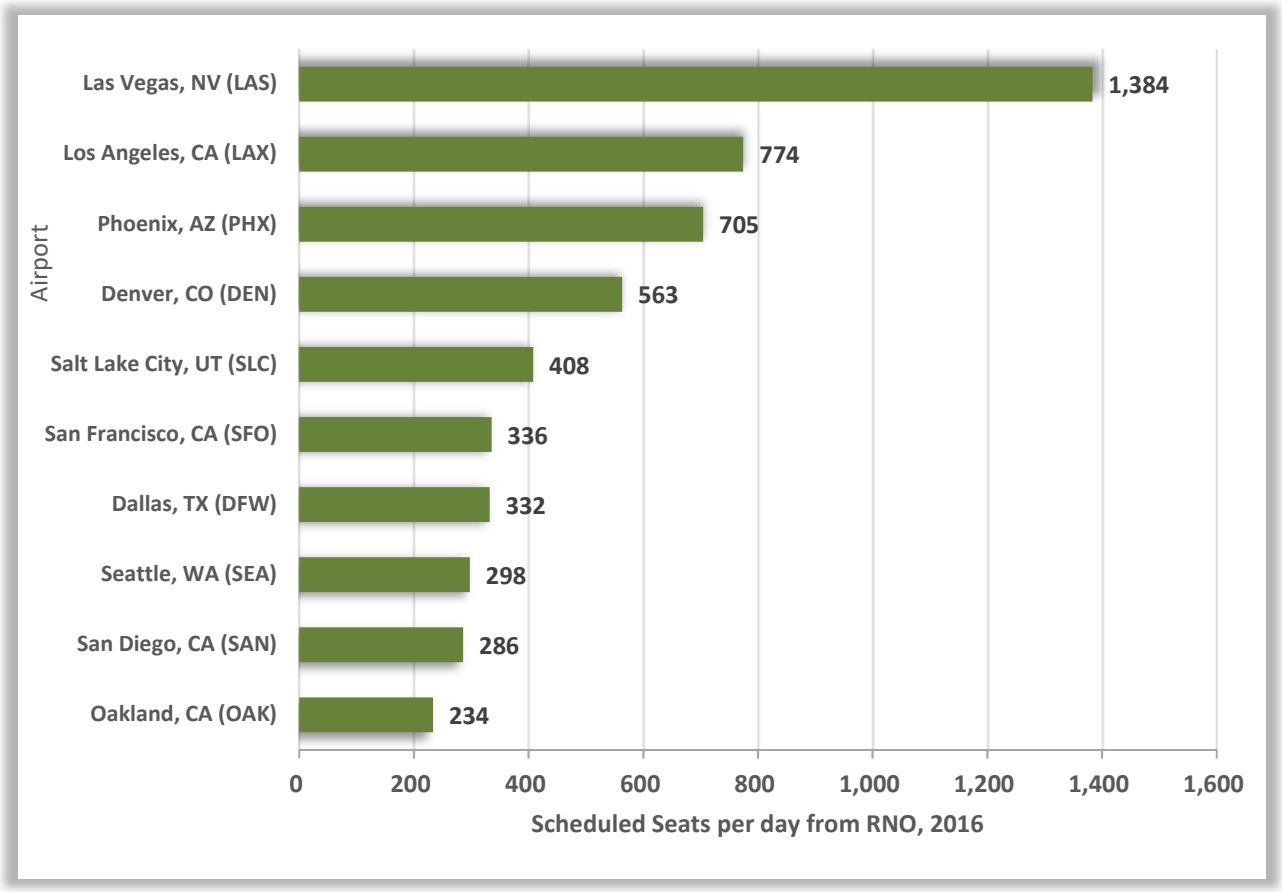


Source: OAG Schedules Analyzer

[1] Federal Aviation Administration, *Aerospace Forecasts*, FY 2016-2036, March 2016.

A total of 23 airports were served nonstop from RNO in 2016. All but one, Guadalajara, Mexico, are U.S. airports. **Figure 1-14** lists the top 10 nonstop airport markets by number of scheduled seats from RNO. The top four are Las Vegas McCarran International Airport (LAS), Los Angeles International Airport (LAX), Phoenix Sky Harbor International Airport (PHX), and Denver International Airport (DEN). These four airports are major hubs. They rank among the top 10 U.S. airports by total passengers and among Southwest Airlines' top 10 airports served by number of scheduled seats.

Figure 1-14: Top 10 Airport Markets by Scheduled Seats from RNO, 2016



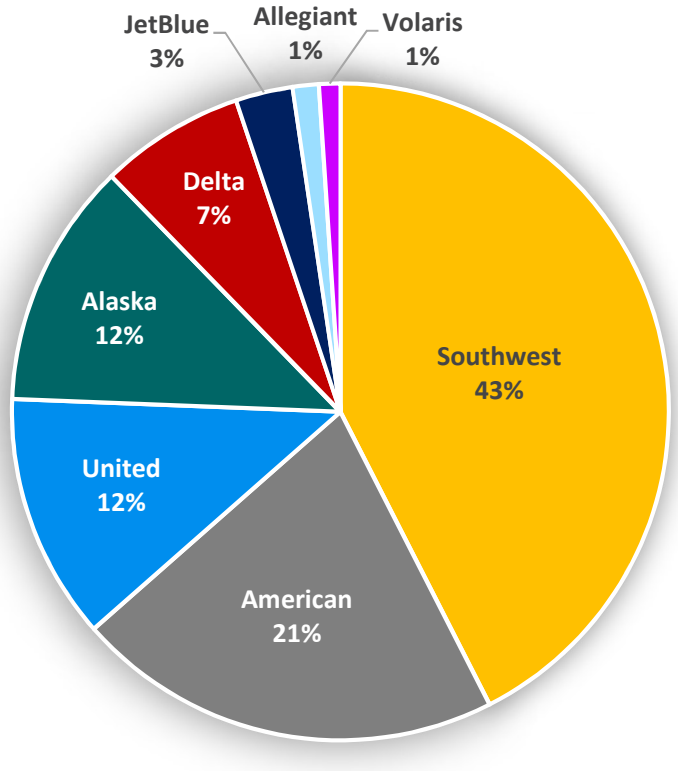
Source: OAG Schedules Analyzer

Passenger Enplanements

Enplanements at RNO totaled an estimated 1.83 million in 2016. Comparing total enplanements with total scheduled seats yields a boarding load factor estimate of 78.8 percent on average for all airlines serving RNO. That is less than 4 percentage points lower than the average for all U.S. airports, which is 82.6 percent.[2]

Southwest Airlines accounts for the largest share of passenger traffic at RNO. In 2016, Southwest Airlines held a 43 percent share of the Airport's enplanements, followed by American, at 21 percent; United at 12 percent; and Alaska, also at 12 percent (**Figure 1-15**). Together these four airlines accounted for 88 percent, while Delta, JetBlue, Allegiant, and Volaris shared the remaining 12 percent. Volaris, which carried 1 percent, is the only airline that serves international traffic, with travel to Guadalajara.

Figure 1-15: Carrier Share of RNO Passenger Enplanements, 2016



Source: Airport Statistics

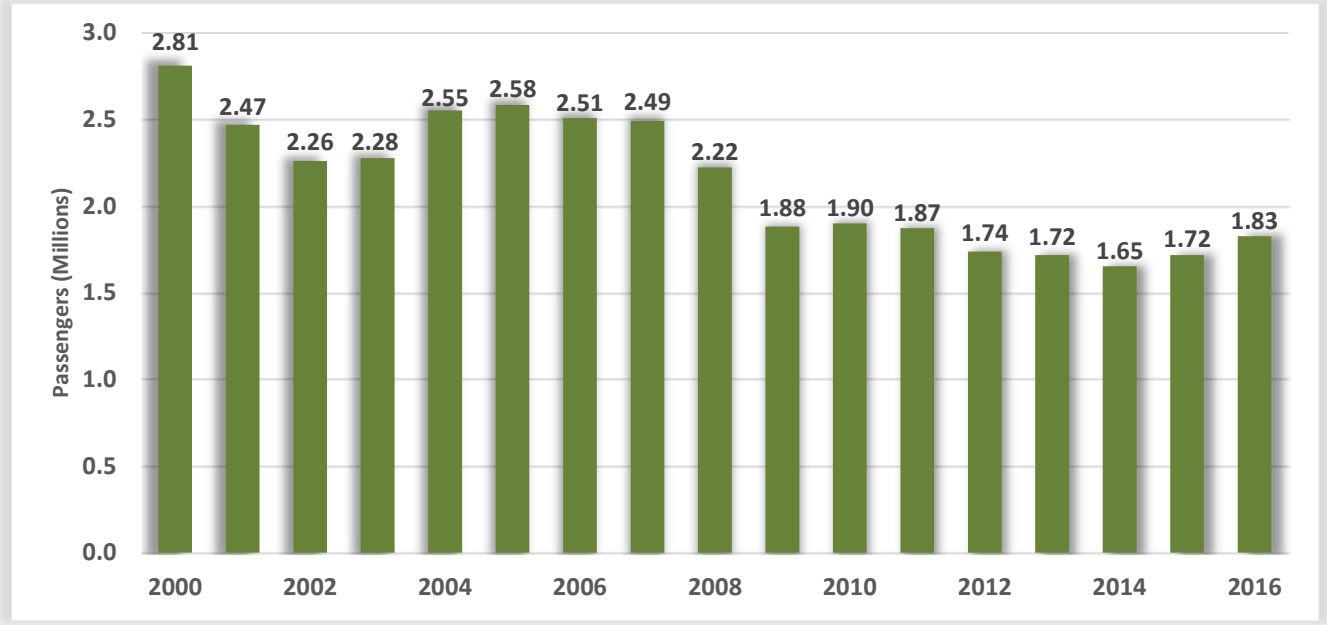
Passenger enplanements increased in the past two years, by 3.9 percent in 2015 and another 6.3 percent in 2016 (**Figure 1-16**). Before 2015, however, annual enplanements had been decreasing. In 2014 they reached their lowest level in recent history at 1.65 million enplanements.

[2] U.S. Department of Transportation Bureau of Transportation Statistics T-100 Segment data.

The decreases in annual enplanements began before 2000—in 1998 when Reno Air began cutting service. Reno Air operated a network hub at the Airport in the mid-1990s and was acquired by American Airlines in 1999. Facing financial pressures following the September 11, 2001, terrorist attacks, American disposed of Reno Air's fleet to reduce capacity, discontinued Reno Air's route network, and downgraded RNO from Reno Air's connecting hub to a spoke in American's route system. RNO's enplanements continued to decrease until 2003, and enplanements increased for three straight years. In 2006, they began to decrease again when the U.S. economy slowed and eventually entered the Great Recession in 2008-2009. After the recession ended, enplanements at RNO continued to decrease as airlines continued to cut capacity and reduce service at smaller airports like RNO.

Although enplanements in 2016 (1.83 million) were still only 70 percent of enplanements in 2005 (2.58 million), the increase in enplanements over the past two years could indicate the beginning of a recovery in commercial passenger services and traffic at RNO.

Figure 1-16: RNO Passenger Enplanements, 2000-2016



Sources: ACI-NA (2000-2005) and Airport Statistics (2006-2016)

Air Cargo Service

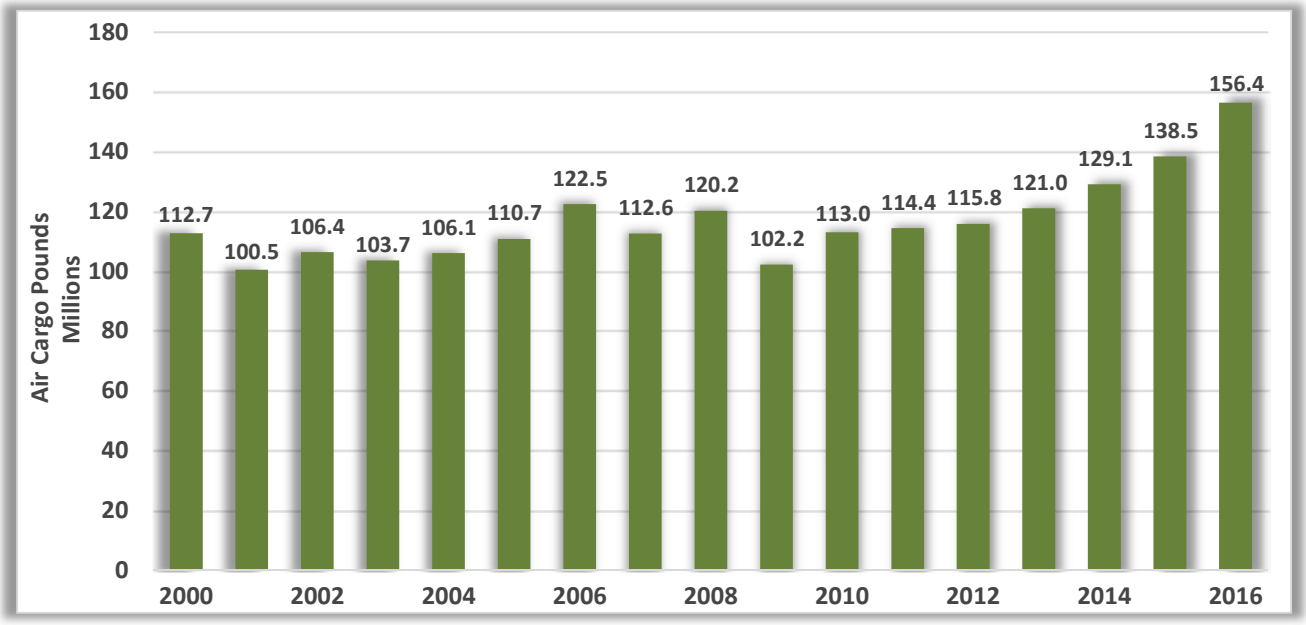
Integrated all-cargo carriers Federal Express (FedEx) and United Parcel Service (UPS) transport more than 90 percent of RNO's cargo traffic for domestic services. DHL, a foreign all-cargo carrier, also operates cargo flights at RNO but accounts for approximately 2 percent of traffic. As of November 2015, Southern Air and Redding Aero took over cargo flights on behalf of DHL. Belly cargo on passenger airlines makes up the remaining share of the cargo traffic at RNO, and it is primarily hauled by Southwest Airlines.

Approximately 139 million pounds of cargo moved through RNO in 2015, placing the Airport 54th for total volume of air cargo handled by U.S. airports according to ACI-NA rankings. RNO serves local and regional demand for domestic shipments in terms of its cargo market function. Truck transport to and from international gateways, predominantly Los Angeles International Airport, meets most international demand for the West Coast region.

Year-to-date through May 2016, FedEx and UPS account for a combined 95 percent market share for cargo traffic at RNO. Both dominant carriers already have western regional hubs, including Oakland, California, for FedEx and Ontario, California, for UPS. RNO serves as a spoke for the two carriers' regional and national hubs. European integrated carrier DHL accounts for another 3 percent market share, with the small balance carried in bellies of passenger aircraft.

Figure 1-17 illustrates the amount of cargo, including freight and mail pounds, enplaned and deplaned at RNO from 2000 to 2016. Unlike passenger enplanements, cargo traffic has consistently increased at RNO since the 2008 recession. In fact, the total weight of cargo handled at RNO exceeded pre-recession levels as of 2015. Since reaching its lowest level in 2009, cargo traffic handled at RNO increased by 35 percent in 2015, to 138 million pounds, averaging around 5 percent in annual growth during this recovery period.

Figure 1-17: Total Air Cargo Handled at RNO, 2000-2016

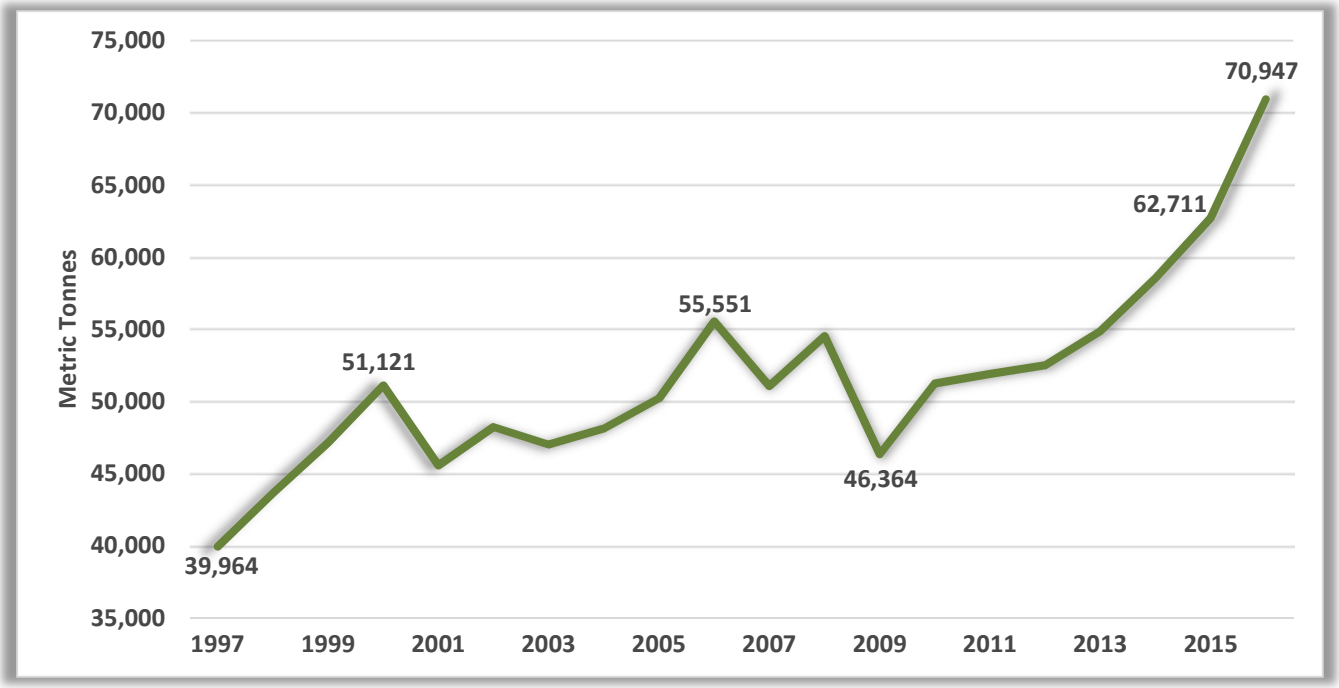


Sources: ACI-NA (2000-2005), Airport Statistics (2006-2015)

U.S. mail was a mainstay of belly carriers for decades. The rise of electronic banking transactions and outsourcing of priority mail to FedEx and other carriers caused mail cargo to decrease sharply. At the same time, the heightened screening requirements for belly cargo marginalized the domestic cargo market. International cargo remains strong, and accounts for more than 50 percent of the transcontinental air cargo market.

As **Figure 1-18** illustrates, RNO experienced a decrease in air cargo after a peak year in 2000. Unlike most U.S. airports, RNO established a new peak in 2006 before entering a highly erratic period. Since 2009, RNO's annual cargo has been on the ascent, consecutively establishing new peaks in 2014 and 2015, and on pace to do so again in year-to-date 2016.

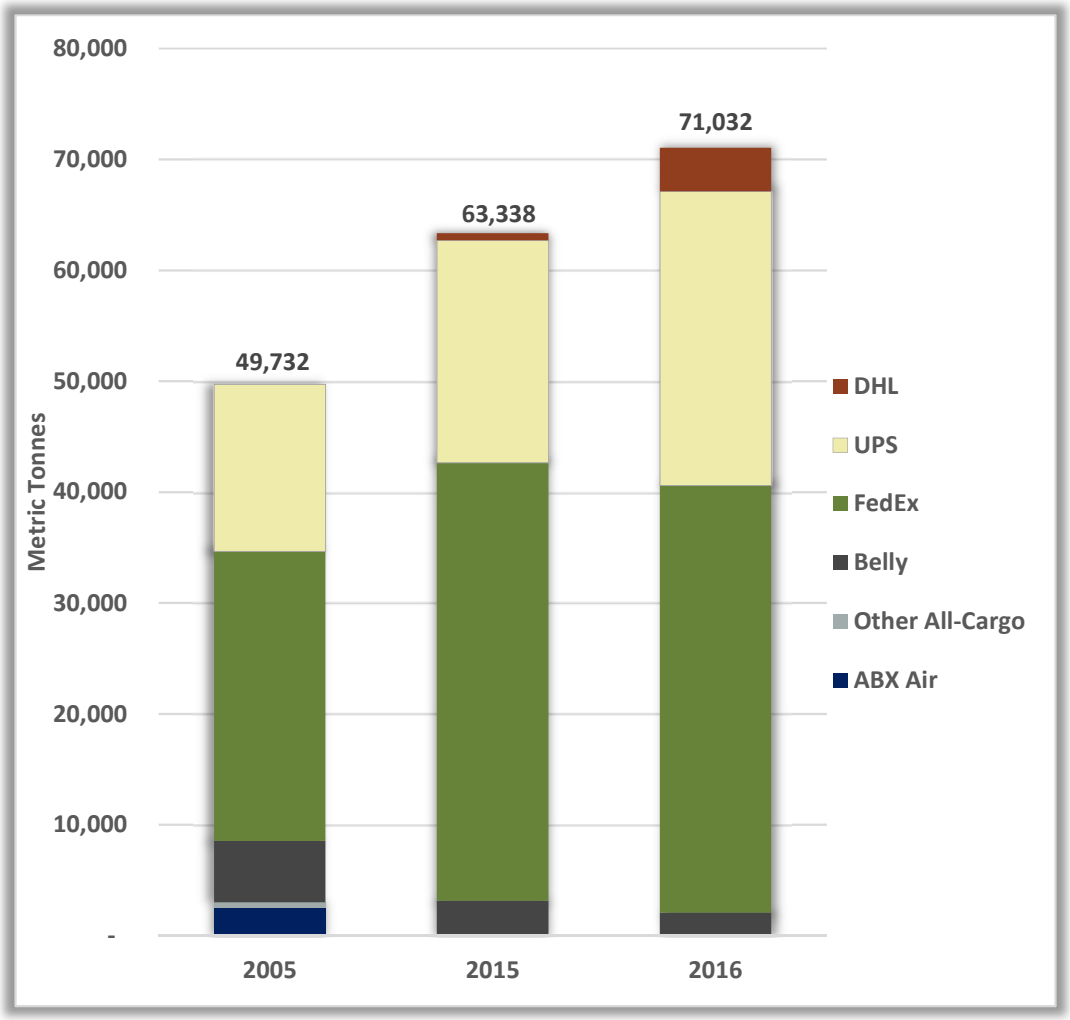
Figure 1-18: RNO Total Air Cargo Tonnage (Metric) from Calendar Year 1997 through 2015



Sources: Airports Council International – North America and Webber Air Cargo, Inc.

Figure 1-19 shows the expansion experienced by FedEx, with 63 percent, and UPS, with 32 percent, leading to a combined market share at RNO of 95 percent, while belly cargo carriers have only 2 percent. The bankruptcies and acquisitions of all-cargo carriers also affected RNO. In 2005, Airborne Express (ABX) had a 5 percent market share at RNO, serving domestic and international customers. Relying on hired aircraft for its U.S. network and serving only international customers, DHL (which acquired Airborne) has grown its RNO operation and had a 3 percent market share for the year through May 2016.

Figure 1-19: RNO Total Air Cargo Tonnage by Carrier for Calendar Years 2005, 2015 & 2016



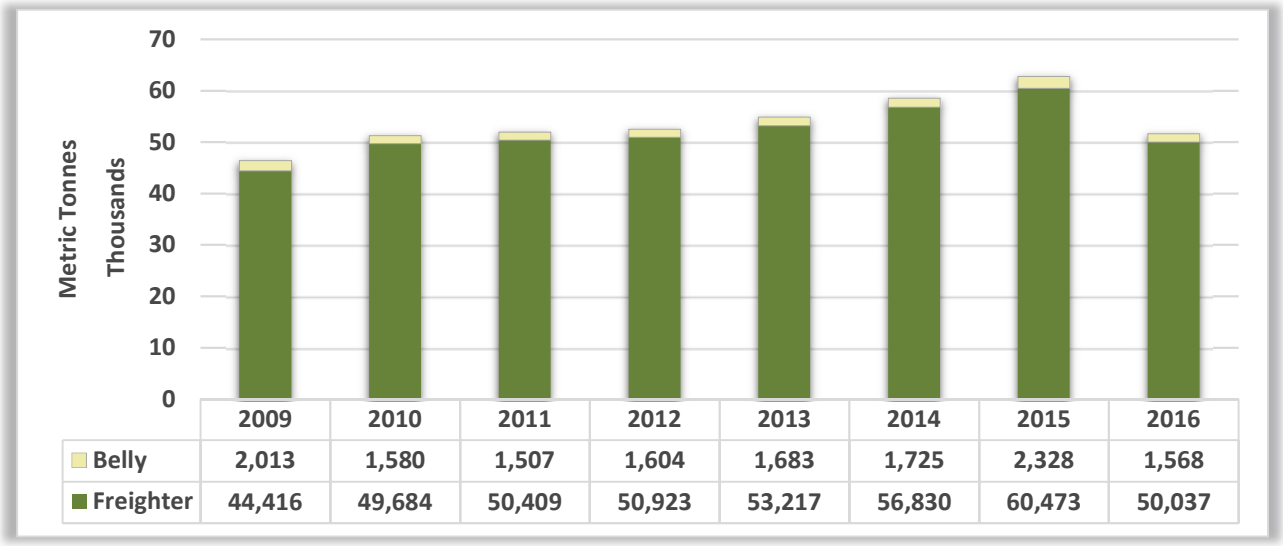
Sources: FAA T-100 with additional analysis by Webber Air Cargo, Inc.
Note: 2016 data is through May.

Mail has slumped to only about 2 percent of cargo tonnage at RNO, while belly cargo carriers still carry a commanding 68 percent. UPS also has a substantial role, especially for holiday e-commerce shipments. FedEx transports much of the U.S. Postal Service's Express and Priority mail but does not report it separately. Instead, tonnage is reported as part of FedEx's freight tonnage. The Postal Service has closed most on-airport sortation centers due to its diminished share and to relatively expensive airport real estate.

Integrated carriers such as FedEx and UPS own proprietary aircraft and truck fleets to control as many critical functions of the supply chain as possible. Typically, they also perform their own ground handling and warehousing functions as well. At RNO, FedEx performs all its own operations, while UPS outsources ramp handling but performs all warehouse operations. DHL relies more extensively upon third party services.

As **Figure 1-20** illustrates, RNO has largely derived its recent cargo growth from freighter operators whose tonnage increased 20 percent, from roughly 50,000 metric tonnes to 60,000 metric tonnes, between 2010 and 2015 alone. Belly carriers also experienced growth, although from a much smaller base. Local market demand formed the entire basis for these gains rather than an expansion of RNO's use as a hub or gateway. In 2014, all-cargo airline Amerijet International, Inc. briefly resolved to use RNO as a western hub to serve larger Pacific Coast markets. Amerijet abandoned the strategy after only two months, but there were no enduring negative effects for RNO's annual tonnage.

Figure 1-20: RNO Total Air Cargo Tonnage by Carrier Type for Calendar Years 2009 through 2015, plus 2016 (year-to-date through September)



	2009	2010	2011	2012	2013	2014	2015	2016
Belly	2,013	1,580	1,507	1,604	1,683	1,725	2,328	1,568
Freighter	44,416	49,684	50,409	50,923	53,217	56,830	60,473	50,037

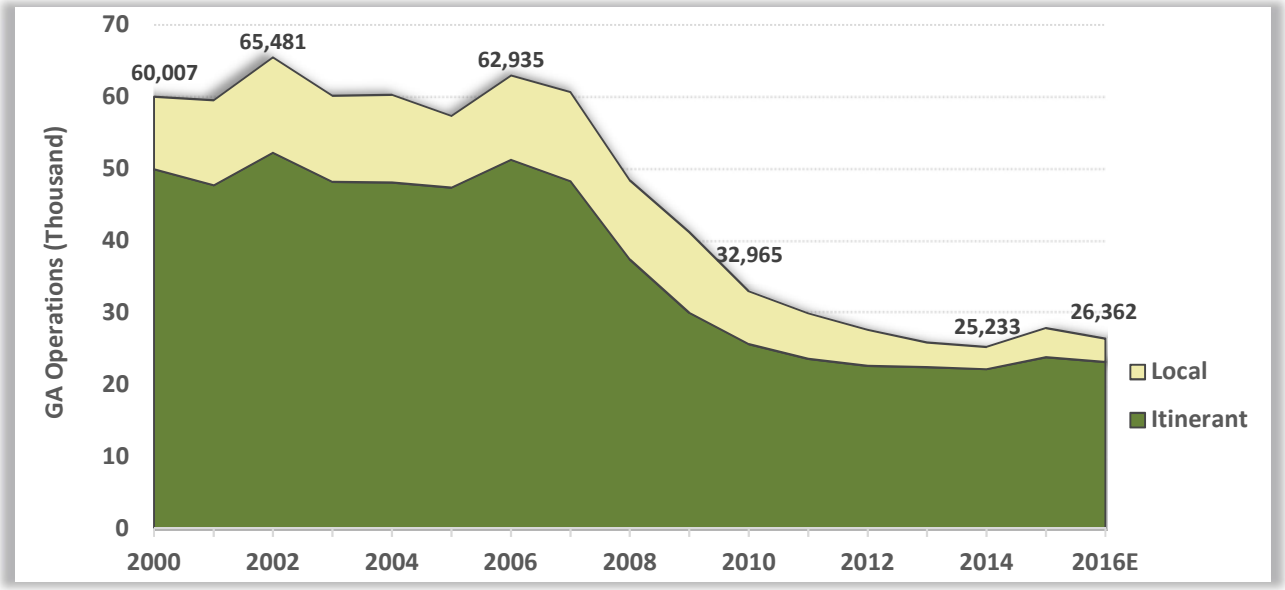
Sources: RTAA with additional analysis by Webber Air Cargo, Inc.

General Aviation

GA includes both itinerant and local aircraft operations not classified as commercial passenger, cargo services, or military. At RNO, itinerant operations make up the large majority of GA operations (86 percent to 88 percent in the last four years). Itinerant operations are those coming from or going to a different airport. In contrast, local operations include flights within the local traffic pattern of the airport or within sight of the airport and flights to designated practice areas within 20 miles of the airport.[3] The broad umbrella of GA primarily covers local air service needs including flight instruction, recreational flying, business travel, and emergency-related transport provided by aircraft based at the airport. The types of aircraft used for GA range from the one-seat single piston aircraft to the long-range corporate jet. They also include helicopters, gliders, and amateur-built aircraft.[4]

GA operations at RNO have decreased significantly since the last recession, as shown in **Figure 1-21**. The number of operations each year has fallen from typically more than 60,000 before the Great Recession began in 2008 to about 25,000 in recent years. The decrease in GA activity at RNO is no different from a national trend that began four decades ago. Clearly the U.S. economic recessions—especially the Great Recession in 2008-2009 and the subsequent slow economic recovery—depressed GA activity, but other factors also contributed. The pilot population has declined since reaching its peak in the 1980s; the production of GA aircraft has also decreased amid the aging of the existing fleet; and aviation fuel prices rose to record high levels until their recent decline.[5]

Figure 1-21: General Aviation Operations at RNO, 2000-2016

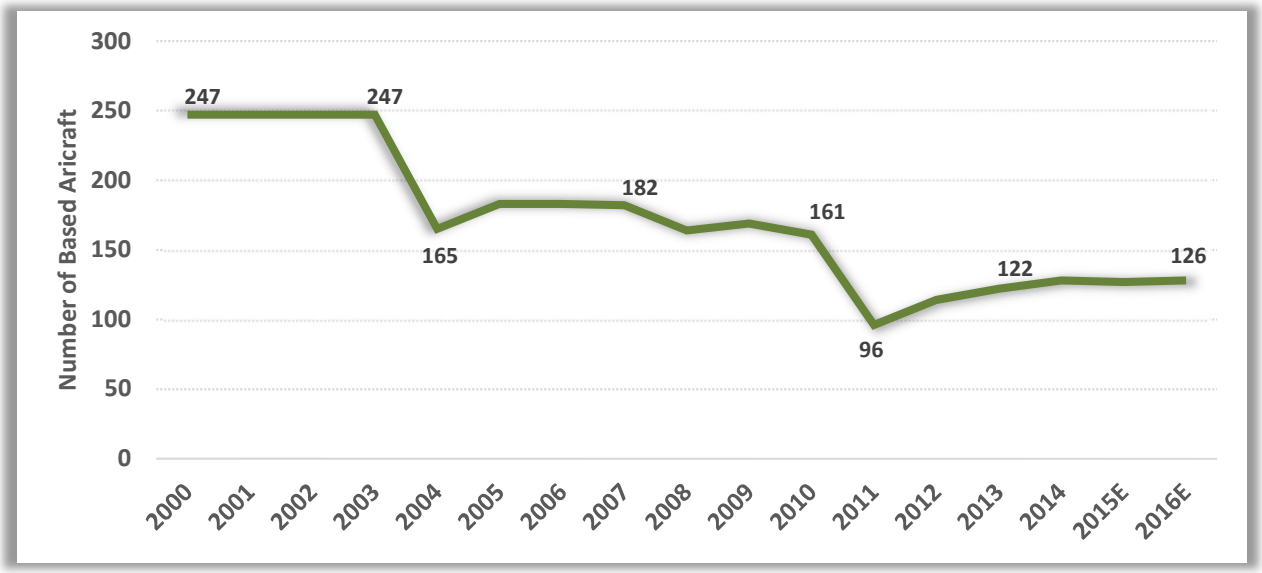


Note: 2016 figures are estimates based on data for Jan-Nov 2016.

[3] Federal Aviation Administration, *ATADS Glossary*.
[4] Federal Aviation Administration, *Aerospace Forecasts, Fiscal Years 2005-2016*.
[5] Kamala I. Shetty and R. John Hansman, "Current and Historical Trends in General Aviation in the United States," *Report No. ICAT-2012-6*, MIT International Center for Air Transportation, August 2012.

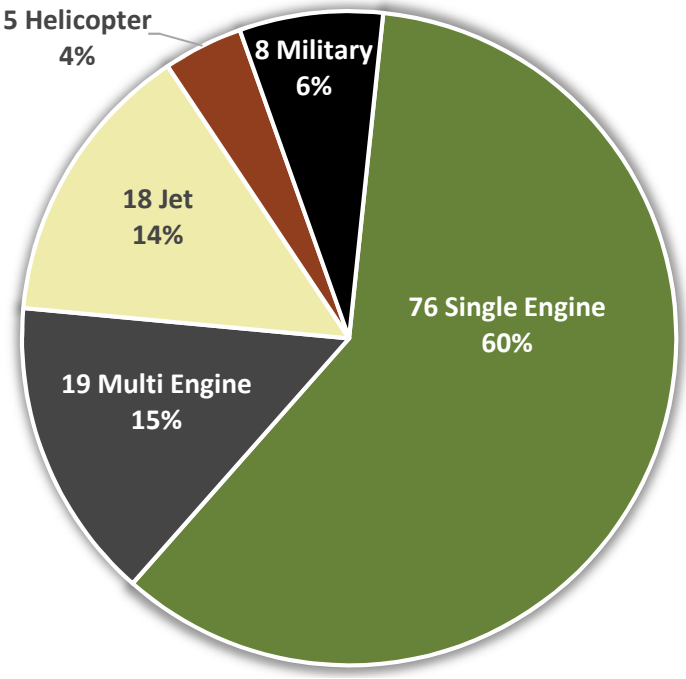
The number of based aircraft (GA and military) has fallen to only about half of the number before the recession, although it increased in the most recent years to 126 in 2016 from a low of 96 in 2011 (see **Figure 1-22**). **Figure 1-23** shows the composition of the 126 based aircraft in 2015.

Figure 1-22: RNO Based Aircraft, 2000-2015



Source: FAA Terminal Area Forecasts

Figure 1-23: RNO Based Aircraft Composition, 2015



Source: Airport IQ 5010 and RTAA records

Existing Airport Facilities

General Airport Layout

RNO has three runways with six approach and departure ends. Runways 16R/34L and 16L/34R, which are oriented north-south, and Runway 7/25, which is oriented east-west. The runway configuration divides RNO into four quadrants:

- Northwest: The majority of landside and airside facilities are located in the northwest quadrant. Major facilities here include the passenger terminal, Federal Inspection Service, automobile parking, NVANG, cargo facilities, Airport maintenance, and storage buildings.
- Northeast: The northeast quadrant is primarily occupied with GA facilities and corporate hangars, and a fuel farm, with the ATCT and vacant land east of the tower and north of Taxiway L.
- Southwest: The southwest quadrant is home to GA hangars, which consist of T-hangars, small box hangars and large executive hangars, and the aircraft rescue and firefighting (ARFF) building, plus vacant land south of the ARFF and west of Taxiway A.
- Southeast: This quadrant is currently undeveloped and includes a culvert that routes Dry Creek through Airport property. The southeast quadrant includes a perimeter road and security fencing, and a former aircraft taxilane that was built for the Porsche motor company's North American Division, but is now outside of the fence. The property is now owned by Tessco, Inc and is no longer used for aviation purposes.

Airside and landside facilities described herein will reference these quadrants. **Figure 1-24** is a Master Facility Map that illustrates the primary facilities and quadrants at RNO. **Figure 1-24** is a key for other inset maps of RNO that show the facility areas in more detail: Terminal Area (**Figure 1-25**), Cargo Facilities / Northwest Quad (**Figure 1-26**), NVANG / Southwest Quad (**Figure 1-27**) and Northeast Quad (**Figure 1-28**). **Figures 1-25 through 1-29** will be referenced throughout this chapter when a specific facility is described to help the reader locate that facility.

Airside Facilities

Runways

RNO's three runways and associated taxiway system are illustrated in **Figure 1-29**. Runways 16R/34L (the Airport's primary runway) and 16L/34R are equipped with visual and navigational aids that allow for instrument operations (arrivals and departures during low visibility). Runway 7/25 is the crosswind runway, and does not have instrument approach procedures, which means it is closed when visibility falls below three statute miles. The crosswind designation of Runway 7/25 means that it is oriented to support aircraft operations for when wind blows perpendicular to the orientation of the two 16/34 parallel runways .

Runway designations are based on the magnetic compass heading of the runway. For example, Runway 16R and 16L have a magnetic heading of 166.6° and are situated heading nearly due south, and Runways 34 in the opposite direction are oriented to the north. Runways 16 and 34 designators will likely be re-numbered within the next five years to 17 and 35, respectively, due to moving magnetic declination.

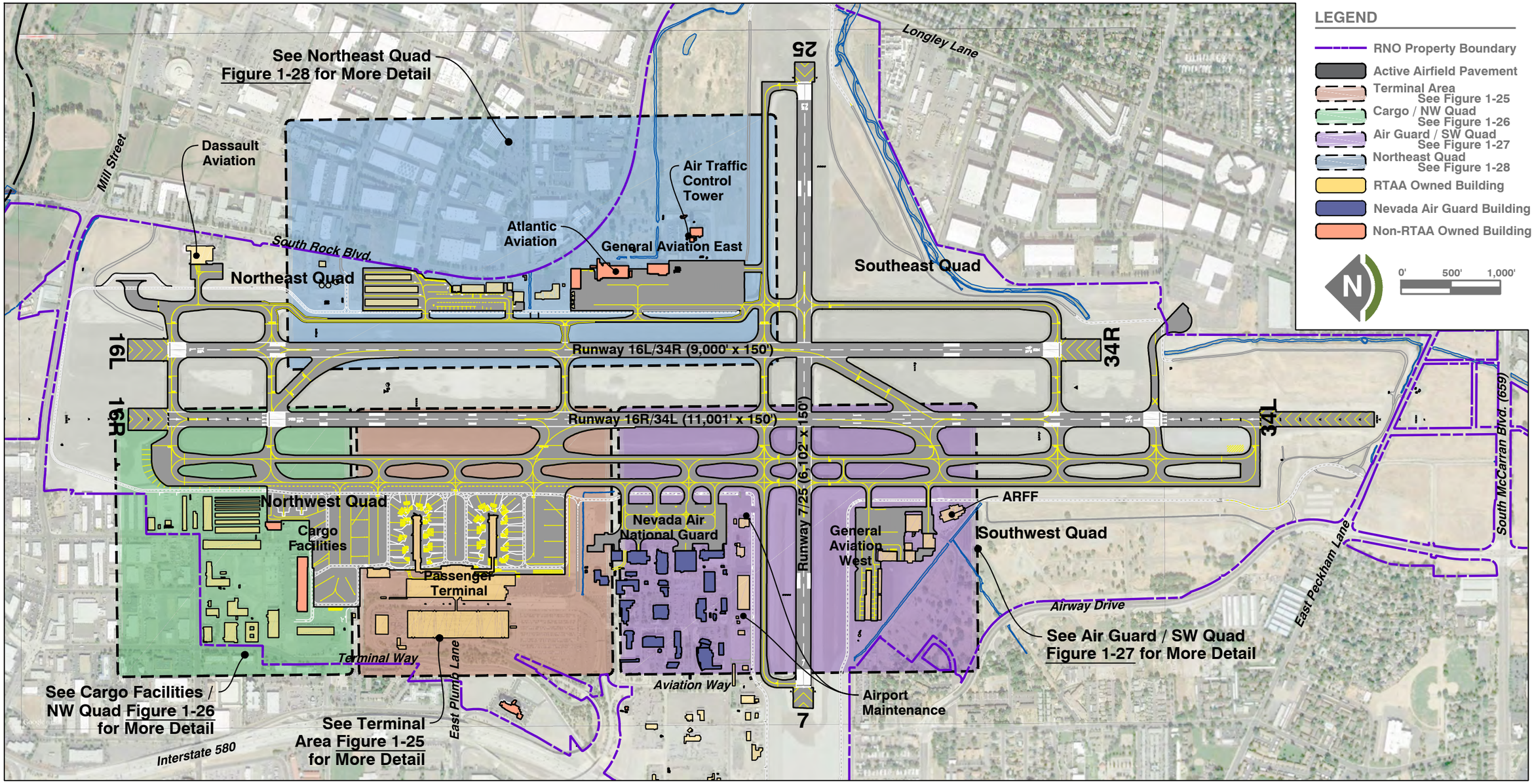


Figure 1-24
Major Facility Areas

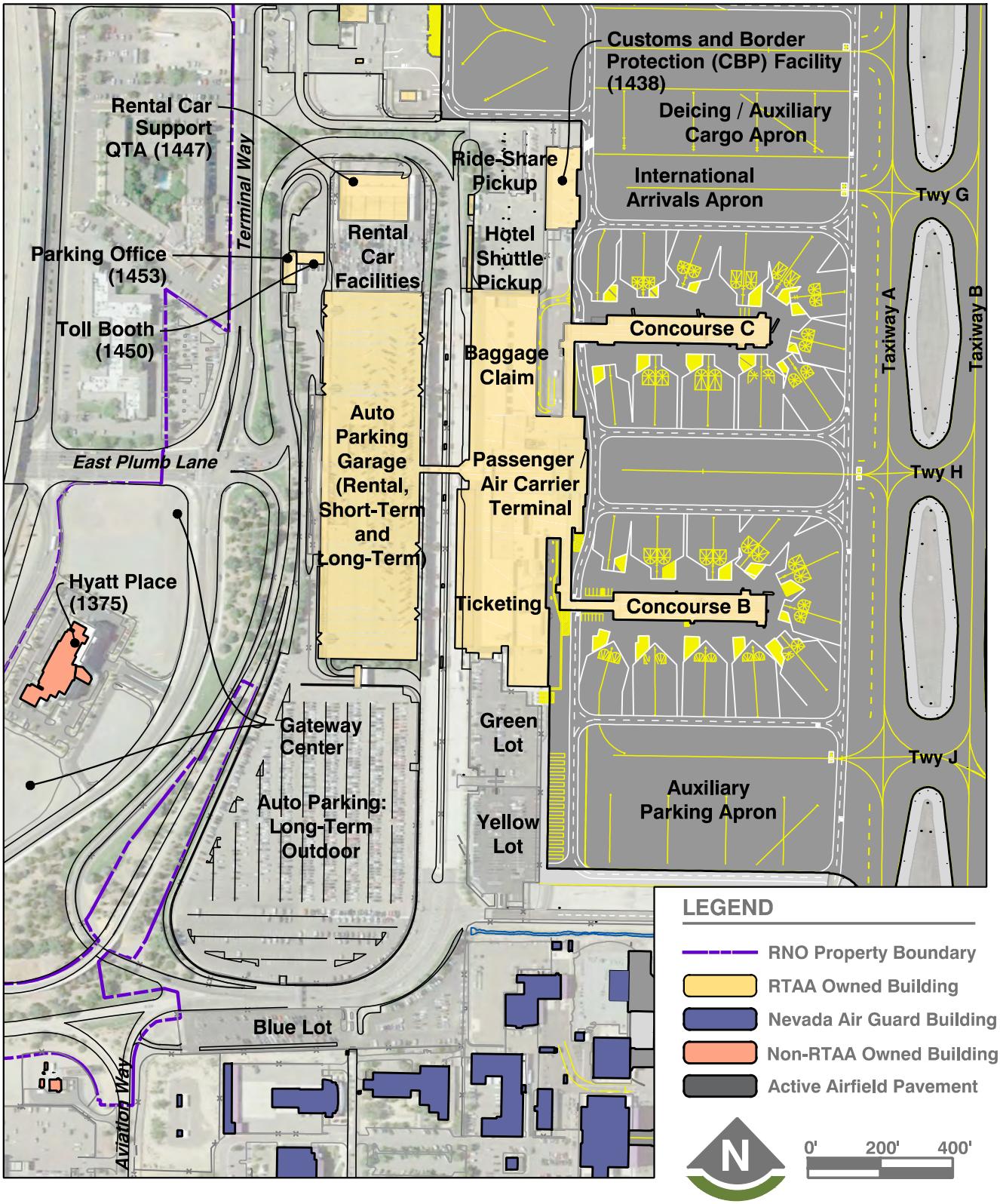


Figure 1-25
Terminal Area

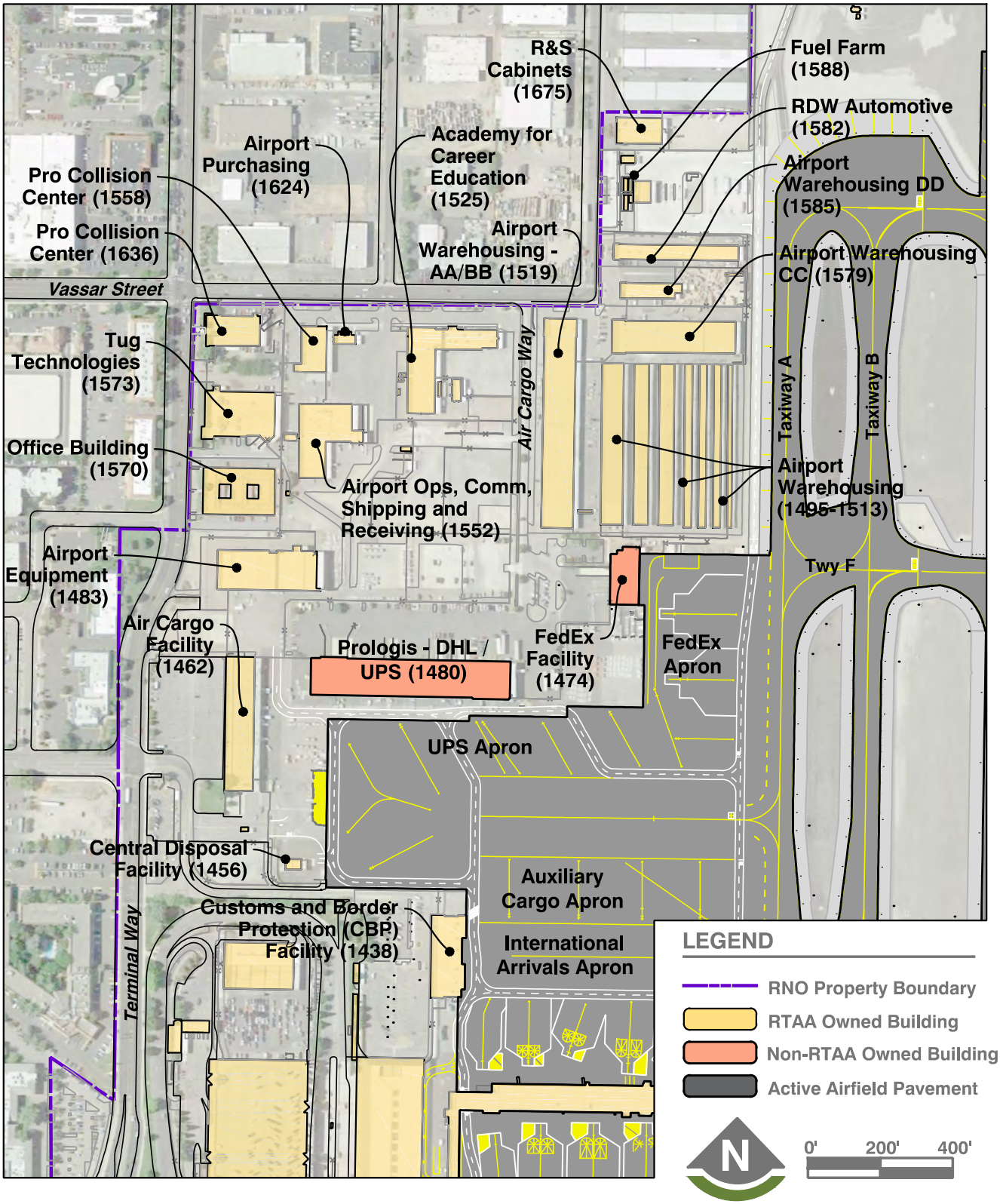


Figure 1-26
Cargo Facilities / Northwest Quad

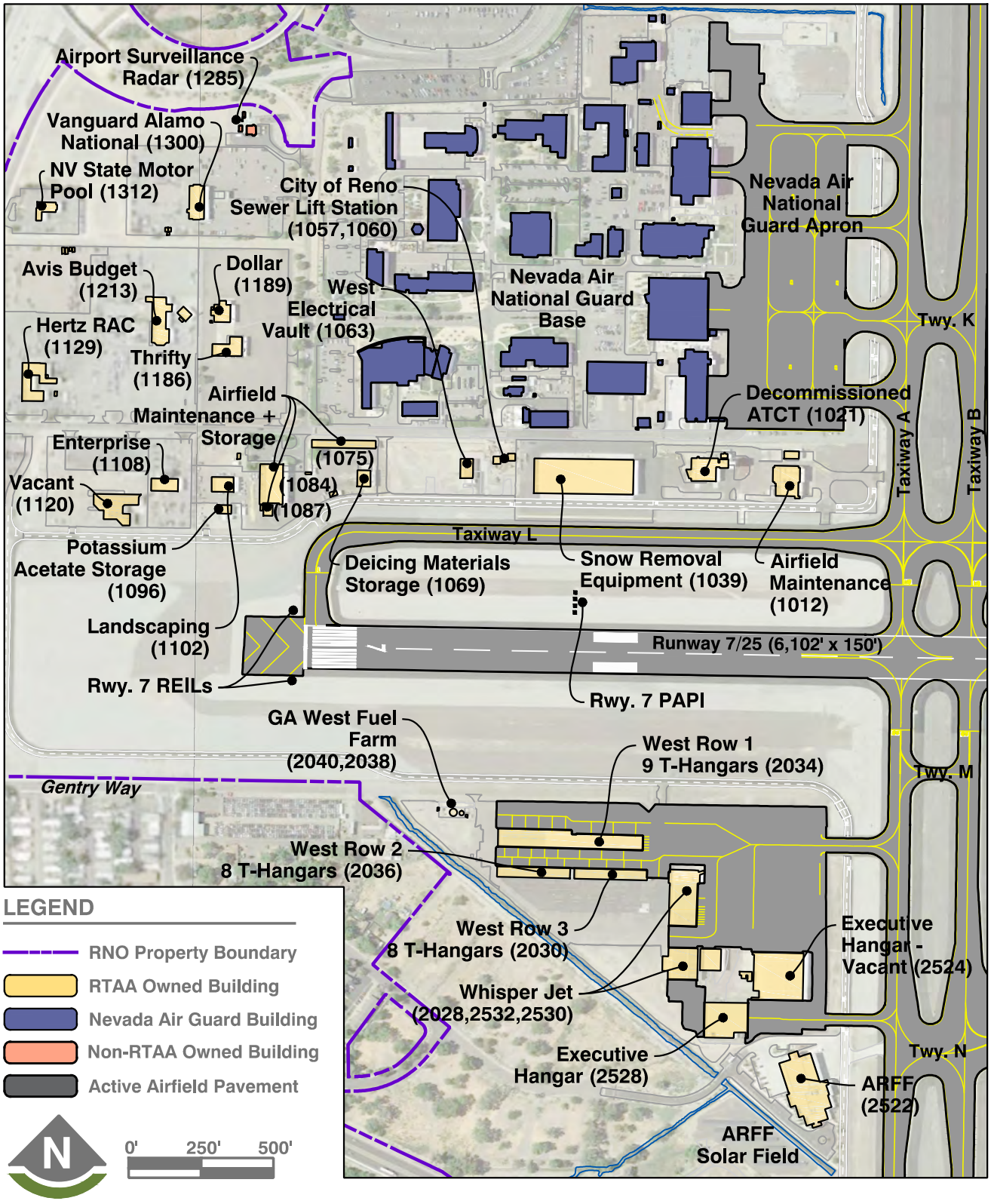


Figure 1-27
Air Guard / Southwest Quad

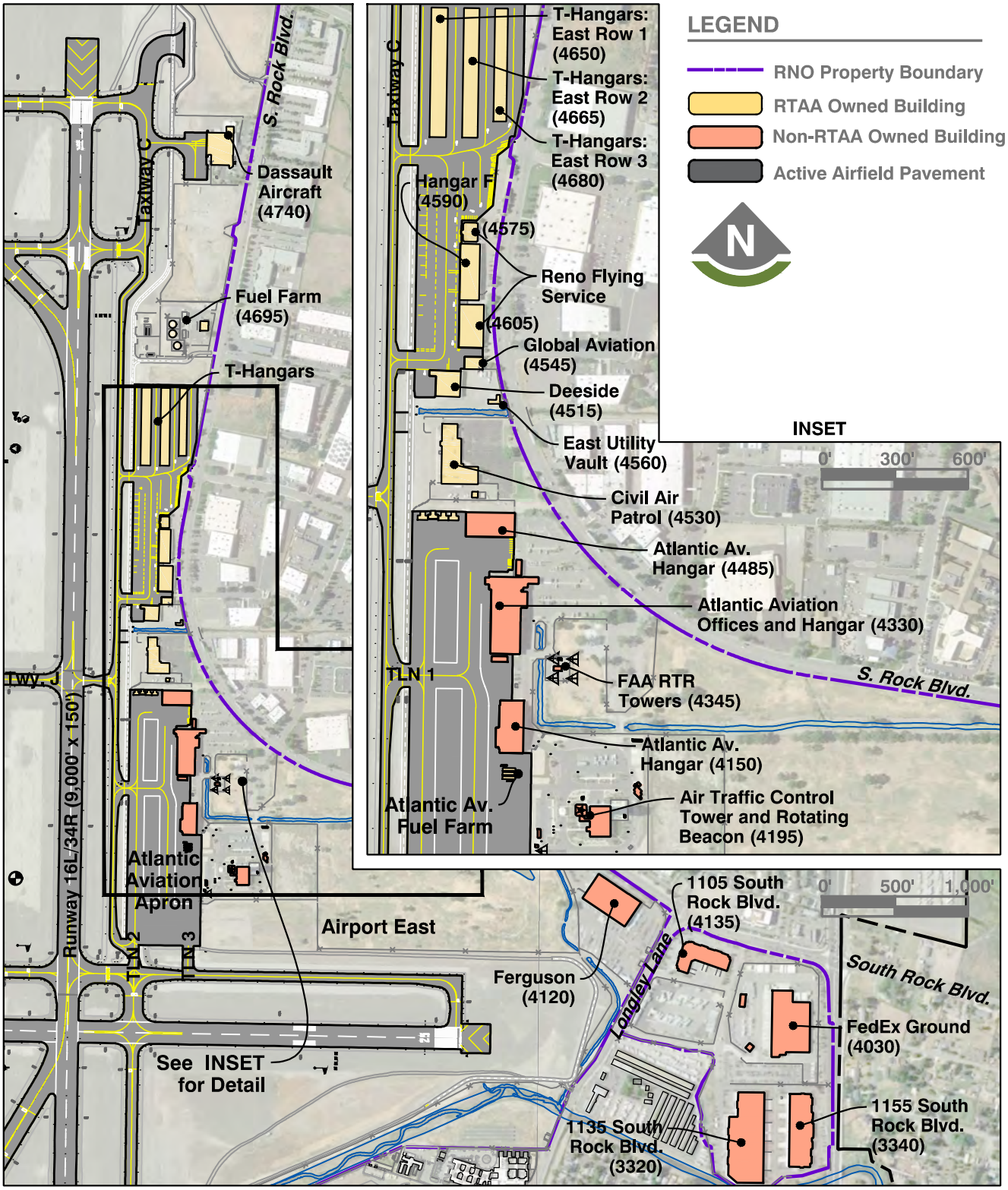


Figure 1-28
Northeast Quad

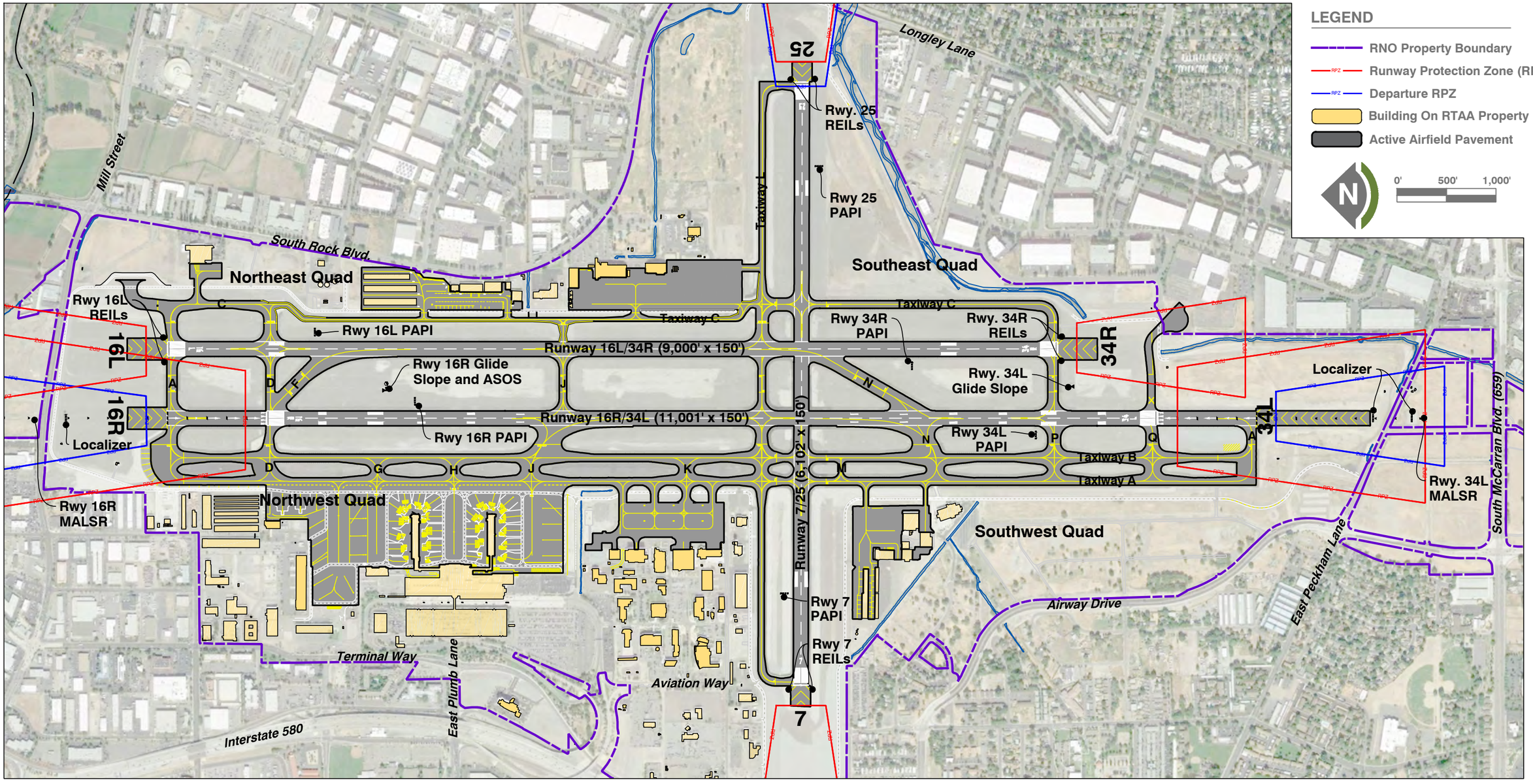


Figure 1-29
Runway, Taxiways and NAVAIDS

Runway data is presented in **Table 1-7** below, and **Figure 1-29** shows the runway-taxiway system with letter and number designators. Visual and navigational aids for each runway are also shown on **Figure 1-29** and described later in the **Navigational Aids** Section.

Table 1-7: RNO Runway Data

	Runway					
	16R / 34L		**16L / 34R**		**7 / 25**	
Length	11,001 feet		9,000 feet		6,102 feet	
Width	150 feet		150 feet		150 feet	
Surface	Grooved Concrete		Grooved Concrete		Grooved Concrete	
PCN[1]	72 / R / B / W / T		72 / R / B / W / T		68 / R / B / W / T	
Weight Bearing Capacity (thousand pounds)	❖ Single Wheel: 75.0 ❖ Double Wheel: 185.0 ❖ Double Tandem: 350.0 ❖ Dual Tandem: 850.0		❖ Single Wheel: 75.0 ❖ Double Wheel: 209.0 ❖ Double Tandem: 407.0 ❖ Dual Tandem: 850.0		❖ Single Wheel: 60.0 ❖ Double Wheel: 170.0 ❖ Double Tandem: 260.0 ❖ Dual Tandem: N/A	
True Bearing	180.1°	0.1°	180.1°	0.1°	90.2°	270.2°
Magnetic Bearing[2]	166.6°	346.6°	166.6°	346.6°	76.7°	256.7°
Displaced Threshold[3]	1,000 feet	990 feet	None	None	None	None

Source: FAA Datasheet and Airport 5010

1. Pavement Classification Number. PCN source: Stantec memo, September 9, 2014

PCN Key:

Numerical Value / Pavement Type / Subgrade Strength / Allowable Tire Pressure / Method Used to Determine PCN
R=Rigid Pvmnt B=Medium W=High (No Limit) T=Technical Evaluation

2. Magnetic declination calculated from National Oceanic and Atmospheric Administration (NOAA) calculator and subtracted from the true bearing provided by FAA Datasheet.
3. A displaced threshold is a landing threshold located at a point on the runway other than the designated beginning of the runway.

Pavement strength is designated with the pavement classification number (PCN). This is a unit-less number that defines the pavements bearing strength as compared to an aircraft classification number (ACN). If a PCN is greater than the ACN, then the aircraft can operate on the pavement without damage.

Runway Flow

Because of length, orientation, terrain, and navigational aids, Runways 16R/34L and 16L/34R are used for the majority of aircraft operations. ATCT staff and the Airport Noise Operations Monitoring System (ANOMS) report that flights arrive and depart on Runways 16R or 16L approximately 80 percent of the time, and typically exit the runway at the acute-angled, or high-speed, exit Taxiway N. Airline and cargo aircraft will then taxi north on either Taxiway A or B to the passenger terminal or cargo apron. When winds change direction and are out of the north, a south-to-north flow is used and airline and cargo aircraft arrive on Runways 34L and 34R.

Runway 7/25 is typically used by smaller GA aircraft, such as single-engine pistons and smaller turboprops; however, commercial aircraft occasionally use this runway for landing. Operations on 7/25 arrive and depart predominantly on Runway End 25. GA aircraft use Runway 7/25 about 5 percent of the time. Operational flow for aircraft type on each runway is summarized in **Table 1-8**.

Table 1-8: Runway Utilization

Runway End(s)	Flow	Airline / Cargo / Large GA	Military	Small GA	Total
16R/16L	North-to-South	80%	80%	75%	75%
34R/34L	South-to-North	20%	20%	20%	24%
7	West-to-East	0%	0%	<1%	<1%
25	East-to-West	<1%	<1%	5%	<1%
Source: ATCT (Numbers may not add to 100% due to rounding).					

Runways 16R/34L and 7/25 have established declared distances. Declared distances are the distances available for a turbine powered aircraft's takeoff run, takeoff distance, accelerate-stop distance, and landing distance requirements. The declared distances for Runway 16R/34L are:

- Takeoff Run Available (TORA): the runway length declared available and suitable for the ground run of an aircraft taking off. Runway 16R/34L TORA = 11,001 feet / 11,001 feet.
- Takeoff Distance Available (TODA): the TORA plus the length of any remaining runway or clearway beyond the far end of the TORA; the full length of TODA may need to be reduced because of obstacles in the departure area. Runway 16R/34L TODA = 11,001 feet / 11,001 feet.
- Accelerate-Stop Distance Available (ASDA): the runway plus stopway length declared available and suitable for the acceleration and deceleration of an aircraft aborting a takeoff. Runway 16R/34L ASDA = 11,001 feet / 11,001 feet.
- Landing Distance Available (LDA): the runway length declared available and suitable for landing an aircraft. Runway 16R/34L LDA = 10,001 feet / 10,011 feet.

The declared distances for Runway 7/25 are:

- Runway 7/25 TORA = 5,854 feet / 6,102 feet.
- Runway 7/25 TODA = 5,854 feet / 6,102 feet.
- Runway 7/25 ASDA = 6,102 feet / 6,102 feet.
- Runway 7/25 LDA = 5,854 feet / 6,102 feet.

Taxiways

A system of parallel and connector taxiways links the runways to aircraft parking aprons for the passenger terminal, air cargo area, NVANG, and GA facilities. **Figure 1-29** shows the taxiway system, and the PCN ratings for the taxiways are detailed in **Table 1-9.**

Table 1-9: RNO Taxiway Data

Taxiway	Width	Pavement Type	PCN[1]
A	75’	PCC	70 / R / B / W / T
B	75’	PCC	66 / R / B / W / T
C	75’, 35’	PCC	100 / R / B / W / T
D	90’	PCC	72 / R / B / W / T
F	140’	PCC	71 / R / B / W / T
G	75’	PCC	63 / R / B / W / T
H	75’	PCC	94 / R / C / W / T
J	75’, 50’	PCC	60 / R / B / W / T
L	60’	PCC	67 / R / B / W / T
N	140’	PCC	71 / R / B / W / T
P	75'	PCC	79 / R / B / W / T
Q	75’	PCC	80 / R / B / W / T
Terminal Aprons	N/A	PCC	78 / R / B / W / T

Source: Stantec memo, September 9, 2014
Pavement Classification Number (PCN)
Portland Cement Concrete (PCC)
PCN Key:

Numerical Value /	Pavement Type /	Subgrade Strength /	Allowable Tire Pressure /	Method Used to Determine PCN
	R=Rigid Pavement	B=Medium C=Low	W=High (No Limit)	T=Technical Evaluation

Navigational Aids (NAVAIDs), Lighting and Instrumentation

NAVAIDs are visual and electronic guides that assist pilot navigation. Visual NAVAIDs include lights and wind indicators that can be seen through aircraft windows. The reliance on sight limits the utility of visual NAVAIDs when visibility is poor and at great distances. Electronic NAVAIDs communicate with instruments onboard aircraft, and help aircraft navigate and land when it is not possible to do through visual cues alone. Electronic NAVAIDs include terrestrial antennae that use radio beacons, and satellites that use the global positioning system (GPS). NAVAIDs are used during all flight conditions, and must be used when visibility and cloud ceilings are low enough to be considered instrument meteorological conditions (IMC). FAA regulations refer to flight relying on instruments as instrument flight rules (IFR), and IMC is occasionally referred to as “IFR conditions.” When visibility and cloud ceiling are above IMC, pilots may elect to fly using IFR or visual flight rules (VFR), which requires the pilot to use visual cues to safely operate the aircraft.

- Visual Meteorological Conditions (VMC): are experienced during good weather conditions. VFR apply during VMC, making the pilot responsible for navigation based on geographical features and maintaining safe distances between aircrafts.
- IMC: are experienced during reduced visibility, rain, and low cloud ceiling. IMC generally apply when cloud ceiling is below 1,000 feet above ground level (AGL) or visibility is less than 3 statute miles. During IMC, IFR apply where Air Traffic Control assumes control of airspace and responsibility for aircraft separation.

NAVAIDs and runway lighting for RNO are listed in **Table 1-10**, and described in more detail in the section that follows. The entire taxiway system is equipped with medium intensity light-emitting diodes (LED) taxiway edge lights that are blue. Runway edge lighting and taxiway lighting systems are in good condition.

Table 1-10: NAVAIDs and Instrumentation

Runway	16R	34L	16L	34R	7	25
Visual NAVAIDs	4-Light PAPI	4-Light PAPI	4-Light PAPI	4-Light PAPI	4-Light PAPI	4-Light PAPI
	MALSR	MALSR	REILs	REILs	REILs	REILs
Runway Lights	Runway Edge Lights – High Intensity		Runway Edge Lights – High Intensity		Runway Edge Lights – Medium Intensity	
	Centerline Lights		Centerline Lights			
Electronic NAVAIDs	GPS	GPS	GPS	GPS	None	None
	ILS Glide Slope and Localizer	ILS Glide Slope and Localizer				
	RVR	RVR				

Source: FAA Datasheet and Airport 5010

- Airport Surveillance Radar (ASR): The ASR provides aircraft position information to air traffic controllers and allows them to coordinate aircraft movement through the airspace surrounding RNO and assists controllers in providing vectoring information to pilots as they approach and depart the Airport. The ASR is owned by the FAA and located south of the southbound Interstate 580 off ramp that leads to the passenger terminal, west of the NVANG base.
- Automated surface observation system (ASOS): An ASOS supports aviation operations through weather reporting. The ASOS at RNO is located between Runways 16R/34R and 16L/34L, near the approach end of Runway 16R. An ASOS is outfitted with sensors that record wind direction and speed, visibility, cloud ceiling, and precipitation, data, and the ASOS broadcasts the minute-by-minute weather reports to pilots.
- Precision Approach Path Indicator (PAPI): The PAPI is a visual NAVAID that assists pilots in maintaining the correct glide path on approach to a runway. Typically, the PAPI light array will signal to a pilot if the aircraft is on the proper glide path with two red and two white lights; too low on the glide path with all red lights; and too high on the glide path with all white lights. Each of the runway ends at RNO are equipped with 4-light PAPIs.
- Runway End Identifier Lights (REILs): REILs are visual NAVAIDs that help pilots locate the physical runway end or landing threshold location. REILs are two synchronized, unidirectional strobe flashing lights facing the approach to the runway and positioned at an angle of 10 to 15 degrees. REILs generally have an approximate visual range of three miles in daylight and 20 miles at night, according to the FAA. REILs are located at the approach ends of Runways 16L, 34R, 7 and 25.
- Instrument Landing System (ILS): A precision instrument approach system that normally consists of the following electronic components and visuals aids: localizer, glideslope, outer marker, middle marker, and approach lights.

- Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR): Approach ends to Runways 16R and 34L are equipped with a MALSR as part of the ILS to each runway.
- Localizer: The component of an ILS that provides horizontal course guidance to the runway. Runway ends on 16R and 34L are equipped with a localizer as part of the ILS to each runway.
- Glide Slope: An electronic signal radiated by a component of an ILS to provide vertical, or descent path, guidance to approaching aircraft. Runway ends on 16R and 34L are equipped with a glide slope as part of the ILS.
- Runway Visual Range (RVR): An RVR measures the atmospheric transmissivity along runways and translates this visibility value to the air traffic user to support increased landing capacity for ILS installations. Runway 16R/34L is equipped with an RVR.
- Very High Frequency (VHF) Omnidirectional Range (VOR): This is a radio beacon that provides guidance to aircraft in flight. VOR antennae are used for standard terminal arrival (STAR) procedures, instrument approach and departure procedures, and en route navigation. VOR antennae provide directional guidance to pilots, allowing them to navigate from antenna to antenna at prescribed altitudes. The VOR may be combined with distance measuring equipment (VOR/DME) or a Tactical Air Navigation System (VORTAC), which provide pilots with a distance to the antenna in addition to the bearing.

There are three principal VOR antennae in the area surrounding RNO that provide positional awareness to pilots during approach, departure, and transition through the airspace. These include the Mustang VORTAC (FMG) six nautical miles to the east/northeast, Squaw Valley VOR/DME (SWR) 30 miles to the southwest, and Hazen VORTAC (HZN) 36 nautical miles to the east.

Terminal Facilities

The passenger terminal complex is located in the northwest quadrant of the Airport, south of the air cargo apron and north of the NVANG. The terminal complex includes the passenger terminal building and associated facilities: a three-story parking garage, surface parking lots, rental car facilities, terminal loop road, ground transportation pick-up lot, taxi hold lot, and the Federal Inspection Services (FIS) building. **Figure 1-25** above illustrates the passenger terminal and associated facilities and parking areas.

Terminal Building

The passenger terminal building consists of two levels and has approximately 448,650 square feet of terminal and concourse space with 23 attached gates. The terminal building houses airline offices and ticket counters, rental car counters, and back offices, ground transportation counters, restaurants and retail concessions, service provider offices, baggage claim, baggage handling and makeup, TSA offices, and RTAA administrative offices. Local artwork, exhibits, and advertising displays are featured throughout the terminal and concourses. **Figure 1-30** shows a general layout of the two levels of the terminal and pier design concourses, and total square footage for the terminal and the concourses is detailed in **Table 1-11.**

Figure 1-30: General Terminal Layout

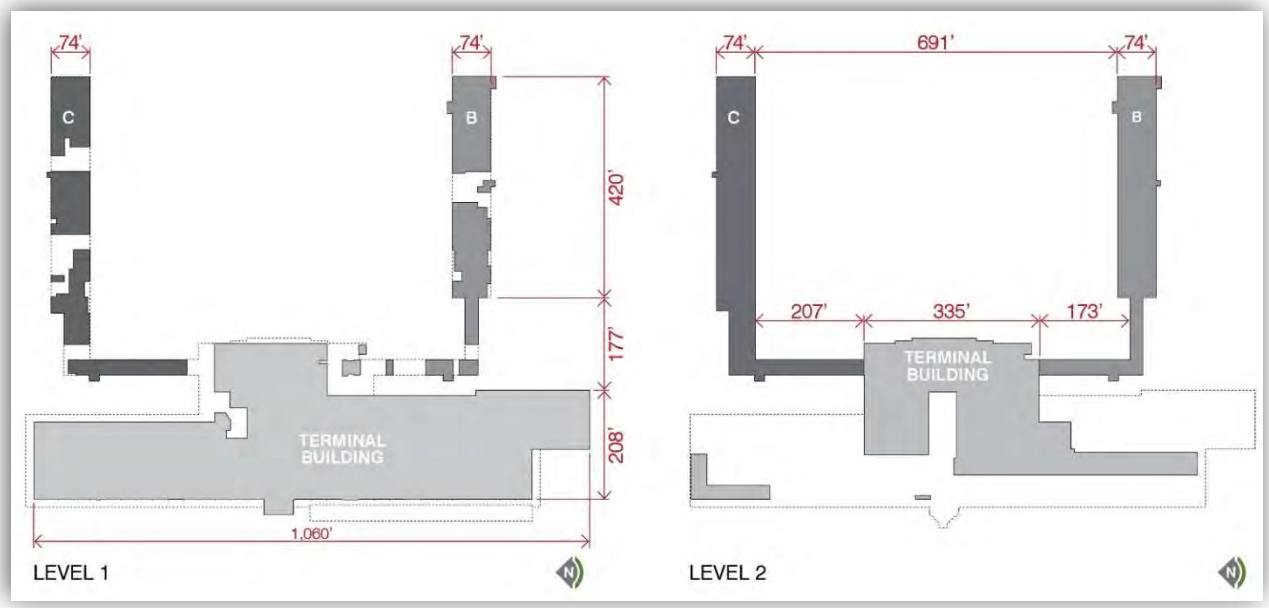


Table 1-11: Passenger Terminal Gross Area (Square Feet)

AREA	LEVEL 1	LEVEL 2	TOTAL
Terminal Building	205,390	91,070	296,460
Concourse B	31,870	40,430	72,430
Concourse C	34,210	45,550	79,760
TOTAL	**271,470**	**177,180**	**448,650**

Note: Calculations based on gross areas measured to the outside edge of exterior walls
Source: ACAD line work provided by RTAA

The main entrance to the terminal building is centrally located on the west wall, adjacent to the passenger arrival/departure curb. The ticketing lobby is located to the south; baggage claim, ground transportation and rental car counters to the north; and the security checkpoint leading up and into the concourses to the east of the main entrance. **Figure 1-31** below shows a detailed plan view of Level 1 of the terminal building with terminal functions identified by color, and **Figure 1-32** shows Level 2. **Table 1-12** gives a detailed breakdown of functional uses in the terminal and concourse.

Figure 1-31: Terminal Building – Level 1

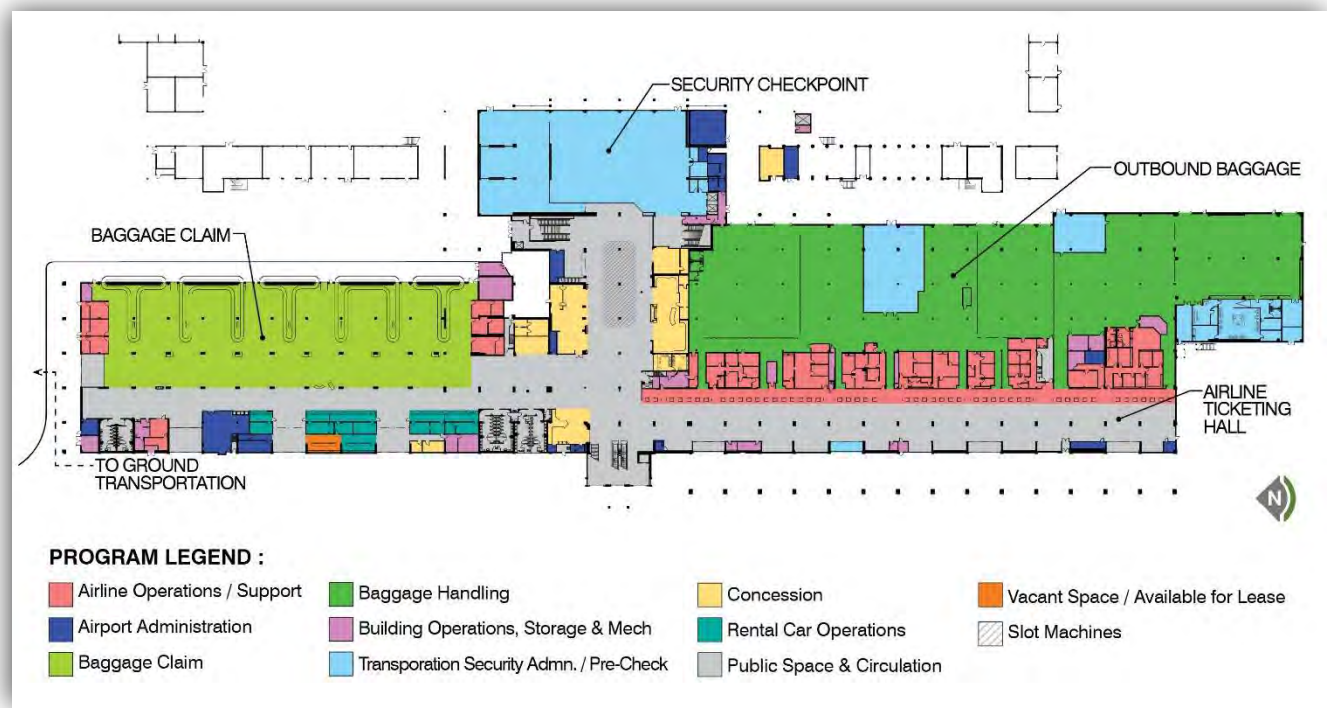


Figure 1-32: Terminal Building – Level 2

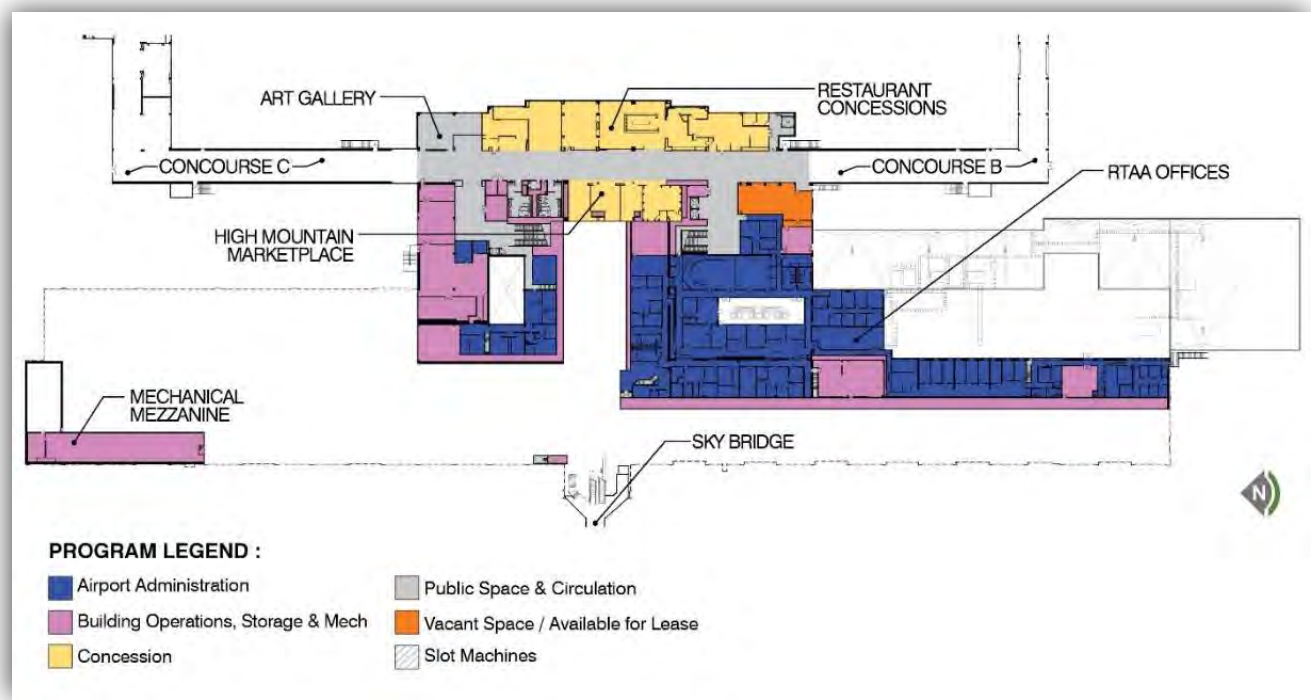


Table 1-12: Passenger Terminal Space Allocation (Square Feet)

FUNCTIONAL USE	TOTAL
Airline Operations	42,172
Airport Administration	45,603
Baggage Handling & Make Up	49,917
Baggage Claim	19,454
Concessions	35,893
Rental Car / Ground Transportation	4,157
Transportation Security Administration	11,180
Vacant / Available for Lease	34,644
Public Space / Circulations / Building Services	205,020
TOTAL	**448,650**

Source: RTAA Airline-Airport Use and Lease Agreement Summary & ACAD line work provided by RTAA

The airline ticketing lobby is south of the main entrance with 460 linear feet of check-in positions and airline ticketing offices (ATOs) for each airline that services RNO. Five other entrances south of the main entrance provide direct access from the arrival/departure curb front to the ticketing lobby. Southwest Airlines also has a dedicated curbside check-in and ticketing counter.

A row of columns divides the airline ticketing lobby, separating the north-south passenger circulation and waiting queues to the ticketing counters. Check-in kiosks are located in front of individual airline ticket counters. Passenger queuing consists of stanchions laid out in various patterns to accommodate passenger and baggage check-in. The distance between the front edge of the check-in counters and the west wall of the vestibule is approximately 35 feet. Airline personnel have approximately eight feet between the check-in counters and the baggage take away belts.

Outbound baggage handling and sorting facilities are behind and to the east of ticketing counters and airline offices. Conveyor belts move baggage through the TSA screening station and then to the large room with garage doors that open to the terminal apron. Bags are manually loaded on carts that transport the bags to the aircraft.

The baggage claim wing is north of the main entrance and contains the baggage carousels, airline baggage service offices, rental car counters and office space, ground transportation counters, and the RTAA's River Room, which is available for meetings and conferences. Restrooms are located at the south and north ends of the baggage claim wing. Four sets of doors allow patrons to exit the baggage claim area near the rental car counters, an RTAA conference room, or into the ground transportation pick-up areas.

There are five flat plate baggage carousel devices and approximately 835 linear feet of claim frontage. The inbound baggage is a direct feed system from belts located on the exterior east side. With the exception of Allegiant Air and Volaris, passenger airlines maintain baggage service offices in the baggage claim wing. There are four areas for oversized baggage pickup, located between each baggage claim device, which is fed directly from a ground loading position outside.

The main terminal lobby is between the airline ticketing lobby and baggage claim wing. The main lobby connects the passenger from the ticketing lobby to the TSA security checkpoint and the concourses. The main lobby contains a central gaming area flanked by restaurant and retail concessions, as well as a meeter-greeter seating area, and stairs to the RTAA administrative offices on the second floor of the terminal building above the ticketing offices and to Airport Badging, Security and Operations offices.

As shown in **Figure 1-32**, Level 2 of the terminal building is a secure area that contains approximately 32,600 square feet of RTAA offices including Airport Security, Operations, Airport Police and Badging. An additional 24,900 square feet of mechanical, electrical, and support rooms are also included on Level 2. The RTAA offices are accessed from a stairway in the main hall, near the main entrance and from a stairwell located across from the gaming area, above the High Mountain Marketplace.

Passenger Security Screening

Security screening is conducted by the TSA. The entrance to the security checkpoint is at the east end of the main lobby, past the gaming and concessions area. Approximately 1,120 linear feet of queueing lanes exist for passengers, and one lane each is dedicated for premium passengers and TSA pre-check. The queuing area has been recently enlarged; however, the structural columns in the center of the area limit the optimum efficiency for queueing.

Seven security screening lanes feature three full body scanners and four metal detectors for passengers, and x-ray machines for baggage screening. Although only five to seven feet of space exists between the end of the post-x-ray exit and the primary re-composure area, there is a long row of chairs for passengers to use while gathering their belongings. A second re-composure area is positioned at the base of the escalators and stairs. During peak activity periods, the primary re-composure area may become congested, causing minor delays for passengers accessing the public areas of Level 2. Passengers reach level 2 of the terminal via two departure elevators, two escalators, or a single set of stairs.

Concourses

Concourses B and C are parallel to each other, oriented east-west, and perpendicular to the terminal building. The two concourses and north-south connection corridor are beyond the security screening checkpoint for essential airport functions, passenger waiting, concession sales, and aircraft loading and unloading. Passengers use Level 2 of the concourses to access the loading gates, holdrooms, food and beverage and retail concessions and restrooms. After accessing Level 2 from security, the north-south corridor that connects passengers to concourses B and C features restaurant and retail options in the High Mountain Marketplace. The corridor also has a public seating area associated with the McDonald's outlet with views to the apron and foothills, an art gallery, a children's play area, and an animal relief area.

Level 1 of the concourses is at the apron level and only used by RNO staff, airline tenants, concessionaire storage, and Airport Operations and Facility and Maintenance. Exterior tunnels at the apron level of both concourses help move airline tugs, baggage carts and operations equipment move efficiently. Level 1 also holds some RTAA utility and storage rooms.

Figure 1-33: Concourse B & C – Level 2

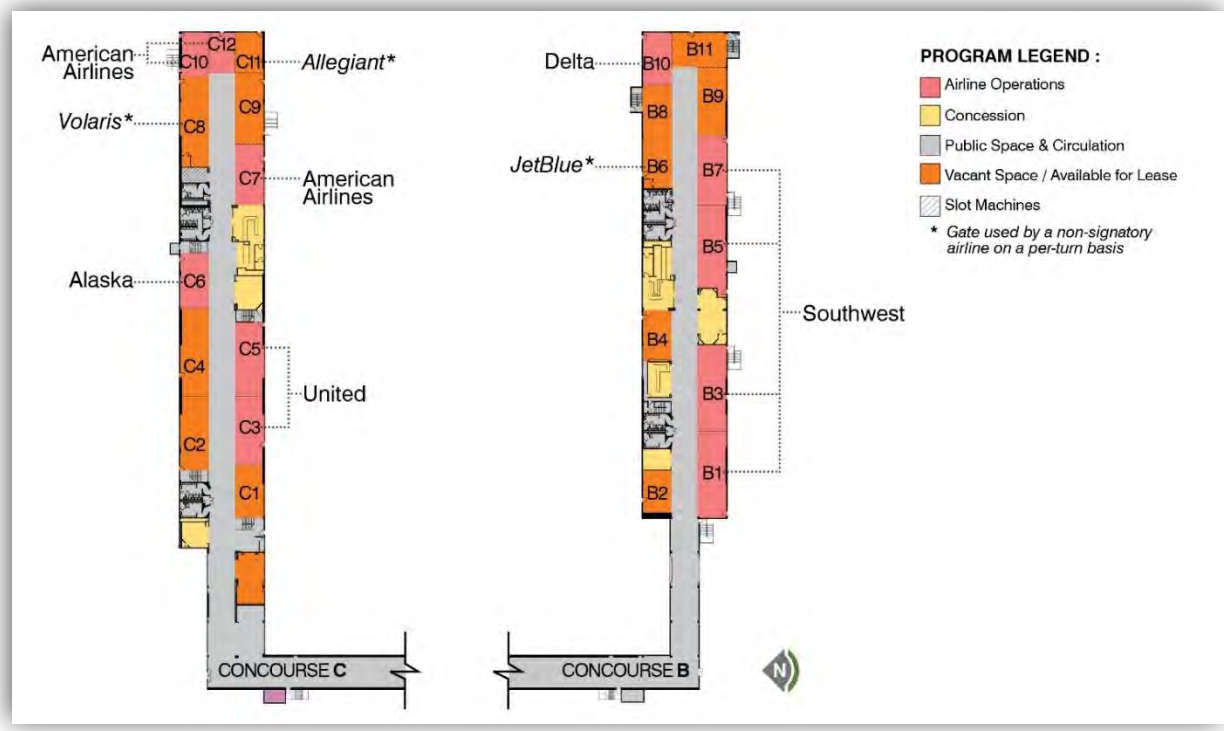


Figure 1-33 illustrates the location of airline, concession, and public space within Concourses B and C. The concourses together provide a total of 23 gates available for active loading and unloading of passengers and baggage. A current gate schedule by airline is provided in **Table 1-13**. The gates are non-exclusive.

Concourses B and C provide approximately 3,900 square feet and 4,200 square feet of concessions space respectively, which is a mix of retail, news and gifts, and bars and restaurants. Both concourses offer two banks of restrooms, with the larger bank being further down the concourse, plus one family restroom. Multiple banks of slot machines are on both sides of the main corridors, and a small designated gaming room is on the north side of concourse C.

Table 1-13: Passenger Gate Assignments

GATE	AIRLINE	AIRCRAFT TYPE	FAA AIRCRAFT DESIGN GROUP
B1	Southwest	Narrow Body	III
B2	Vacant	Narrow Body	III
B3	Southwest	Narrow Body	III
B4	Vacant	Narrow Body	IV
B5	Southwest	Narrow Body	III
B6	Vacant / JetBlue*	Narrow Body	IV
B7	Southwest	Narrow Body	III
B8	Vacant	Narrow Body	III
B9	Vacant	Narrow Body	III
B10	Delta/Skywest	Wide Body	IV
B11	Vacant	Narrow Body	III
C1	Vacant	Narrow Body	II
C2	Vacant	Narrow Body	III
C3	United Airlines	Narrow Body	III
C4	Alaska / Horizon	Narrow Body	III
C5	United Airlines	Narrow Body	IV
C6	Alaska / Horizon	Narrow Body	III
C7	American Airlines	Narrow Body	III
C8	Vacant / Volaris*	Narrow Body	IV
C9	Vacant	Narrow Body	III
C10	American Airlines	Narrow Body	IV
C11	Vacant / Allegiant*	Narrow Body	III
C12	American Airlines	Narrow Body	III

Note: Gate use by airline, December 2016. Gates are non-exclusive.
* Gate is used by a non-signatory airline on a per-turn basis and is therefore considered "vacant"
Source: RTAA Economic Development

Airlines enplane and deplane passengers using passenger bridges directly from the airline holdrooms to the aircraft door. Alaska Airlines has a modified approach because the Bombardier Q400 aircraft that serve RNO have doors that are too low for a passenger bridge. Passengers flying on Alaska enplane and deplane by climbing up or down a set of stairs into the passenger bridge. Volaris is another exception that enplanes at the terminal using a passenger bridge, but deplanes at the FIS facility north of the terminal using a portable passenger boarding ramp.

Aircraft Apron

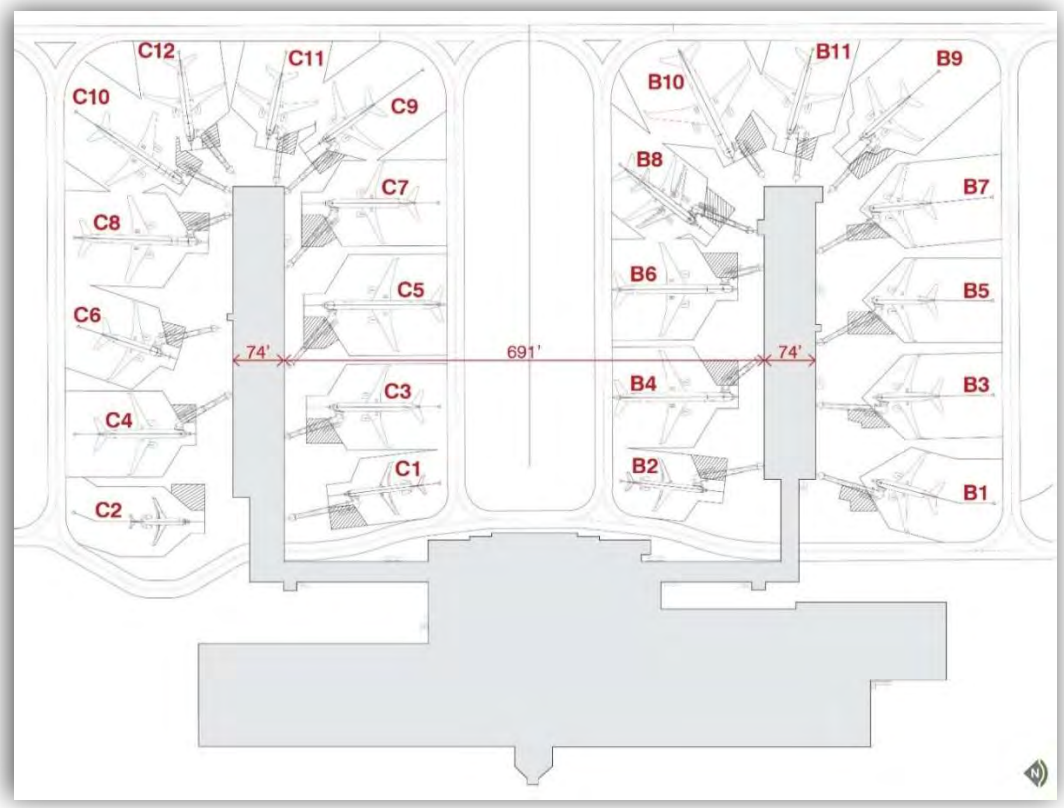
The passenger terminal apron is a total of 1,343,000 square feet. The total area for each apron is shown in **Table 1-14** and the plan with gates is illustrated in **Figure 1-34**.

Table 1-14: Terminal Apron Area (Square Feet)

APRON	SQUARE FEET
CBP / North Auxiliary	160,000
North Concourse C	168,000
Middle Terminal	478,000
South Concourse B	201,000
South Auxiliary	336,000
TOTAL	1,343,000
Source: ACAD line work provided by RTAA	

Based on the aircraft parking layout provided by RTAA, there are 23 aircraft parking positions with passenger loading bridges that provide direct access to the concourses. Parking positions are configured to accommodate aircraft types currently using RNO, including the Airbus A318, A319, and A320, Boeing 737, and the Bombardier Q400 and CRJ-series. All gates can accommodate a narrow body aircraft, and gate B10 can accommodate a wide body aircraft. Based on the existing concourse separation of 690 feet, the aircraft parking positions on the south side of concourse C and north side of concourse B are limited. Furthermore, the gateway expansion project appears to have further limited the aircraft parking and access adjacent to gates B2 and C1, reducing the functionality of those gates to regional aircraft operations only. A series of service roads painted on the aprons provide the movement areas for RNO operations and ground support equipment.

Figure 1-34: Apron Parking Layout



Terminal Utilities

As part of the inventory of existing conditions at RNO, the consultant team conducted a utility condition assessment focusing on the plumbing, electrical, and communication utilities at the terminal building in October 2016. The purpose of this assessment was to evaluate the general condition and the capacity of the primary utilities associated with the terminal building to support future growth of the facility. The assessment consisted of a visual inspection of each utility along with a review of available utility maps and other existing utility data. Deficiencies identified during the observation are documented in the terminal building facility condition assessment report (**Appendix A**). It should be noted that this utility assessment did not include any diagnostic testing and is not intended to substitute for a more detailed evaluation that would fully define the scope of future expansion of the terminal building.

Natural Gas: The terminal building's natural gas service is provided by NV Energy (NVE) and heats the passenger terminal building including outbound baggage handling areas. Upgrades to the natural gas system occurred when improvements to the baggage handling system took place. Natural gas is distributed to the main terminal building (including baggage handling and pickup areas) but not to the concourses. Based on observations during the utility assessment, any large expansion of the passenger terminal building will likely require a new natural gas service to be added, to install a new service and meter set, or a new service to be extended from the existing natural gas meter set. This includes replacing existing natural gas piping with new (larger) piping as the current piping downstream of the meter set is at its maximum capacity.

Potable Water: Domestic water is provided by Truckee Meadows Water Authority through three main water meters to the entire airport property with 19 sub-meters around the site and within the terminal building. There are multiple points of water entry into the west side of the terminal building along with multiple water meters located throughout the terminal building. The existing water service into the terminal building operates below the capacity of the piping and adequately meets the current level of demand for water. However, any significant expansion of the terminal building would likely require adding capacity through new service laterals and meters. In addition, extensions to existing water mains within the building may be necessary to support the need for increased water consumption.

Sanitary Sewer: The City of Reno provides the building's sanitary sewer service. This service is adequately sized for the existing needs and configuration of the passenger terminal building. Individual lift stations serve the existing concourses. Small expansions can be added to the terminal building with minimal impacts to the existing sanitary sewer system. However, any large expansion would likely require adding a new sanitary sewer main and lift station(s). The limiting factor of the sanitary sewer system is the extent of elevation change from the collection area to the lift station. For example, if sewer facilities are located far from existing services, new lift stations may be required.

Electrical Systems: The terminal building is equipped with a master metered medium voltage of 1200A 4160V 3 phase-4 wire system. The system is redundant with A and B sections fed from different NVE utility substations. Each section is capable of providing full power to the terminal upon loss of a substation. The main electrical switchgear is located at the west end of Concourse C on Level 1. From there the medium voltage is distributed to eight unit substations located at various locations throughout the terminal building. These substations convert the voltage down to 480/277V 3 phase-4 wire, which powers the various building systems including HVAC equipment and lighting. There likely is adequate capacity for future expansion to the terminal building based upon the 12-month peak demand reading (December 2015-December 2016), from NVE. Further evaluation of the capacity is required once the terminal facility expansion needs have been forecast.

The medium voltage primary line comes in at 25 KV and is stepped down to 4.16KV using utility transformers located outside the main electrical room. The primary utility lines run underground in a north to west orientation from the terminal towards the intersection of Terminal Way just north of Plumb Lane where it transitions to overhead lines. While each line is physically separate, they are routed together in the same duct-bank and transition to the single feed primary same overhead line. This section between the overhead distribution and the split between the A and B utility transformers is a point of failure with the terminal facility electrical distribution as demonstrated with the previous power failure.

Communications: Communications utilities from Charter Communications and AT&T also enter the terminal building on Level 1 at approximately the same location as the electrical system, which is on Level 1, Concourse C. Based on observation, these communication facilities appear to follow the same general underground path from the terminal to NVE's primary electrical transmission lines located near Terminal Way. This is the main communications hub for the airport campus, with this telecommunications equipment room serving all other airport owned/operated facilities. This main equipment room itself appears to be at capacity, with little room for future expansion.

Federal Inspection Service Facility

The FIS facility is a standalone building directly north of the terminal, operated by the U.S. Customs and Border Protection and illustrated in **Figures 1-25 and 1-26**. This facility serves international flights from Guadalajara, Mexico, on Volaris along with international charter and GA flights. The passengers deplane via a portable passenger boarding ramp and enter the FIS building. This hard stand deplaning operation is required to keep international passengers entering the country in a sterile configuration until clearing CBP. The building, which is approximately 15,800 square feet, was modernized to CBP design standards, in 2014, and has the capacity to process 200 passengers per hour; however, due to staffing constraints, processing of passengers is insufficient. Processing times can take up to 90 minutes. To aid in processing, there are two automated passport control kiosks in addition to the standard CBP agent positions. The facility lacks an airside vestibule to maintain comfortable interior temperatures during the winter and summer months. The baggage claim area presents another key challenge, as it is undersized and often results in a delay of passengers exiting the building. Bags are manually removed from the flat plate belt and then placed in a corralled area before any passenger can access them.

The secondary wait area also requires staffing and can incur longer wait times. The facility has three holding cells, an animal quarantine room, finger print lab, storage, and other miscellaneous rooms. Once passengers have cleared CBP, they exit out a door facing the ground transportation parking area. Signage and ground markings direct international passengers to the north end of the domestic baggage claim area. An international waiting area is designated at the north end of the domestic baggage claim area for family members and greeters.

Central Disposal Facility

The Central Disposal Facility (CDF) provides a disposal location for airlines/ground service operators to dump "blue water" from the airplane restrooms as well as glycol collected after deicing airplanes. There are also interior and exterior wash pads for airlines, ground service operators, and RTAA to wash equipment. There are currently two blue water disposal bays, one interior wash bay, one exterior wash pad, and one exterior glycol dump pad. The CDF was upgraded in 2015 to replace all equipment, add an additional disposal bay, relocate the wash pad and glycol dump pad to the exterior, and install large sand/oil interceptor.

Landside Facilities

Airport Access & Connectivity

Connectivity between RNO and its catchment area is achieved primarily by access to Interstate 580 (I-580) which runs concurrently with U.S. Highway 395. I-580 runs north-south through the City of Reno and passes directly west of the airport. Two (2) I-580 direct connect ramps, constructed in 1991, serve on-airport traffic only: a southbound off-ramp and a northbound on-ramp. The direct connect ramps collect and deposit traffic into the terminal loop road. A freeway interchange at Plumb Lane, less than 200 meters from the main entrance, provides a southbound on-ramp and a northbound off-ramp for I-580.

I-580 connects RNO with destinations south such as Carson City and Lake Tahoe, and with destinations north such as Susanville and Portola. At the Interstate 80 I-580 interchange, also known as the Spaghetti Bowl, access to destinations east and west is achieved. I-80 connects RNO with destinations east such as Sparks, the Tahoe Reno Industrial Center, Fernley, and Fallon and with destinations west such as Truckee and Nevada City.

Air cargo and ground transportation services achieve access from Vassar Street / Air Cargo Way and Villanova Drive. Airport facilities on the east are served by Rock Boulevard. Airport facilities on the southwest are served by Moana Lane / Airway Drive.

Internal roadways provide the principle access for vehicle trips associated directly with airport operations. National Guard Way and Aviation Way serve the cell phone waiting lot, airfield maintenance, rental car remote lots, and the Nevada Air National Guard. Radar Way serves the ground transportation passenger pick up area, Customs and Border Protection, and Gate 155, the primary vendor entrance to the airfield.

The primary internal roadway, the terminal loop road, starts and ends at the intersection of Plumb Lane and Terminal Way. When approaching the airport terminal, the loop road expands to six lanes and splits: the east three lanes are dedicated for passenger drop-offs directly on the terminal curb. The west three lanes are separated from the east three lanes by a wide median for passenger pick up. The west three lanes also provide access to rental car pick-up and return, the public long-term surface parking lot, and long and short-term parking in the parking structure. The terminal loop road also serves three separate employee parking lots and Gate 170, the primary access point for emergency responders entering or exiting the airfield.

The majority of RNO's departing passengers arrive by vehicle. These trips occur by private automobile, taxi, rental car, shuttle, transportation network company vehicle, and public transit. Given the nature of airport operations, very little pedestrian or bicycle traffic is associated with RNO. However, there are two bike racks, one on the northeast corner of the surface parking lot and the other on the north end of the passenger terminal building. Pedestrians accessing the passenger terminal are directed to a dedicated and marked pedestrian access route off Terminal Way that connects to the north end of the terminal building.
Public parking facilities, consisting of a surface lot and a parking structure, are available for passengers using personal vehicles to access RNO. Bicycles and motorcycles can be parked in the parking facilities free of charge. The parking structure consists of three levels and is located directly west of the passenger terminal building. The structure has 1,650 spaces for long term parking, with 800 on the second level, and 850 spaces on the third level. The ground level of the structure has about 295 spaces for short-term parking in addition to stalls for rental car pick-up and return. A public long-term surface lot, with approximately 1,600 parking spots (depending on vehicle size) is located south of the parking structure.

Passengers picked up by taxi, shuttle, or transportation network company use the ground transportation lot north of the passenger facility. A staging area for taxies is located along Radar Way and a staging area for transportation network companies is located along Air Cargo Way. These staging areas provide dedicated waiting areas for a number of vehicles and prevent congestion in the ground transportation lot. A cell phone waiting lot, located along National Guard Way, decreases the number of vehicles circling the terminal loop road and loitering curbside.

The Regional Transportation Commission (RTC) of Washoe County provides transit access to RNO on two routes: Routes 12 and 19. Route 19 terminus is the RTC 4th Street Station and stops in front of the passenger terminal on the terminal loop road. Route 19 only operates on weekdays (non-holidays) from 6:45 AM to 5:45PM and stops at RNO every hour. Route 12 passes near RNO on Terminal Way, but does not access the terminal loop road. This Route is in operation seven days a week from 5:30 AM to 1:00 AM and stops near RNO every hour.

RNO employees and tenants, who drive to work, may use one of three available parking lots, located south of the passenger terminal. These lots are named Green, Yellow, and Blue:

- Green Lot: 131 spaces for RTAA staff parking.
- Yellow Lot: 152 spaces for RTAA staff and RNO tenant supervisors.
- Blue Lot: 252 spaces for tenant line employees.

Rental Car Facilities

At RNO, three companies operate nine rental car brands under six rental car agreements. The on-airport brands include Alamo/National, Avis/Budget, Dollar/Thrifty Enterprise and Hertz. Payless is the only off-airport rental car company. Each of these brands occupies rental car counter space within Level 1 of the terminal building, directly across from baggage claim. There are approximately 140 linear feet of rental car counters, with support offices behind. All of these car brands have vehicles immediately available on the ground level of the parking structure, except for Payless, which provides a free shuttle to their vehicles located off airport. Rental car return also occurs in the parking structure, occasionally causing congestion during peak departure hours due to the single access lane into the structure. Passengers exit the rental car return area by foot using overhead signs and painted floor markings leading to the terminal building. Passengers appreciate the proximity of the rental car pick-up and return to the terminal building.
Except for Payless, each of the rental car brands uses a rental car service/storage area located immediately west of the NVANG as shown in **Figure 1-27**. Most of the cars returned in the parking garage are cleaned at the Quick Turn Around facility located immediately north of the parking structure. Those requiring light maintenance or storage are shuttled back to the rental car service/storage area. The rental car service/storage area is approximately seven acres and is accessed via Terminal Way and Aviation Way.

Perimeter and Security Gates

RNO is surrounded primarily by an eight-foot high fence with three-strand barbed wire outriggers for security and wildlife exclusion. However, some segments of fence are six feet high. Those are scheduled for replacement when funding becomes available. According to Geographic Information System (GIS) data, there are approximately 400 total gates designed for vehicle or pedestrian access over RNO property. Each gate is accessed using an RTAA assigned access code, keys or employee identification cards equipped with radio-frequency identification technology.

Air Cargo Facilities

Air cargo facilities are located north of the passenger terminal in the northwest quadrant. **Figure 1-24** shows a general location of the air cargo facilities at RNO, and **Figure 1-26** shows more detail. Cargo operators at RNO include UPS, FedEx, and DHL. As of November 2016, cargo operations at RNO are the fastest growing airline activity, with FedEx having the largest operation. **Figure 1-26** illustrates the cargo aprons. The total cargo apron is approximately 798,000 square feet, which is divided into three sections based on the cargo carriers: FedEx, UPS and DHL, and the auxiliary apron.

- FedEx: 240,000 square feet
- UPS + DHL: 405,000 square feet
- Auxiliary: 153,000 square feet

Ten total aircraft parking positions are dedicated to air cargo aircraft; however, not all can be used simultaneously due to aircraft separation requirements. Currently, two air cargo parking positions store large package containers used by the cargo carriers and two positions are dedicated for smaller aircraft. Additional aircraft parking is available on the North remote apron if needed.

FedEx's principal operation is housed in a 12,000-square-foot building, identified on **Figure 1-26** as building number 1474, leased from Dermody Properties and located at 1350 Air Cargo Way. Typically, integrated carriers have more automated warehouses, and therefore, achieve higher throughput than the "thumbnail metric" of one tonne per square foot. A tonne, also known as a metric ton, is a standard unit of measure for air cargo and equivalent to 2,204.6 pounds, which is heavier than a U.S. ton. FedEx processed about 40,000 tonnes through this building in 2015. FedEx also leases a small amount of space for ground support equipment (GSE) maintenance from Prologis in its multi-tenant building. FedEx has two assigned preferential ramp positions and uses a third on a per-turn basis, and given its fleet mix at RNO, can be constrained due to overhang between neighboring aircraft.

Commercial real estate developer Prologis has a combined 79,849 square feet of warehouse space in two separate buildings. The ground lease for both buildings expires in October 2026, with the option for an additional decade in potential extensions, at the sole discretion of the RTAA.

The north air cargo building is the principal on-ramp facility, located at 1395 Air Cargo Way and built in 1997. **Figure 1-26** illustrates the north air cargo facility with building number 1480. The building is 56,562 square feet and sits on a leased area of 300,564 square feet. The building has a total of 13 dock high doors and 19 drive-in doors, as well as a shared 150-foot truck court with 86 shared car parking spaces. As of 2016, the building hosts UPS, Southwest Airlines, DHL, and cargo handlers Consolidated Aviation Services (CAS) and Worldwide Flight Services (WFS) for a total 82 percent occupancy. Two available non-contiguous spaces consist of ground floor warehouse with office space above as follows: one space is 4,554 square feet with 444 square feet of office, and 5,873 square feet with 434 square feet of office.

In terms of tonnage and all-cargo operations, the multi-tenant building's biggest tenant is RNO's second-largest air cargo carrier, UPS. UPS experiences an increase in operations during peak periods that creates chronic challenges though the warehouse is adequate for much of the year in non-peak periods. UPS has two assigned preferential aircraft parking positions and uses a third on a per-turn basis, but reports using only one of the three positions for GSE. Any local or network delay that impacts its RNO operation may cause UPS to face a shortage of freighter parking positions. Unless it conflicts with use by CBP to clear international passengers, UPS may use the North Remote ramp for this purpose at times.

DHL leases about 12,500 square feet of warehouse space from Prologis, which appears adequate for their current annual tonnage and even provides surplus capacity for their growing operation. DHL has a daily B737-400 flight operated by Southern Air on the ground from about 09:00 to 18:00. DHL also has a Monday through Friday Cessna Caravan flight operated by Redding Aero on the ground from about 16:00 to 19:15. Compared with UPS and FedEx, DHL's relatively modest operation is reasonably accommodated. Through May, DHL's 2016 tonnage at RNO has grown enough to serve as RNO's third-largest air cargo carrier.

The building's other tenant is ground handler CAS, which acquired RNO's long-time tenant Integrated Airline Service and has since been acquired by the even larger WFS. Terms of individual contracts vary, but generally ground handlers may load and unload aircraft, perform fueling, tug cargo between ramp and warehouse, build/break containers and pallets, and load/unload trucks on the landside. Apart from Southwest Airlines, belly cargo carriers have mostly outsourced all cargo operations to operators such as CAS. Even UPS uses CAS for its ramp operation, and DHL is also a CAS client.

Prologis has a 23,287-square-foot building, known as the west air cargo building, located at 1500 Terminal Way on a total land lease of 100,188 square feet. Built in 1985, the west air cargo facility is illustrated on **Figure 1-26** with building number 1462. Prologis's commercial listing indicates the building currently has only a 38 percent occupancy rate with 14,437 square feet of combined availability. Existing tenants are spread so that only 4,468 square feet of contiguous space is available. The building is immediately west of the north air cargo facility and has direct access to aircraft parked on the apron. Available parcels include two warehouses of roughly 4,500 square feet, one parcel of 3,334 square feet, and another parcel of 2,208 square feet. The building has a total of 17 drive-in doors on both the land and apron sides, plus a 200-foot-truck court with 175 shared car parking spaces.

Nevada Air National Guard

The 61-acre NVANG base, which is more than 50 years old, is located south of the passenger terminal in the northwest quadrant. The campus-like base has less ground coverage than similar functioning bases and the layout is illustrated in **Figure 1-27**. About 1,100 full-time and weekend Guard personnel use the base. The NVANG maintains their own facilities on the base. The base may be accessed from either Terminal Way or Interstate 580. The main entrance off Terminal Way, via National Guard Way, can become congested on weekends when reserve duty personnel arrive and depart.

Eight C-130s are stationed at the base, and additional aircraft from other units across the country come for training throughout the year. The mission of the NVANG is tactical airlift and the personnel practice in the Sierra Nevada Mountains since this landscape resembles foreign theater terrain where U.S. armed forces are presently engaged. The other mission of the base is to assist with modular airborne firefighting, which can take aircraft anywhere on the West Coast, and a photo interpretation unit. Although the existing 100-year lease with the RTAA will not expire until the year 2054, the future of the base, like other military installations, is decided by the U.S. Department of Defense. The life and mission of the base is dependent on world events, congressional funding, and federal policies. Based on information provided by the base commander, the NVANG's mission is expected to remain consistent throughout the 20-year planning period.

General Aviation Facilities

GA operations include on-demand charter operators, corporate aviation, flight instruction, and recreational aviators. GA users rely on fixed base operators (FBOs), which are businesses that provide GA services that may include pilot and passenger facilities, aircraft maintenance and storage, flight instruction, and fueling.

GA operations are divided into two areas. GA East includes facilities located in the northeast quadrant. Tenants in GA East include a maintenance, repair and overhaul center for business jet manufacturer Dassault Aircraft Services, FBO Atlantic Aviation and commercial aeronautical operator Reno Flying Service, and T-hangar facilities. GA West includes facilities located in the southwest quadrant and helicopter operator and maintenance shop Whisper Jet, GA box hangars and T-hangar facilities. GA facilities are detailed in **Figure 1-24, Figure 1-27** and **Figure 1-28** and described in greater detail below.

Atlantic Aviation (FBO)

Atlantic Aviation is RNO's only full-service FBO and was upgraded in 2013 to a new state-of-the art hangar and office facility. Atlantic Aviation manages fuel services and provides maintenance service to GA and military aircraft, and flight schools rent space from Atlantic Aviation to store up to three aircraft. Atlantic Aviation is located in the northeast quadrant, west of the ATCT and is accessed from South Rock Boulevard. Atlantic Aviation is illustrated in **Figure 1-28** as building numbers 4150, 4330 and 4485.

Atlantic Aviation is open 24 hours a day, 365 days a year. Based on interviews with Atlantic Aviation staff, it is estimated that 60 percent of their customers are flying for business, and the other 40 percent are flying for recreation and flight instruction. Atlantic Aviation manages the T-hangar rentals at RNO. Total apron size at Atlantic Aviation is 658,000 square feet. The Atlantic Aviation facility is used as the terminal for air taxi flights to Burning Man in September every year. The apron also accommodates heavy traffic during other special events such as the Reno Air Races. When the Atlantic Aviation apron reaches capacity, aircraft will park on Taxiway L near the approach end of Runway 7, or if needed, on Runway 7/25. The taxilanes that provide access to the Atlantic Aviation apron from Taxiways C and L are numbered 1 through 3 and are illustrated on **Figure 1-28**.

Dassault Aircraft Services

Dassault Aircraft Services is a maintenance, repair and overhaul service center for Dassault Falcon aircraft located in the northeast quadrant near Runway End 16L, detailed in **Figure 1-28** as building number 4740. The hangar space can accommodate up to five Dassault Falcons at a time, depending on the aircraft model. According to Dassault, current services include troubleshooting, performing scheduled and unscheduled maintenance, and performing inspections. The Dassault apron size is 48,000 square feet.

General Aviation Hangars

GA at RNO is divided into two areas: GA East, which includes facilities in the northeast quadrant, and GA West, which contains facilities in the southwest quadrant. GA East hangars are located north of Reno Flying Service. GA West hangars are located near Whisper Jet. The hangars are a mix of T-hangars and box hangars. Atlantic Aviation, along with RTAA Airport Economic Development, manages the T-hangar operations and occupancy.

The northeast quadrant hangars are accessed from South Rock Boulevard and detailed on **Figure 1-28**. The hangars in the southwest quadrant are illustrated on **Figure 1-27** and these are accessed from Gentry Way via Terminal Way. Total T-hanger occupancy is 90 percent. Eight T-hangars are currently non-leasable due to pavement conditions and adverse slope conditions.

- T-Hangars: East Row 1- 18 Hangars
- T-Hangars: East Row 2- 18 hangars
- T-Hangars: East Row 3- 21 hangars
- T-Hangars: West Row 1- 9 hangars
- T-Hangars: West Row 2- 8 hangars
- T-Hangars: West Row 3- 8 hangars

Reno Flying Service

Reno Flying Service (RFS) operates on GA East and is a commercial aeronautical operator with services that include a flight school, charter operations, air ambulance, and aircraft repair and maintenance to all aircraft except large jets. RFS is located in the northeast quadrant, north of the Civil Air Patrol and shown on **Figure 1-28** as building numbers 4545, 4590 and 4605. RFS was established in the 1940s and continues to serve the needs of smaller (recreational) GA aircraft

Flying Start Aero

Flying Start Aero (FSA) is a pilot training facility and is Northern Nevada's only Cessna pilot center. FSA is located within the Atlantic Aviation building and offers scenic flight opportunities over Lake Tahoe and the Sierras.

Civil Air Patrol-Nevada Wing

The Civil Air Patrol (CAP)-Nevada Wing is located in the northeast quadrant, north of Atlantic Aviation and illustrated on **Figure 1-28.** CAP occupies 33 percent of building number 4530. The CAP assists with cadet training, aerospace education, and emergency service. The CAP's cadet program membership has increased almost 70 percent over the last four years to more than 80 members. The Incident Management Assistance Team is capable of and ready for flying anywhere in the 50 states within a four-hour notice. The CAP operates a Cessna 182 and a Cessna 206 out of their two T-hangar facilities located on GA East.

Whisper Jet

Whisper Jet, Inc. is located on the southwest quadrant, north of the ARFF building. Whisper Jet occupies three hangar facilities and is detailed on **Figure 1-27** as building numbers 2028, 2530 and 2532. Whisper Jet Helicopters owns a fleet of Sikorsky-S55 QT aircraft and provides aerial right of way clearing, tree harvesting, construction, mineral exploration, firefighting, and transportation services.

Air Traffic Control Tower

The FAA ATCT is located on the east side on the airfield in the northeast quadrant, east of Atlantic Aviation and north of Taxiway L. The ATCT provides a cab floor elevation of 195 feet AGL providing controllers unobstructed views to the passenger terminal apron. The FAA invested millions of dollars in the new ATCT, constructed in 2008, to meet post-9/11 security requirements. The ATCT is owned and operated by the FAA, and is staffed and operated 24 hours a day, typically by two employees and one supervisor. The ATCT is detailed in **Figure 1-28** as building number 4195. The ATCT facility also houses offices for FAA staff and regional NAVAID repair and maintenance personnel.

While the location is ideal for spotting operations to the runways and tracking ground movement near the passenger terminal, there is an interruption to controller line of sight beneath the tower on the GA apron near Atlantic Aviation, which is located below the ATCT.

An FAA remote transmitter receiver (RTR) antenna array is located directly north of the ATCT. The RTR is labeled on **Figure 1-28** as building number 4345. The RTR antennas enhance communication between the ATCT and pilots.

Airport Maintenance Facilities

Various buildings located on RNO help support airfield and airport operations. These include general equipment storage, shipping and receiving, snow removal equipment and landscaping. These facilities are listed below with RTAA building numbers and location. All facilities are included on the Master Facility Table, which contains more detail such as square footage and building age. Airport support facilities are located in the northwest quadrant, north of cargo facilities. These are detailed on **Figure 1-28**. Airfield maintenance facilities and additional support buildings are located south of the NVANG. These are illustrated on **Figure 1-27**.

Aircraft Rescue and Firefighting (ARFF)

The ARFF facility was constructed in 2008 and is located in the southwest quadrant. The ARFF facility is shown on **Figure 1-27** as Building 2522. The ARFF facility is 25,000 square feet and provides Index C level of ARFF service. Index level is determined by the air carrier lengths that operate at the airport. Index C includes aircraft at least 126 feet but less than 159 feet long. Index classification requires certain staff and equipment criteria be met. The RNO ARFF actually meets Index D requirements for aircraft at least 159 feet but less than 200 feet long.

There are five pull-in/out apparatus bays and seven trucks housed in the facility. A 135-kilowatt solar system is located south of the ARFF building and helps reduce the ARFF's electrical usage. The new ARFF was designed to allow direct access first to the apparatus bay, then to the runway to improve responder times and conform to the FAA-required three-minute response time. ARFF vehicle fueling takes place on-site, and 18 full-time firefighters (24/7 coverage with eight firefighters per shift) and support staff use the building.

Fuel Facilities

There are four primary aircraft fuel storage areas at RNO. These include two fuel facilities owned by Reno Fueling Facilities Corporation (RFFC), which does business as Swissport, the Atlantic Aviation fuel farm, and an RTAA fuel farm leased to Atlantic Aviation. These facilities provide fuel to scheduled and non-scheduled commercial passenger and cargo aircraft, and to GA aircraft that use RNO. RFFC focuses on the passenger and cargo airlines, and Atlantic Aviation focuses on GA.

RFFC operates the largest fueling operation at RNO by volume. Their facilities include two fuel farms. The primary storage facility is located in the northeast quadrant, between the northernmost GA hangar facilities, and the Dassault facility. This is shown on **Figure 1-28**, building 4695. Constructed by the RFFC in 2010, the secondary fuel facility, or fuel loading rack, which is used by aircraft mobile refueling trucks that serve commercial passenger and air cargo airlines, is located north of the air cargo buildings in the northwest quadrant. This is shown on **Figure 1-26**, buildings 1588 and 1678. Fuel tanks in the northeast quadrant are fed from a pipeline in Sparks that is part of a larger pipeline network to San Francisco. Tanks in the northeast quadrant feed the storage tanks in the northwest quadrant via a fuel line that passes beneath the runways. Mobile fuel trucks distribute fuel, and RFFC does not offer self-serve fueling. RFFC is open from 5:00 a.m. until 10:00 p.m., which accommodates the flight schedule in and out of RNO; however, it does not accommodate some GA users who operate between those hours.

Atlantic Aviation's fuel distribution system is located to the west of the ATCT. This system was installed in 2016 and includes three 30,000-gallon Jet A fuel tanks and one 12,000-gallon avgas fuel tank, a dual compartment MOGAS/diesel fuel tank, and a 500-gallon split waste fuel tank. Prior to the construction of the fuel distribution system, Atlantic Aviation filled its fuel trucks using RFFC's facility. The new system feeds Atlantic Aviation's fuel trucks, and does not pump directly to aircraft. Atlantic Aviation does not offer self-serve fueling. Atlantic Aviation is open 24 hours per day, which accommodates the on-demand flight schedules associated with GA users. All fuel tanks at RNO with their fuel type and capacity are detailed in **Table 1-15**.

Table 1-15: RNO Fuel Types and Capacity

Facility	Fuel Type	Capacity (Gallons)	# Tanks	Total (Gallons)
RFFC GA East	Jet A (10K barrel tanks)	420,000	3	1,260,000
RFFC NW Quad	87 Octane Unleaded	12,000	1	12,000
	Ultra-low Sulfur Diesel	12,000	1	12,000
Atlantic Aviation	Avgas	12,000	1	12,000
	Diesel	4,000	1	4,000
	Jet A	30,000	3	90,000
Split Waste Tank:	JetA / Avgas	100 / 400	1	500
GA West	Jet A	20,000	1	20,000
	Avgas	12,000	1	12,000
	Mogas	1,000	1	1,000
Source: RTAA				

Master Facility Table and Condition Assessment

A Master Facility Table was developed to help identify buildings on RTAA-owned property and consolidate essential data for each building, including the facility name, RTAA building ID number, type of facility, if the building is owned by RTAA, and what quadrant the facility is located in. **Table 1-15** also lists on which numbered figure the facility is illustrated. Location, building ID numbers, addresses and ownership are from data provided by RTAA. This data will be incorporated into the RTAA GIS.

The Master Facility Table includes the results of a facility condition assessment conducted to determine the general condition of physical structures (walls, site work, and roof) as well as mechanical, electrical, and plumbing (MEP) systems at various RTAA-owned buildings. The condition assessment included the use of a qualitative-based ratings system ranging from poor conditions (1) to excellent (5). The ratings system is a composite of both physical structures and MEP systems. These ratings are further explained in **Table 1-16**. The assessment was conducted between October 2016 and January 2017 and consisted of a visual inspection of physical structures and MEP systems. The emphasis of the assessment was to evaluate the remaining usable life of physical structures and MEP systems for each building. Obvious deficiencies are noted in Table 1-16. The intent of documenting the remaining useful life of physical structures and MEP systems is to give an overall sense of the building conditions and should be used in conjunction with already established maintenance schedules. The results of the facility condition assessment are summarized in **Table 1-17** with a composite rating. Deficiencies identified during observation were incorporated into the Facility Condition Assessment Report in **Appendix A**. That assessment includes more detail on physical structure ratings and provides a full review of MEP systems. That assessment did not include any diagnostic testing and is not intended to serve as substitute for a more detailed evaluation that would fully define the scope of future upgrades, replacement and/or refurbishment.

Table 1-16: Composite Building Rating System

5	**Excellent Conditions**	Like new conditions. Replacement/refurbishment of physical structure/MEP systems not required within the next 20-25 years, monitor conditions afterwards.
4	**Above Average Conditions**	Replacement/refurbishment of physical structure/MEP systems not required within the next 15 years, monitor conditions afterwards.
3	**Average Conditions**	Replacement/refurbishment of physical structure/MEP systems not required within the next 10 years, monitor conditions afterwards.
2	**Below Average Conditions**	Replacement/refurbishment of physical structure/MEP systems recommended within the next 5-10 years.
1	**Poor Conditions**	Immediate replacement/refurbishment of physical structure/MEP systems required.
N/A	**Not Applicable**	Property not owned by RTAA or system is not applicable to facility.

Source: MSA Facility Condition Assessment, Oct 2016 – January 2017

Table 1-17: Master Facility Table

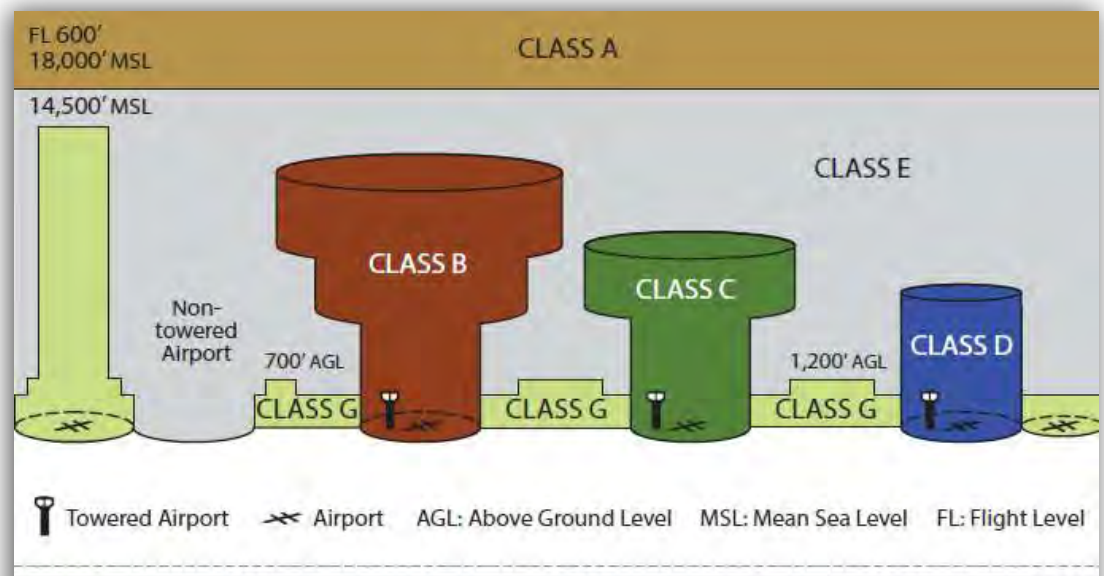
Facility Name	Building Number(s)	Building Function	RTAA Owned Building?	Location (Quad)	Figure #	Footprint (SF)	Structure Type	Overall Condition of Structure (1-5)
1105 South Rock Boulevard	4135	Private Business	No	NE	1-28: NE GA	44,814		
1135 South Rock Boulevard	3320	Private Business	No	NE	1-28: NE GA	138,063		
1155 South Rock Boulevard	3340	Private Business	No	NE	1-28: NE GA	78,126		
Abandoned Building	1120	N/A	Yes	NW	1-27: Guard SW	10,736	Concrete	1
Academy for Career Education	1522	Private Business	Yes	NW	1-26: Cargo NW	1,464	CMU	3
Academy for Career Education	1525	Private Business	Yes	NW	1-26: Cargo NW	27,525	CMU	3
Aircraft Rescue & Fire Fighting	2522	Airport Support	Yes	NW	1-27: Guard SW	28,110	Concrete	5
Airfield Maintenance (Airfield Storage)	1087	Airport Support	Yes	NW	1-27: Guard SW	1,170	Metal	1
Airfield Maintenance (Former ARFF)	1012	Airport Support	Yes	NW	1-27: Guard SW	9,065	Steel/concrete	3
Airfield Maintenance Garage	1009	Airport Support	Yes	NW	1-27: Guard SW	1,339	Metal	3
Airfield Maintenance Office/Shop	1084	Airport Support	Yes	NW	1-27: Guard SW	10,805	Concrete	3
Airfield Maintenance Storage	1075	Airport Support	Yes	NW	1-27: Guard SW	5,816	Metal	2
Airport Equipment Storage	1483	Airport Support	Yes	NW	1-26: Cargo NW	30,216	Metal	1
Airport Ops + Shipping / Receiving	1552	Airport Support	Yes	NW	1-26: Cargo NW	23,768	CMU	3
Airport Purchasing	1624	Airport Support	Yes	NW	1-26: Cargo NW	1,628		
Airport Surveillance Radar	1285	FAA Facility	No - FAA	NW	1-27: Guard SW	1,019		
Airport Warehousing	1495-1513	RTAA Operated Business	Yes	NW	1-26: Cargo NW	93,611	CMU	2
Airport Warehousing - AA/BB	1519	RTAA Operated Business	Yes	NW	1-26: Cargo NW	51,008	Concrete	3
Airport Warehousing - CC	1579	RTAA Operated Business	Yes	NW	1-26: Cargo NW	30,186	Concrete	2
Airport Warehousing - DD	1585	RTAA Operated Business	Yes	NW	1-26: Cargo NW	6,831	CMU	2
ATCT & TRACON	4195	FAA Facility	No - FAA	NE	1-28: NE GA	13,482		
Atlantic Aviation Hangar	4150	Hangar	No	NE	1-28: NE GA	22,737		
Atlantic Aviation Hangar	4330	Hangar	No	NE	1-28: NE GA	44,091		
Atlantic Aviation Hangar	4485	Hangar - 20,000 sf	No	NE	1-28: NE GA	20,117		
Atlantic Aviation Office	4330	FBO	No	NE	1-28: NE GA	44,091		
Avis Budget Car Rental Group	1213	Private Business	Yes	NW	1-27: Guard SW	9,351	Concrete	3
Box Hangar F: F-1 (Longview Ranch Aviation) F-2 (Boardroom) F-3 (Sierra Nevada Holdings)	4590	Hangar	Yes	NE	1-28: NE GA	18,621	Metal	3
Brush Storage	1096	Airport Support	Yes	NW	1-27: Guard SW	1,463	Metal	1
Central Disposal Facility	1456	Airport Support	Yes	NW	1-26: Cargo NW	1,252	CMU	4
Challenger Consulting	2528	Hangar - 17,175 sf	Yes	SW	1-27: Guard SW	17,497	Metal	3
City of Reno Sewer Lift Station	1057	Municipal Services	No	NW	1-27: Guard SW	632		
City of Reno Sewer Lift Station	1060	Municipal Services	No	NW	1-27: Guard SW	666		
Civil Air Patrol	4530	Private Business - Aviation	Yes	NE	1-28: NE GA	24,148	CMU	2
Customs and Border Protection (CBP) Facility	1438	Airport Support	Yes	NW	1-25: Terminal	20,692	Steel	
Dassault Aircraft Services Corp.	4740	Private Business - Aviation	Yes	NE	1-28: NE GA	41,323	Metal	4
Decommissioned ATCT	1015	Airport Support	Yes	NW	1-27: Guard SW	377	CMU	2
Decommissioned ATCT	1021	Airport Support	Yes	NW	1-27: Guard SW	8,351	Concrete	2
Deeside Trading - Hangar G	4515	Airport Support	Yes	NE	1-28: NE GA	11,329	Metal	3
Dermody (FedEx)	1474	Cargo	No	NW	1-26: Cargo NW	12,287		
Dollar	1189	Private Business	Yes	SW	1-27: Guard SW	3,907	CMU	2
East Utility Vault	4560	Airport Support	Yes	NE	1-28: NE GA	1,122	CMU	4
Enterprise Rental Car	1108	Private Business	Yes	SW	1-27: Guard SW	3,932	CMU	2
Executive Hangar - 9	2524	Hangar	Yes	SW	1-27: Guard SW	27,796	Metal	3
Executive Hangar - 9 office	2524	Private Business - Aviation	Yes	SW	1-27: Guard SW	27,796	Metal	3
Ferguson Enterprises, Inc.,	4120	Private Business	No	NE	1-28: NE GA	70,267		
GA West Fuel Farm	2038	Airport Support	Yes	SW	1-27: Guard SW	60	Concrete	3
GA West Fuel Farm	2040	Airport Support	Yes	SW	1-27: Guard SW	67		
Generator	4470	Airport Support	Yes	NE	1-28: NE GA	596	CMU	3
Global Aviation - Hangar E	4545	Hangar - 3,750 sf	Yes	NE	1-28: NE GA	3,888	Metal	2
Hertz RAC	1129	Private Business	Yes	NW	1-27: Guard SW	8,884	CMU	3
Hyatt Place	1375	Private Business	No	NW	1-25: Terminal	16,541		
Landscaping	1102	Airport Support	Yes	NW	1-27: Guard SW	3,902	Metal	2
Landside Toll Booth Canopy	1450	Airport Support	Yes	NW	1-27: Guard SW	N/A	Concrete	3
Nevada Air National Guard	30 Structures	Military	No	NW	1-27: Guard SW			
Nevada State Motor Pool	1312	Private Business	Yes	SW	1-27: Guard SW	2,845	CMU	3
Office Building	1570	Private Business	Yes	NW	1-26: Cargo NW	23,122	Wood Frame	2
Parking Office	1453	Airport Support	Yes	NW	1-25: Terminal	2,869	CMU	3
Pro Collision Center	1558	Private Business	Yes	NW	1-26: Cargo NW	9,336	CMU	3
Pro Collision Center	1636	Private Business	Yes	NW	1-26: Cargo NW	12,502	Metal	2
Prologis - RNO Cargo Center 10	1480	Cargo	No	NW	1-26: Cargo NW	56,523		
Prologis - RNO Cargo Center 11	1462	Cargo	Yes	NW	1-26: Cargo NW	29,375	Concrete	3
R&S Cabinets	1675	Private Business	Yes	NW	1-26: Cargo NW	8,906	Metal	2
RDW Automotive	1582	Private Business	Yes	NW	1-26: Cargo NW	14,280	Concrete	2
Remote Transmitter Receivers	4345	FAA Facility	No - FAA	NE	1-28: NE GA	611		
Reno Flying Service	4575	Private Business - Aviation	Yes	NE	1-28: NE GA	4,835	CMU	2
Reno Flying Service - Hangar B	4605	Hangar - 17,463 sf	Yes	NE	1-28: NE GA	17,813	Metal	3
Reno Fueling Facilities Corp.	1588	Airport Support	Mixed	NW	1-26: Cargo NW	2,897	Concrete	5
Reno Fueling Facilities Corp.	1678	Airport Support	Mixed	NW	1-26: Cargo NW	838	CMU	4
Reno Fueling Facilities Corp.	4695	Airport Support	Mixed	NE	1-28: NE GA	3,673	Metal	3
Rental Car Support (Quick Turn Around)	1447	RAC	Yes	NW	1-27: Guard SW	24,711	CMU	3
Sand / Salt Storage	1069	RAC	Yes	NW	1-27: Guard SW	2,546	Concrete	3
Scannell (FedEx Ground)	4030	Private Business	No	NE	1-28: NE GA	103,376		
Snow Removal Equipment	1039	Airport Support	Yes	NW	1-27: Guard SW	41,218	CMU	5
T-Hangars: East Row 1	4650	Hangar	Yes	NE	1-28: NE GA	36,630	Metal	3
T-Hangars: East Row 2	4665	Hangar	Yes	NE	1-28: NE GA	33,883	Metal	3
T-Hangars: East Row 3	4680	Hangar	Yes	NE	1-28: NE GA	24,620	Metal	3
T-Hangars: West Row 1	2034	Hangar	Yes	NW	1-27: Guard SW	28,671	Metal	2
T-Hangars: West Row 2	2036	Hangar	Yes	NW	1-27: Guard SW	8,956	Metal	2
T-Hangars: West Row 3	2030	Hangar	Yes	NW	1-27: Guard SW	8,918	Metal	2
Thrifty	1186	Private Business	Yes	NW	1-27: Guard SW	5,220	CMU	2
Tug Technologies Corporation	1573	Private Business	Yes	NW	1-26: Cargo NW	24,900	Concrete	2
Vanguard Alamo National Car Rental	1300	Private Business	Yes	NW	1-27: Guard SW	6,187	Metal	3
West Electrical Vault	1063	Airport Support	Yes	NW	1-27: Guard SW	2,919	CMU	5
Whisper Jet - Hangar 2	2028	Hangar	Yes	SW	1-27: Guard SW	19,491	Metal	3
Whisper Jet - Hangar 2 office	2028	Private Business - Aviation	Yes	SW	1-27: Guard SW	19,491	Metal	3
Whisper Jet - Hangar 7	2532	Hangar	Yes	SW	1-27: Guard SW	12,211	Metal	3
Whisper Jet - Hangar 7 office	2532	Private Business - Aviation	Yes	SW	1-27: Guard SW	12,211	Metal	3
Whisper Jet - Hangar 8	2530	Hangar - 5,180 sf	Yes	SW	1-27: Guard SW	5,330	Metal	3

Aeronautical Setting

Airspace Classification

The FAA breaks airspace in the U.S. up according to what the airspace is used for, how congested it is, and whether it is managed by air traffic control or not. Each classification of airspace has requirements for pilot licensure, flight rules that must be followed, and communication requirements with air traffic control. Controlled airspace for aircraft in flight above 18,000 feet above MSL is referred to as Class A. Controlled airspace surrounding airports is either Class B, Class C, or Class D. Controlled airspace surrounding en route and terminal areas outside of Class A, B, C, and D is Class E, and uncontrolled airspace is Class G. RNO is a towered airport with radar approach control, and airspace surrounding the Airport is classified as Class C. Airspace classes and general definitions are shown in **Figure 1-35**, and **Figure 1-36** illustrates the Aeronautical Chart for RNO and vicinity, with local airports.

Figure 1-35: Airspace



Airspace Class	Communication with Air Traffic Control (ATC)	Entry Requirements	Seperation Services	Special VFR in Service Area
A	Required for All Operations	ATC Clearance	All	N/A (No Surface Area)
B	Required for All Operations	ATC Clearance	All	Yes
C	Required for All Operations	Two-way Communications Required Prior to Entry	VFR/IFR	Yes
D	Required for All Operations	Two-way Communications Required Prior to Entry	Runway Operations	Yes
E	Required for All Operations	Required for IFR Operations	Required for IFR Opeartions Only	Yes
G	Not Required	None	None	N/A (No Surface Area)

Figure 1-36: RNO Aeronautical Chart

Source: SkyVector.com

Instrument Approach and Departure Procedures

Aircraft operate at RNO under both VFR and IFR. During instrument conditions, RNO has multiple straight-in instrument approach procedures to Runways 16R, 16L, 34R and 34L. RNO also has a circling instrument approach (VOR-D) that is not runway specific, and only provides guidance to a point where RNO is visible to the pilot and then aircraft circle to land. RNO has multiple procedures because different aircraft are equipped with different aviation electronic (avionic) equipment. Each approach is listed in the **Table 1-18** below, and is current as of November 10, 2016.

Table 1-18: Instrument Approach Procedures

Runway	Procedure	Minimums	
		Decision Height (AGL)	Visibility (Statute Miles)
16R	ILS X OR LOC X	200 feet	½ mile
	ILS Y	500 feet	1-¼ mile
	ILS Z OR LOC Z	200 feet	½ mile
	RNAV (GPS) X	1,785 feet	1-1/4 mile
	RNAV (RNP) Y	402 feet	3/4 mile
	RNAV (RNP) Z	558 feet	1-3/8 mile
	LOC Y	1,005 feet	¾ mile
16L	RNAV (GPS) X	1,305 feet	1-1/4 mile
	RNAV (RNP) Y	377 feet	1-1/8 mile
	RNAV (RNP) Z	381 feet	1-1/8 mile
34R	RNAV (GPS) X	892 feet	1-1/4 mile
	RNAV (GPS) Y	635 feet	2 mile
	RNAV (RNP) Z	765 feet	2-3/4 mile
34L	RNAV (GPS) X	890 feet	1 mile
	RNAV (GPS) Y	608 feet	1-1/4 mile
	RNAV (RNP) Z	361 feet	1 mile
	ILS OR LOC/DME	536 feet	1-½ mile
Circle-to-Land	VOR-D	1,585 feet	1-1/4 mile

Source: FAA Digital Terminal Procedures (d-TPP) publication and Airport 5010

RNO has 11 STAR, which are procedures that aircraft follow under an instrument flight plan. A STAR procedure guides an aircraft in proximity to an airport, where that aircraft will intercept a specific runway instrument approach for landing. RNO has eight departure procedures. These allow aircraft to depart a runway with instrument capabilities under IFR conditions.

Communications

Aircraft and controllers use radio frequencies to communicate with one another. There are different frequencies used depending on the stage of flight, and the purpose of the communication. For example, a commercial aircraft will contact controllers in the ATCT on the ground frequency prior to pushing back from the gate for taxi instructions. The ground controllers will pass the aircraft off to the departure controllers in the ATCT as the aircraft nears the departure runway, and the departure controllers will pass the aircraft off to the terminal radar approach control (TRACON), who pass the aircraft over to the air route traffic control center (ARTCC) as they leave the terminal airspace and transition to the en route phase of flight. A similar process is used for aircraft approaching the airport, who transition from the ARTCC to the TRACON to the Reno ATCT to ground. Common public frequencies and their use are described below. The NVANG has their own dedicated frequencies for aircraft using their facilities.

UNICOM: The UNICOM is a frequency used by pilots to talk to one another and advise others of their position. It is commonly employed when there is no ATCT at an airport, and when the ATCT is closed at a towered airport.

Clearance Delivery: This frequency is used to copy departure clearance instructions back to the ATCT by pilots departing the Airport.

Reno Ground: This frequency is used by pilots to communicate with ATCT when operating on the taxiways before and after departure, and when moving from one location to another on the airfield.

Reno Tower: This frequency is used by pilots immediately before arrival, immediately before entering the runway to depart, and immediately after departure. ATCT staff will hand arriving pilots off to Reno Ground, and departing pilots off to Oakland Center.

Class C Transition: The airspace surrounding RNO is classified as Class C, which is described in the section that follows. The FAA requires aircraft operating in the Class C to be in contact with the control tower before entering the airspace, and remain in contact until they exit the airspace. There are two frequencies for use by aircraft operating in the Class C airspace surrounding RNO, depending on where the aircraft is flying in relation to the Airport.

Northern California Terminal Radar Approach Control (NORCAL TRACON): The TRACON provides transition approach and departure control service to aircraft arriving and departing RNO. TRACON controllers receive and hand off pilots to the ARTCC and the Reno Tower.

Air Route Traffic Control Center (Oakland Center): Oakland Center is responsible for aircraft in the en route stage of flight over and near RNO. The boundaries of Oakland Center's control include northwestern Nevada, Northern California, and the Pacific Ocean along the Northern California coast.

Digital Automatic Terminal Information Service (D-ATIS): This frequency broadcasts weather information, runway and approach information, and any notices to airmen that are in effect. Pilots monitor D-ATIS as they approach the Airport for up-to-date information.

Environmental Overview

This environmental overview summarizes the environmental resources and environmentally-sensitive areas on and within the immediate vicinity of the Airport. This Environmental Overview is guided by the National Environmental Policy Act (NEPA) of 1969. As stated in FAA AC 5070-6B, Change 1a, *Airport Master Plans*, Paragraph 605a, the principal objective of an environmental overview is to document environmental conditions that should be considered in the identification and analysis of airport development alternatives. Subsequent planning processes will use this evaluation to consider potential effects of the improvement alternatives identified as part of the Master Plan.

This environmental overview is not a substitute for a NEPA document. Instead, this overview provides information on known environmental resources at RNO. This overview considers FAA guidance set forth in FAA Order 1050.1F, *Environmental Impacts*, and addresses the following resources or issues:

- Noise
- Air Quality
- Compatible Land Use
- Threatened and Endangered Species
- Water Quality
- Wetlands
- Floodplains
- Historical, Architectural, Archaeological and Cultural Resources

The following discussions are based on information readily available from state and federal resource agency databases and data collected during previous environmental studies, such as Environmental Assessments (EAs) prepared for past projects at RNO:

- Proposed Improvements to Runway 16L-34R (1992),
- Proposed 1,000–foot Extension of Runway 16R-34L (1993),
- Proposed Construction and Operation of an Instrument Landing System and Approach Lighting System for Runway 34L (2006), and
- Airport Traffic Control Tower Construction and Operation (2007).

Noise

Title 14 of the Code of Regulations (CFR) Part 150, “Airport Noise Compatibility Planning Program,” also known as Federal Aviation Regulation (FAR) Part 150, is the primary regulation used to guide panning for aviation noise compatibility around airports. Part 150 provides a methodology for measuring aircraft noise and noise exposure and identifies the land uses considered compatible with various levels of exposure to aircraft noise. The Part 150 Noise Compatibility Program for an airport documents what measures an airport operator has undertaken or proposed to reduce or prevent incompatible land uses. Two airport-specific documents result from the Part 150: a Noise Exposure Map (NEM) and a Noise Compatibility Program.

Reno-Tahoe Part 150 Noise Compatibility Program: The RTAA has worked with its surrounding communities to address aircraft noise for nearly four decades. The RTAA initiated its first FAR Part 150 Noise Compatibility Study in 1989, and the FAA approved an updated study in 2004.

The FAR Part 150 Noise Compatibility Study provided both operational and land use recommendations for reducing or eliminating noise impacts around RNO based on forecasted aircraft operations through year 2010. The identified forecasts and noise contours show approximately 8,320 residences and 22,513 residents experienced exposure to aircraft noise above the federal standards. Results also indicated twelve noise-sensitive institutions (places of worship, schools, libraries, and one historic resource) would be subject to elevated levels of aircraft noise exceeding the federal standard 65 Day-Night Sound Level (DNL). 2016 operational levels are consistent with the projections, and the 2010 noise contours continue to be used for planning purposes. These noise contours are presented as **Figure 1-37**.

Residential Sound Insulation Program: The RTAA undertook a Residential Sound Insulation Program from 1995 to 2014 to reduce the number of residents exposed to aircraft noise. During this time, the RTAA received FAA Airport Improvement funds for the sole purpose of providing sound insulation for homes in nearby communities. The RTAA's voluntary participation in the FAR Part 150 Noise Compatibility Program, which identified specific areas of noise exposure to homes in Sparks, Reno, and unincorporated areas of Washoe County, made the RTAA eligible to receive these funds.

In 1995, more than 5,400 residential units near RNO had eligibility for the program. More than 5,100, or 95 percent, of these units received noise mitigation construction improvements by the time the program concluded in 2014. Improvements included measures such as the replacement of existing windows and doors with acoustically rated products at no cost to the homeowners. The program invested more than $68 million to provide sound insulation to homes within the eligible area.

RNO Noise Compatibility Program: The 2004 RNO Part 150 Study states that a noise compatibility program provides procedures to abate or reduce aircraft noise exposure through aircraft operating procedures, such as preferential runway use air traffic control procedures, airport regulations, and airport facility modifications. RNO's program also includes provisions for land use compatibility planning, which are addressed later in this chapter.

Airport Noise and Operations Monitoring System: RNO is equipped with an Airport Noise and Operations Monitoring System (ANOMS), through which the community can access near real-time flight tracking data and report noise complaints on-line. The ANOMS automatically matches noise complaints with aircraft operations and noise events.

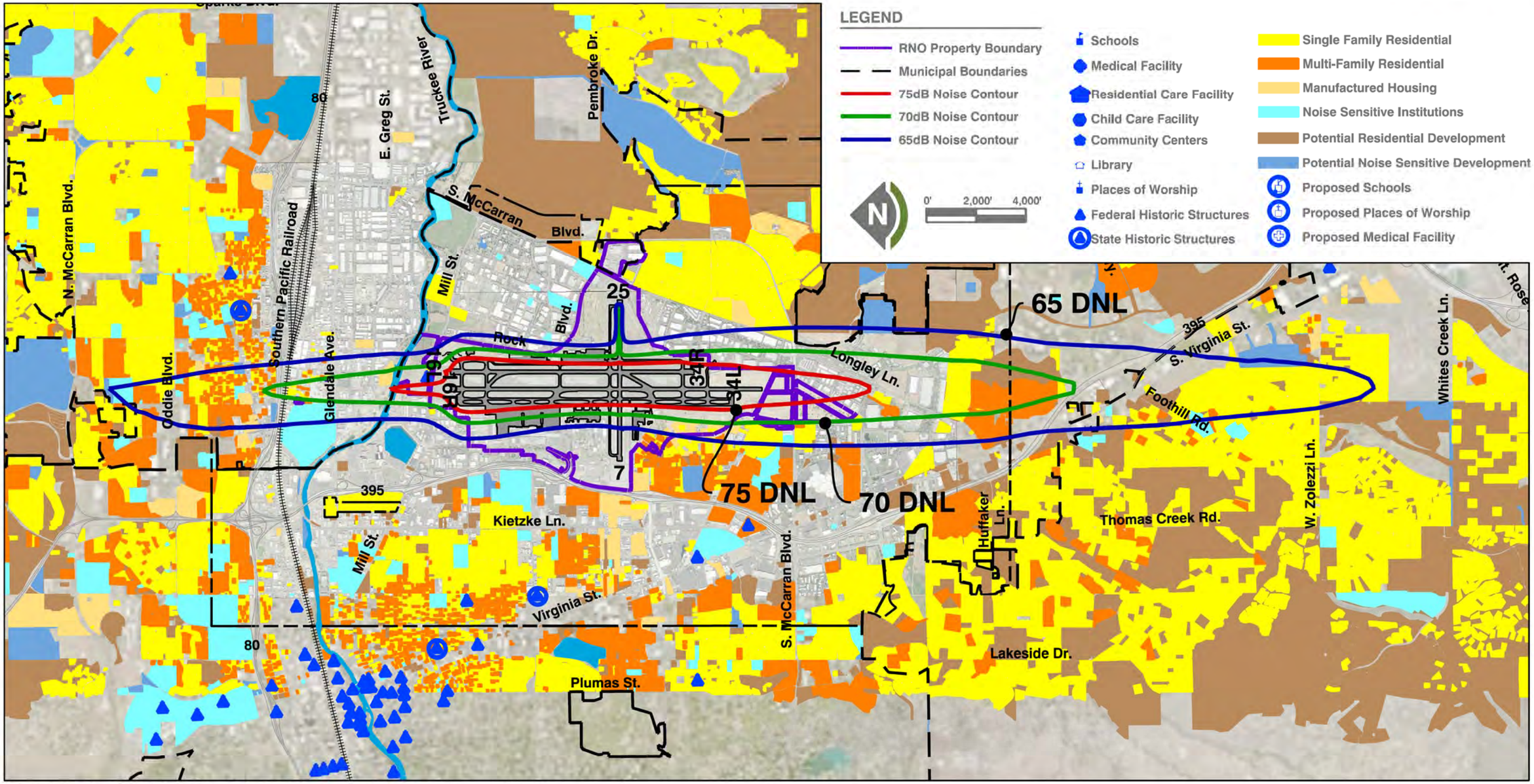


Figure derived from Exhibit 4E form the 2000 Part 150 Study. Figure updated with current Airport base map and property boundary. No other changes made to land use and proposed facilities and uses from Exhibit 4E.
Land Use source: Washoe County Assessors DataBase, 2000.

Figure 1-37
Noise Contours

Air Quality

The RTAA conducted a baseline air emissions inventory to identify the aviation-related emissions associated with RNO for the calendar year 2015. In the future, the RTAA will be able to use this inventory as a baseline for comparison with future calculations of aviation-related emissions and to identify the emissions-reduction benefits of future actions.

Federal, state and local legislation regulates air quality. The Environmental Protection Agency (EPA) administers the Clean Air Act (CAA), which governs air quality at the federal level. In Nevada, air quality is also governed by the State Bureau of Air Pollution Control and the Washoe County Air Quality Management Division.

The EPA has established National Ambient Air Quality Standards (NAAQS) for specific pollutants: sulfur dioxide (SO2), carbon monoxide (CO), particulate matter with an aerodynamic diameter less than or equal to 10 micrometers (PM10), particulate matter with an aerodynamic diameter less than or equal to 2.5 micrometers (PM2.5), lead (Pb), nitrogen dioxide (NO2), and ozone (O3), using precursor pollutants volatile organic compounds (VOC) and oxides of nitrogen (NOx). These pollutants are often referred to collectively as criteria pollutants because they represent the chemical compounds for which EPA has established criteria for protecting public health and welfare. **Table 1-19** presents the currently applicable NAAQS.

Table 1-19: National Ambient Air Quality Standards (NAAQS)

Pollutant	Averaging Time	Federal Standard	
		Primary	Secondary
Ozone	8-hour	0.070 ppm	Same as primary
Carbon Monoxide (CO)	8-hour	9 ppm (10 mg/m3)	N/A
	1-hour	35 ppm (40 mg/m3)	N/A
Nitrogen Dioxide (NO2)	AAM [3]	53 ppb (100 µg/m3)	Same as primary
	1-hour [1]	100 ppb (188 µg/m3)	N/A
Sulfur Dioxide (SO2)	3-hour	N/A	0.5 ppm (1,300 µg/m3)
	1-hour [2]	75 ppb (196 µg/m3)	N/A
Coarse Particulate Matter (PM10)	24-hour	150 µg/m3	Same as primary
Fine Particulate Matter (PM 2.5)	AAM [3]	12.0 µg/m3	15.0 µg/m3
	24-hour [4]	35 µg/m3	Same as primary
Lead (Pb)	Rolling 3-month average	0.15 µg/m3	Same as primary

Notes:
ppm = parts per million (by volume) µg/m3 = micrograms per cubic meter mg/m3 = milligrams per cubic meter
N/A = not applicable
1. Violation criteria based on the 98th percentile of the 1-hour daily maximum concentrations, averaged over three years.
2. Violation criteria based on the 99th percentile of the 1-hour daily maximum concentrations, averaged over three years.
3. AAM = Annual arithmetic mean
4. Violation criteria based on the 98th percentile, averaged over three years.
Source: https://www.epa.gov/criteria-air-pollutants/naaqs-table

Geographies are classified as being attainment areas or nonattainment areas. A nonattainment classification means that air quality in a particular region does not attain a federal air quality standard. After an area reaches attainment, a re-designation/maintenance plan is developed to demonstrate maintenance for at least the next 10-year period, leading to a maintenance designation. RNO is located in Washoe County and under control of the Washoe County Air Quality Management Division. Portions of the County are categorized as maintenance for CO, SO2, and PM10. For all other pollutants, the County is either unclassified or in attainment.

Criteria Pollutant Inventory

The emissions inventory model used was the FAA Aviation Environmental Design Tool (AEDT) version 2c. Aircraft-specific default use for ground service equipment and auxiliary power units is available in the model and was used for this inventory. The model used 2015 aircraft operations data as input, and the annual recorded schedule for air carrier aircraft augmented the operations data. The model used 79,275 for the total annual aircraft operations. The baseline emissions inventory consisted of models of the following individual pollutants:

- CO
- VOC
- NOx (which combines with VOC in sunlight to form ozone)
- SOx
- PM2.5
- PM10
- CO2
- Fuel Consumption

Table 1-20 summarizes the results of the aviation-related emissions inventory as measured in statute tons.

Table 1-20: 2015 Emissions Inventory (Measured in Statute Tons)

Source Category		Fuel	CO	VOC	NOX	CO2	SOX	PM2.5	PM10
Aircraft Engines In the Landing and Takeoff Cycle	Start up[1]	N/A	N/A	5.9	N/A	N/A	N/A	N/A	N/A
	Taxi-out	2,855.4	119.7	12.8	11.9	9,008.8	3.3	0.3	0.3
	Taxi-in	1,239.4	52.4	5.8	5.2	3,910.2	1.5	0.1	0.1
	Takeoff/Climb	3,575.2	84.8	1.1	57.9	11,279.9	4.2	0.4	0.4
	Approach	2,474.8	144.5	4.9	18.5	7,808.1	2.9	0.5	0.5
	Aircraft Subtotal	*10,144.9*	*401.3*	*30.6*	*93.4*	*32,007.0*	*11.9*	*1.3*	*1.3*
Aircraft Auxiliary Power (APU)		N/A	5.0	0.3	5.5	N/A	0.8	0.6	0.6
Ground Support Equipment (GSE)		N/A	72.7	2.7	9.9	N/A	0.3	0.4	0.4
TOTAL[2]		**10,144.9**	**479.1**	**33.6**	**108.8**	**32,007.0**	**13.0**	**2.3**	**2.3**

Notes:
1. Startup emissions are only calculated for VOC.
2. May not add to the listed total due to rounding.

Historical, Architectural, Archaeological, and Cultural Resources

Historical, architectural, archaeological, and cultural resources encompass a range of sites, properties, and physical resources associated with human activities, society, and cultural institutions. Under NEPA and Section 106 of the National Historic Preservation Act (NHPA), the FAA is responsible for analyzing the potential impacts of a proposed action on these resources.

There are 23 cultural resources previously recorded within RNO boundaries, of which one, the Steele Ranch, has been evaluated and formally determined eligible for listing in the National Register of Historic Places (NRHP). Many of the other previously recorded sites require further NRHP evaluation to understand their eligibility status and for review and consensus by the FAA and the Nevada State Historic Preservation Officer (SHPO).

An architectural and archaeological inventory of a Study Area associated with an undocumented 16.02-acre portion of the former Steele Ranch, an RNO Class III Project Area, was completed on November 17, 2016. **Appendix B** provides a detailed description of each architectural and archaeological resource identified during the inventory. As shown in **Appendix B**, this Archaeological Inventory and Evaluation Report identified a number of previously unrecorded historic-era resources within the boundaries of the Study Area. These include: a historic refuse scatter, a concrete foundation pad, and collapsed remnants of structures associated with the Steele Ranch, site numbers C230/WA7997. The inventory identified one obsidian lithic isolate, RA-002. Isolates such as this are generally not considered eligible for listing in the NRHP. The Steele Ranch is eligible for listing in the NRHP; therefore, these resources contribute to the Steele Ranch, C230/WA7997 and will require mitigation under Section 106 for future ground disturbing activities within the Study Area. The FAA will develop suitable mitigation with review and concurrence by the Nevada SHPO and the Advisory Council on Historic Preservation as part of Section 106 as needed with future projects.

Threatened and Endangered Species

Federally-Listed Species

Section 7 of the Endangered Species Act of 1973, as amended, requires federal agencies to ensure that any proposed action does not jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of associated habitat. A review of the Nevada Natural Heritage Program's list checked for the presence of any federally endangered or threatened species. According to the Program's list, only five federally listed species are known to occur in Washoe County as summarized in **Table 1-21**. The RTAA conducted a Wildlife Hazard Assessment (WHA) from 2006 to 2007. None of these species was observed on RNO property during field studies either in support of the WHA or associated with previous NEPA evaluations.

Table 1-21: Federally Listed Species Known to Occur in Washoe County

	Common Name	Scientific Name	Federal Status
Fish Species	Warner sucker	Catostomus warnerensis	Threatened
	Lahontan cutthroat trout	Oncorhynchus clarkii henshawi	Threatened
	Cui	Chasmistes cujus;	Endangered
Amphibian Species	Sierra Nevada yellow-legged frog	Rana sierra	Threatened
Bird Species	Yellow-billed cuckoo	Coccyzus americanus	Threatened

Sources: Nevada Natural Heritage Program (NNHP). Species list for Washoe County, Nevada. November 2016. U.S. Fish and Wildlife Service, Nevada Fish and Wildlife Office, Nevada's Protected Species List, June 29, 2016.

Wildlife Hazards to Aircraft

A critical function of the 2007 WHA was to identify the presence of wildlife that could pose risks to aircraft operations. As shown in **Figure 1-38**, RNO is located near a principal route of the Pacific Flyway, a major migratory route for birds that extends from the Arctic southward to Mexico. The 2007 WHA identified the following wildlife as posing the greatest threats:

- Waterfowl, mainly Canada geese, mallards, and double-crested cormorants,
- Gulls, mainly California gulls,
- Corvids, mainly American crows,
- Columbiforms, mainly rock doves and mourning doves,
- Song birds, mainly horned larks and house finches,
- Birds of prey, mainly red-tailed hawks and American kestrels, and
- Large mammals, such as coyotes and deer.

Figure 1-38: Pacific Flyway

Source: Britannica

In 2008, the RTAA prepared a Wildlife Hazard Management Plan (WHMP) based on the data presented in the WHA. The WHMP identified specific measures implemented to reduce potential hazards to aircraft and wildlife:

- Train employees to identify and disperse hazardous wildlife,
- Exclude or discourage wildlife through anti-perching devices and fences,
- Maintain drainage features to prevent standing water,
- Replace vegetation and trees that provide food, shelter, or nesting habitat, and
- Maintain depredation permits for the species identified to pose the greatest hazards to aircraft.

The mitigation measures are intended to make RNO less attractive to hazardous wildlife or discourage wildlife from visiting the airport through ongoing habitat management and direct control measures, such as dispersal using vehicles and pyrotechnics.

Water Quality

The Clean Water Act (CWA), as amended (33 United States Code [U.S.C.] 1251 et seq.) establishes the basic structure for regulating pollutant discharges into waters of the U.S. and regulating quality standards for surface waters. CWA Section 402 requires that pollutant discharge to waters of the U.S. from any point source be identified and managed in accordance with a National Pollution Discharge Elimination System (NPDES) permit. In the State of Nevada, the Bureau of Water Pollution Control, Nevada Division of Environmental Protection administers the federal NPDES program. The EPA's regulations on Oil Pollution Prevention (Title 40 CFR Part 112) aim to contain discharges of oil and prevent oil from reaching navigable waters and adjoining shorelines. The regulations require non-exempt facilities to develop and implement Spill Prevention, Control, and Countermeasure (SPCC) Plans. SPCC plan regulations include monitoring and measures to identify and intercept any contaminants and prevent them from reaching nearby waters.

Airport Activities and Water Quality

Aviation and industrial activities at RNO have the potential to contribute pollutants to storm water runoff and affect water quality. Specific activities or sources that could potentially affect water quality include:

- Sewage disposal,
- Aircraft and vehicle maintenance activities,
- Equipment cleaning,
- Storage and handling of fuel, petroleum, solvents, and
- Aircraft deicing operations.

Wastewater disposal services are provided by the City of Reno, Department of Public Works.

RNO's drainage system collects storm water runoff from airport facilities. A significant portion of surface runoff discharges to Boynton Slough, a tributary of Steamboat Creek. Steamboat Creek is a tributary of the Truckee River, which is northeast of the airport. The RTAA's Stormwater Pollution Prevention Plan (SWPPP), revised October 2015, is in accordance with the requirements of the Nevada General Industrial Permit, under which the RTAA has obtained permit coverage for storm water associated with industrial activity.

As noted in the RTAA's SWPPP, runoff from the northeastern portion of RNO flows southeast to two discharge points along South Rock Boulevard and into the City of Reno's drainage system. Runoff in the north-central portion of the airport flows easterly to the University Drain. Runoff in the central and southern portions of the airport generally flows easterly and is discharged into Boynton Slough. The drainage basin map provided in the SWPPP is presented as **Figure 1-39.**

Airport operations include industrial activities that require the use and storage of various petroleum products including diesel fuel, gasoline, and motor and hydraulic oils. The RTAA's SPCC Plan, revised October 2016, identifies the RTAA's use and storage of petroleum products, which is summarized in **Table 1-22**.

Table 1-22: Regulated Operations and Storage Containers

Location	Storage Container and Material
Airfield Maintenance Facility	■ Motive power equipment with a cumulative storage capacity of 2,285 gal of diesel fuel ■ 5,200-gal unleaded gasoline AST ■ 5,200-gal diesel fuel AST
Vehicle Maintenance Shop	■ Three steel 240-gal ASTs for motor and hydraulic oil ■ Three steel 120-gal ASTs for motor and transmission oil storage ■ One 600-gal UST for used oil storage ■ Several 55-gal drums and smaller containers are stored on secondary containment pallets indoors or in an outdoor storage area ■ One 420-gal trailer mounted day tank for diesel fuel ■ One 200-gal trailer mounted diesel fuel dispensing tank
Airfield Maintenance Paint Shop	■ One 250-gal AST for diesel fuel
B Concourse	■ One 3,000-gal diesel UST used to fuel emergency generators ■ One 30-gal day tank for diesel fuel
C Concourse	■ One 3,000-gal diesel UST used to store fuel for emergency generators ■ One 30-gal diesel fuel day tank for diesel fuel ■ Two 650-gal non-PCB oil transformers
ARFF	■ Motive power equipment with a cumulative storage capacity of approximately 503 gal of diesel ■ One 5,000-gal AST for diesel fuel ■ One 100-gal capacity day tank for diesel fuel
East airfield lighting vault	■ 500-gal pad mounted AST for diesel fuel
West airfield lighting vault	■ 660-gal sub-base day tank
Airport parking facilities	■ 140-gal (plaza) and 200-gallon (structure) day tanks for diesel fuel
Airport Emergency Operations Center (EOC)	■ One 612-gal AST for diesel
Baggage Make-Up/ C Concourse, southeast side of the Terminal facilities	■ Three 685-gal day tanks for diesel fuel
Key: Gal – Gallons, AST – Aboveground storage Tank, UST – Underground Storage Tank	

In addition to petroleum products, RNO uses deicing and anti-icing materials. Operations staff applies these materials to aircraft and surfaces to eliminate or minimize ice build-up during cold weather conditions. Deicing and anti-icing chemicals consist of propylene glycol-based fluids, potassium acetate, and granulated sodium formate/acetate. Bulk liquid deicing chemicals are stored primarily in ASTs or mobile tanks until they are loaded onto and applied by deicing/anti-icing equipment. Staff applies the granulated products to runways and taxiways and stores these products in bags and within bulk weather protected enclosures. Following application of deicing chemicals, airport maintenance personnel sweeps up excess granules and collects overspray and excess aircraft deicing and anti-icing fluids using specialized glycol recovery vehicles. The vehicles then discharge the materials to the Truckee Meadows Water Reclamation Facility for treatment. **Table 1-23** summarizes the locations of grease and sand/oil interceptors at RNO.

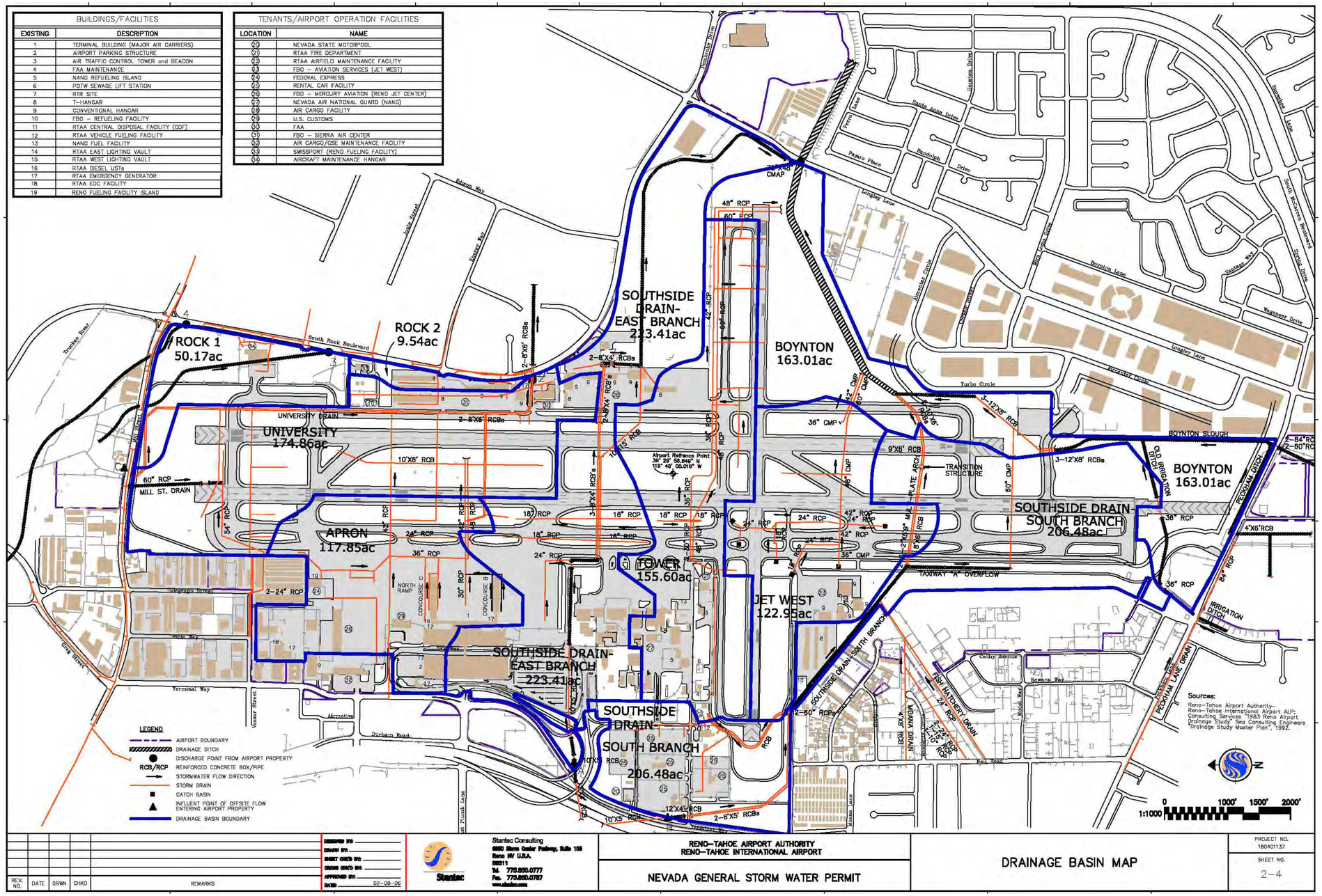


Figure derived from Sheet 2-4 form the RTAA's Stormwater Pollution Prevention Plan (SWPPP), revised October 2015. Figure updated to show drainage basins and storm drains in color. No other changes made to base map or property from Sheet 2-4.

Figure 1-39
SWPPP Drainage Basin Map

Table 1-23: Grease and Sand/Oil Interceptors at Reno Tahoe International Airport

Location	Interceptor Type and Size
Main Terminal	■ 8,000-gal grease interceptor ■ 1,500-gal grease interceptor at Café
B Concourse	■ 750-gal grease interceptor
C Concourse	■ 750-gal grease interceptor ■ 200-gal sand/oil interceptor inside of sewage ejection room
Central Disposal Facility	■ 1,000-gal sand/oil interceptor
Hangar #10	■ 750-gal sand/oil interceptor
Airfield Wash Rack and Old ARFF	■ Two 1,000-gal sand/oil interceptors
Airfield Maintenance Wash Bay	■ 100-gal sand/oil interceptor
Aircraft Rescue and Firefighting Facility	■ 750-gal sand/oil interceptor ■ 5,000-gal storm interceptor
Snow Removal Equipment Building	■ 1,000-gal sand/oil interceptor
Key: Gal – Gallons	

Wetlands

For regulatory purposes under the CWA, "wetlands" refers to areas inundated or saturated by groundwater or surface water at a frequency or duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated conditions. Areas covered with water for such a short duration that there is no effect on moist soil vegetation are not considered wetlands, nor are the waters of streams, reservoirs, and deep lakes. Federal regulations broadly define waters of the U.S. as navigable waters or surface water resources that have a connection to navigable waters. The U.S. Army Corps of Engineers (COE) is responsible for determining whether an area meets the criteria for being a jurisdictional wetland or water of the U.S.

The U.S. Fish and Wildlife Service (USFWS) established the National Wetlands Inventory (NWI) in the 1970s to inventory U.S. wetlands nationwide. The standard NWI maps provide planning level information on the location and type of wetland. This inventory effort examined NWI maps along with wetland information from four EAs prepared for projects at RNO between 1992 and 2007. **Figure 1-40** identifies wetlands documented on NWI maps. Previous field studies at RNO confirmed the presence of the wetlands and waterbodies named and labeled on the NWI map.

Subsequent field investigations confirmed the locations of several wetlands identified on NWI maps (**Figure 1-40**). However, some of the wetlands from the NWI maps have been removed or altered as a result of subsequent airport construction. The RTAA requested an approved jurisdictional determination from the COE in March 2013. A letter from the COE dated January 10, 2014, identified the presence and extent of wetlands at RNO. These wetlands are summarized in **Table 1-24** and shown on **Figure 1-41**.

Jurisdictional Wetlands and Waters of the U.S.

The COE identified 32.5 acres of wetlands within RNO boundaries, and considers 13.3 acres of these as jurisdictional wetlands. These jurisdictional wetlands/waters of the U.S. are the segment of Boynton Slough located in the airport's southeast quadrant, and the section of Dry Creek located south of the approach ends to Runways 34R and 34L. Dry Creek is a tributary of Boynton Slough, which is a major drainage feature at RNO. Boynton Slough flows off RNO property and contributes flow into Steamboat Creek and then into the Truckee River. A portion of the Truckee River is located off-site and adjacent to the Airport's northern boundary. The locations of jurisdictional wetlands are illustrated on **Figure 1-41**.

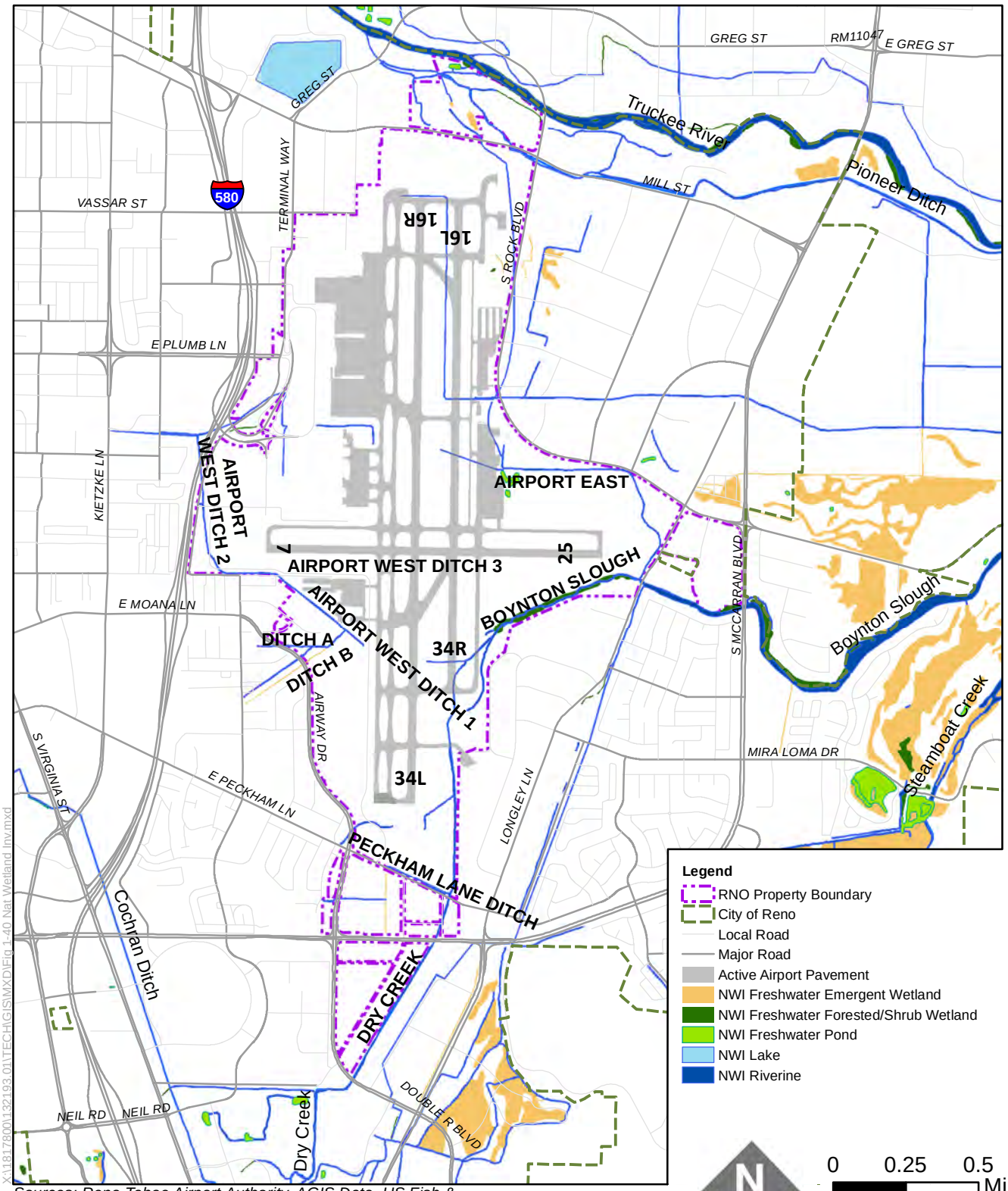
Non-jurisdictional Wetlands and Waters of the U.S.

The remaining 19.2 acres of potential wetlands shown on **Figure 1-41** are non-jurisdictional wetlands. These include several ditches constructed on airport property to facilitate stormwater management and drainage. Neither the stream and ditch associated with the former Brookside Golf Course nor the Peckham Lane Ditch are jurisdictional wetlands or waters of the U.S. The Pioneer Ditch adjacent to Mill Street is listed in the U.S. Geological Survey's hydrography dataset. However, no data is available regarding its jurisdiction.

Table 1-24: Wetlands and Drainages Identified On and Near RNO

Feature	Federal Jurisdiction [1]	Area (Acres)
Boynton Slough	Yes	7.7
Dry Creek	Yes	5.6
Airport West Ditch 1	No	5.3
Airport West Ditch 2	No	2.2
Airport West Ditch 3	No	0.8
Brookside Golf Course	No	7.5
Ditch A	No	0.9
Ditch B	No	1.5
Peckham Lane Ditch	No	1.0
	Total Jurisdictional Wetlands	13.3
	Total Non-Jurisdictional Wetlands	19.2
	Total Wetlands	**32.5**

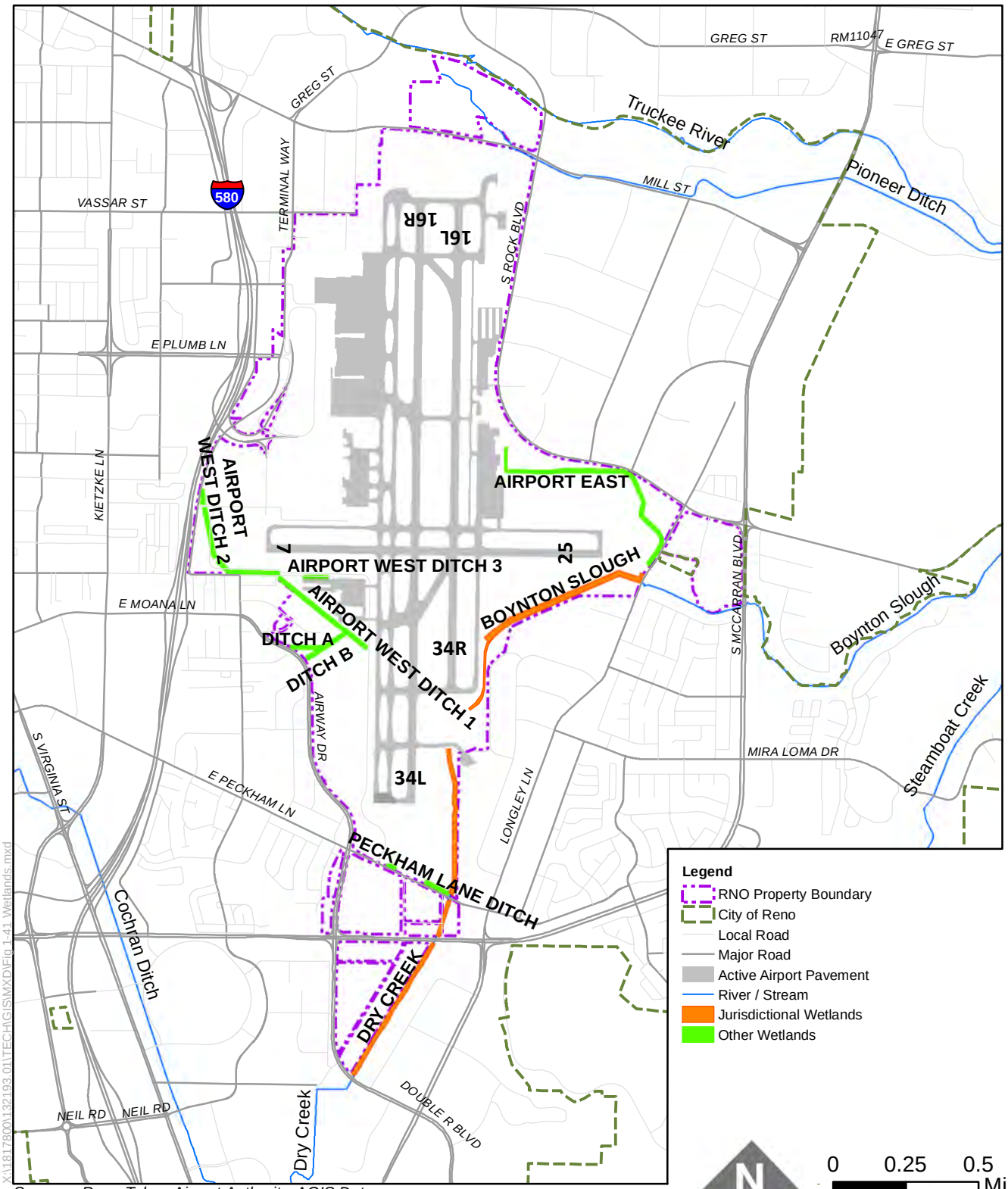
1. Source: U.S. Army Corps of Engineers, Sacramento District, 2014. Jurisdictional determination letter to from K. Hansen, Reno Field Office to K. Bart, Reno-Tahoe Airport Authority, January 10, 2014.



X:\181780\132193 01\TECH\GIS\MXD\Fig 1-40 Nat Wetland Inv.mxd

Sources: Reno Tahoe Airport Authority, AGIS Data, US Fish & Wildlife Service National Wetland Inventory, Washoe County

Figure 1-40
Airport National Wetlands Inventory



X:\118170001\32193.01\TECH\GIS\MXD\Fig 1-41 Wetlands.mxd

Sources: Reno Tahoe Airport Authority, AGIS Data, USGS National Hydrography Dataset, Washoe County

Figure 1-41
Airport Wetlands

Floodplains

Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) indicate that part of the passenger terminal, part of the airfield, and vacant and developed property reside in flood zones or floodplains. The primary sources of regulations pertaining to floodplains are Executive Order (EO) 11988, "Floodplain Management," and local statutes. EO 11988 requires federal agencies "to avoid, to the extent possible, the long and short-term adverse impacts associated with the occupancy and modification of 100-year floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative." For RNO, the guidelines and requirements for development of property within areas determined to be subject to flood damage are provided in Article XVII of the *City of Reno Land Development Code*. In addition, the City of Reno has issued standards and hydraulic studies related to flood storage associated with the Truckee River Flood Project. A review of the FIRMs identified whether RNO property or portions of the property are within flood zones, and found the following:

- **Zone A:** The area that has a 1 percent annual chance of flooding (100-year floodplain); no base flood elevations have been determined.
- **Zone AE:** The area that has a 1 percent annual chance of flooding; base flood elevations have been determined.
- **Zone X:** Areas determined to be outside of the 1 percent and 0.2 percent annual chance floodplain.

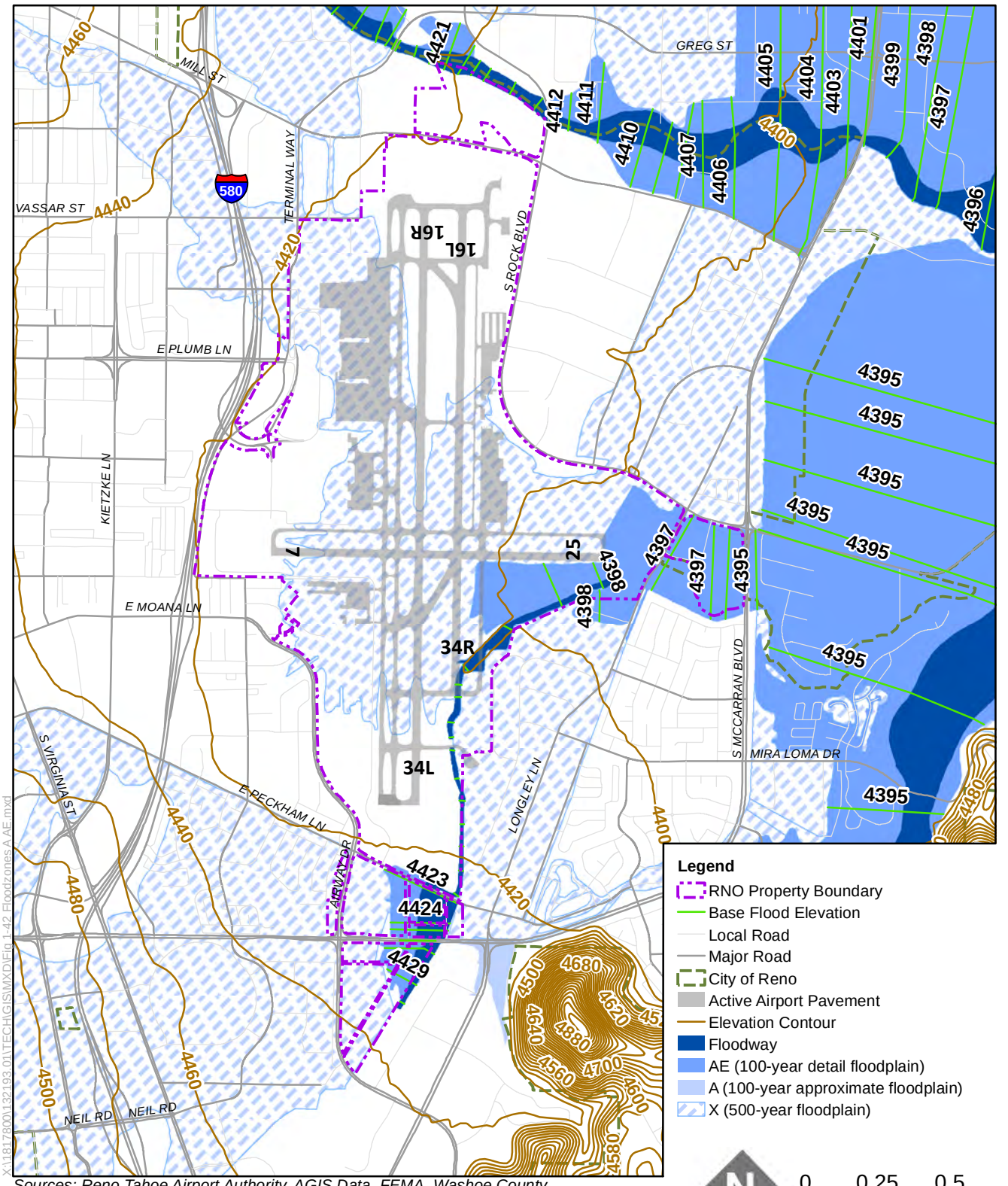
Figure 1-42 illustrates the location of Flood Zones A and AE with required base flood elevations. **Figure 1-43** illustrates the location of Flood Zone X with approximate existing grades. **Table 1-25** summarizes the elevation requirements for new residential and non-residential structures located in these flood zones.

Table 1-25: City of Reno Elevation Requirements for New Construction

Flood Zones		Requirements
Residential Structures (must be elevated)	A	Elevate bottom of basement floor at least 1 foot above the highest existing grade adjacent to the building; or an elevation of 1 foot above the highest top of curb on the street adjacent to the property.
	AE	Elevate bottom of basement floor to 1 foot or more above the base flood elevation.
	X	Elevate bottom of basement floor at least 1 foot above the highest existing grade adjacent to the building; or an elevation of 1 foot above the highest top of curb on the street adjacent to the property.
Non-Residential Structures (must be either elevated or flood proofed)	A	Elevate basement floor at least 1 foot above the base flood elevation.
	AE	Elevate basement floor at least 1 foot above the base flood elevation.
	X	Elevate basement floor at least 1 foot above the highest existing grade adjacent to the building, or 1 foot above the highest top of curb on the street adjacent to the property.

Source: ***City of Reno Land Development Code***

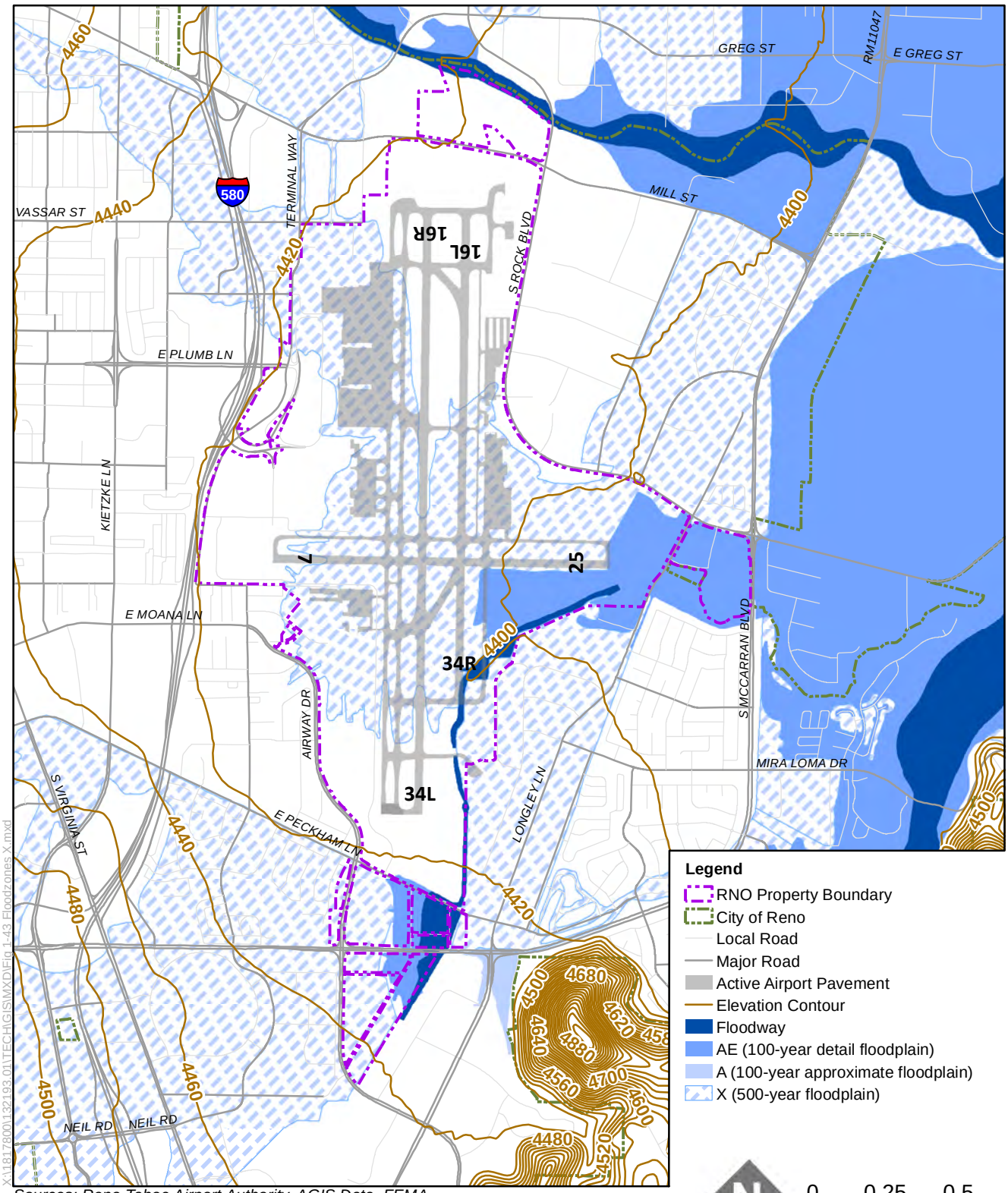
To comply with the City of Reno Codes, non-residential structures that will be located in flood zones can be either elevated or addressed using flood proofing measures. Examples of flood proofing measures include, but are not limited to: installation of watertight doors, bulkheads, and shutters; reinforcement of walls to resist water pressure; use of paints, membranes, or mortars to reduce seepage through walls; addition of mass or weight to the structure to resist floatation; and armor protection of all fill materials from scour and erosion. Based on FAA guidance set forth in Order 1050.1F, elevating new structures is presumed a preferred alternative to flood proofing new structures at RNO, unless elevating is not a practical alternative.



X:\118178000\132193.01\TECH\GIS\MXD\Fig 1-42 Floodzones A AE.mxd

Sources: Reno Tahoe Airport Authority, AGIS Data, FEMA, Washoe County

Figure 1-42
Base Flood Elevations for New Structures in Zones A and AE



X:\181780\0132193.01\TECH\GIS\MXD\Fig 1-43 Floodzones X.mxd

Sources: Reno Tahoe Airport Authority, AGIS Data, FEMA, Washoe County, USGS NED 1/3 arc-second Contours

Note: Ground elevations shown are approximate. New structures should be designed on the basis of detailed ground surveys.

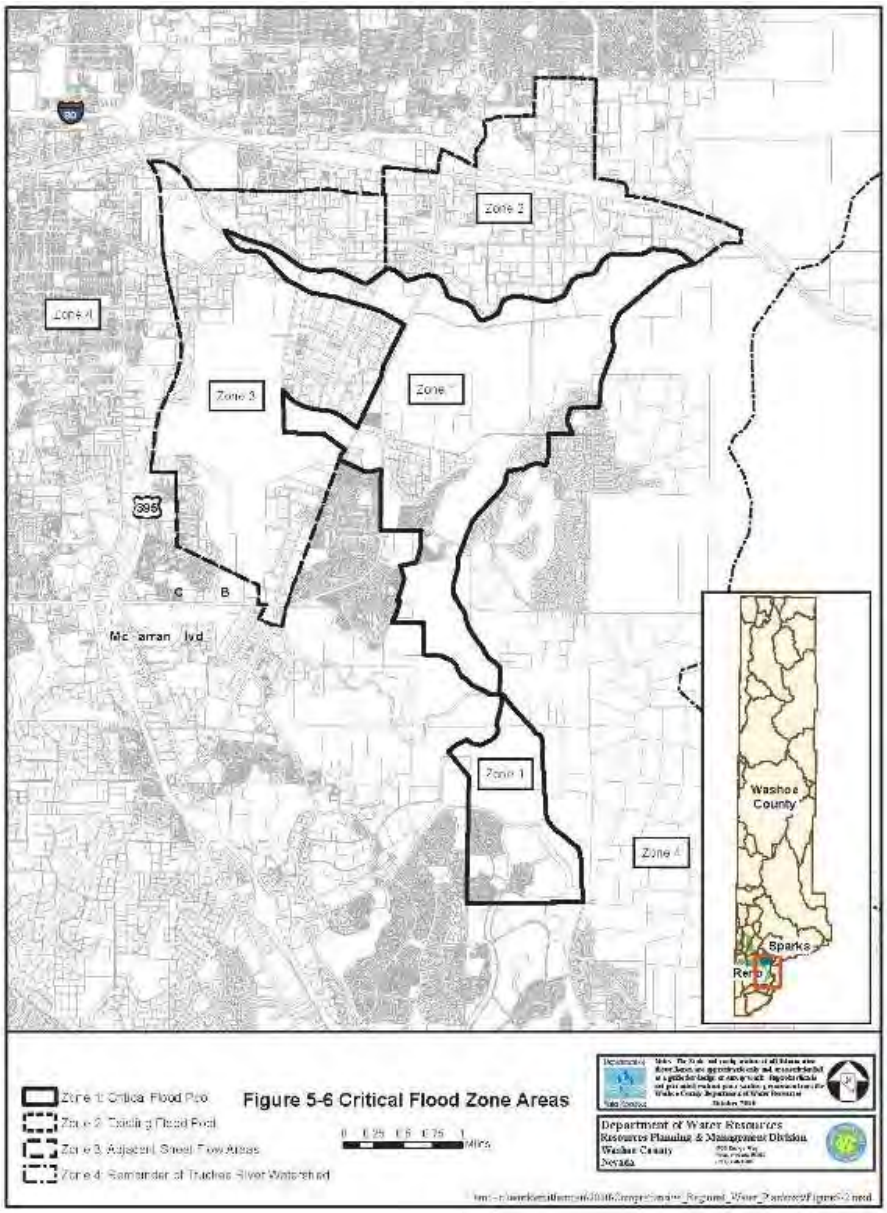
Figure 1-43
Approximate Existing Grades for New Structures in Zone X

Flood Storage

Section 18.12.605 of the *City of Reno Land Development Code* requires that any development in areas that discharge within the Critical Flood Zone 1, as defined in local flood management documents (see **Figure 1-44**), meet the following requirements:

- Storm water discharges from the project must be limited to pre-development conditions relative to peak flows.
- Flood storage volume mitigation, which may be achieved by excavating to mitigate for flood storage volume displaced in a ratio of 1:1. The entire mitigated volume of mitigation areas must be available for flood storage during any flood event, and detention basins required by other ordinances are not eligible for mitigation of lost storage volumes.

Figure 1-44: Critical Flood Zone Map



Source: Regional Water Management Plan

Since RNO is primarily located upstream of Critical Flood Zone 1, the requirements of Section 18.12.605 apply to all development activities on the airport. With Critical Flood Zone 1, the adverse impact on flood storage of any grading performed to meet elevation requirements for new structures must be mitigated by excavation elsewhere at a ratio of 1-to-1. In other words, storage volume must be created for every unit of floodplain storage that is displaced. In addition, the new storage must be created in the same area and elevation bands as the displaced storage as defined by Truckee River Flood Management Project maps. **Figures 1-40 and 1-41** may be used to determine raising/mitigation at sites on a case-by-case basis.

Sustainability Initiatives

The FAA encourages airport operators to implement sustainability and sustainable initiatives into their planning and daily operations. These initiatives identify sustainable actions as actions that contribute to or result in one or more of the following effects:

- Reduce environmental impacts;
- Help maintain high, stable levels of economic growth; and
- Help achieve "social progress" through a broad set of actions that ensure organizational goals are achieved in a way that is consistent with the needs and values of the local community.

The RTAA is committed to integrating sustainability into its planning processes and daily operations using the "EONS" approach that has been widely adopted by the airport industry. EONS includes four components:

- Economic vitality,
- Operational efficiency,
- Natural resources, and
- Social responsibility.

Using the four-component EONS approach to sustainability, the RTAA seeks sustainable solutions that can be measured by their ability to stimulate economic growth, protect the environment and natural resources, efficiently operate its facilities, and serve as a good neighbor and corporate citizen. The incorporation of sustainable programs promoted by the EONS approach also enables the RTAA to achieve a "payback" by implementing business practices that maximize the use of the RTAAs operational and maintenance expenditures.

Sustainable Policies and Programs

Natural resources represent one of the four components of the EONS approach to sustainability, and the RTAA's environmental policy reflects its commitment to natural resources and sustainability. As set forth in its Environmental Policy Statement:

> *In order to meet the demands of sustainable aviation development and to protect the natural environment, the RTAA's environmental programs endeavor to improve environmental practices, support pollution reduction and prevention, and foster environmental stewardship. This commitment goes beyond compliance with the law and encompasses the integration of sound environmental practices into our daily decisions and activities.*

The RTAA's environmental policy specifies that it will pursue ongoing environmental stewardship through continual improvement in its environmental performance and sustainable aviation business practices; resource conservation and pollution prevention through waste reduction and recycling as part of its operations and business practices; and by meeting or exceeding relevant environmental regulations. The policy is communicated to RTAA staff and published on the RTAA's public website.

Sustainable Programs

To demonstrate its commitment to a healthy natural environment and sustainable airport management, the RTAA has developed and incorporated an Environmental Management System (EMS) into its daily practices in accordance with International Organization for Standardization (ISO) 14001 standards for EMS and FAA Advisory Circular (AC) No 150/5050-8, *Environmental Management Systems for Airport Sponsors*.

The RTAA's Environmental Policy Statement serves as the foundation of the EMS design and implementation. EMS components include:

- Planning, which provides a process for identifying the environmental aspects associated with airport operations (e.g., environmental issues/potential impacts), applicable regulations, and objectives and targets for improving environmental performance;
- An organizational structure and responsibilities associated with training, communication, and emergency preparedness and response;
- Checking and corrective action processes, such as measurement and monitoring, corrective and preventive action, recordkeeping and auditing; and
- Management review.

The EMS provides a policy, planning, and standardized framework for the development of specific Environmental Management Programs (EMPs) to address various airport operations and processes. The goal of program implementation is to help the RTAA achieve and demonstrate continued environmental improvement. The EMS documents the EMPs summarized in **Table 1-26**, which include the following elements.

- A designated staff member responsible for leading the program;
- Program objectives and targets;
- Anticipated environmental issues/impacts;
- Strategies for addressing the issues/impacts;
- Resources necessary for program implementation;
- Required actions and targets to achieve program objectives; and
- Metrics for evaluation, called environmental performance indicators.

Table 1-26: Environmental Management Programs at RNO

Program No. and Name	Objectives/Intended Benefits
08-01: Recycling	Further reduce the waste stream by decreasing the volume of recyclable materials currently transported to the local landfill.
08-02: Pelletized Urea	Investigate an alternative (less detrimental to the environment) chemical/product for landside deicing/anti-icing purposes.
08-03: Glycol Aircraft (Deicing/Anti-icing Fluid) Recovery	Properly measure and enhance glycol fluid recovery efforts performed by RTAA's Airfield Maintenance Department.
08-04: Storm Water Pollution Prevention	Ensure the continued compliance with all applicable water quality requirements of the Nevada Storm Water General Permit.
08-05: Energy Conservation	Reduce energy consumption by 2 percent by March 2009.
08-06: Asphalt/Concrete Deconstruction and Reuse	Increase the use of demolished asphalt/concrete as a means to provide aggregate base course for new pavement sections. Also, promote waste reduction and reduce landfill impacts.
08-07: Construction Design Standard-Alternative Fuel Usage	Reduce emissions of criteria pollutants, hazardous air pollutants (HAPs) and greenhouse gases (GHGs) resulting from diesel-powered construction equipment.
Source: Reno-Tahoe Airport Authority, 2009, *Environmental Management System Manual*.	

Many of the programs identified in the EMS have furthered RTAA sustainability goals:

- EMS Program 08-01: Recycling, was designed to increase the amount of waste recycled for targeted items such as: aluminum cans, plastic bottles, newspapers, white paper, cardboard, and glass containers. Since its inception, the program has diverted approximately 81 tons of recyclables from the local landfills annually, which equates to more than 10 percent of the airport waste stream.
- EMS Program 08-02: Pelletized Urea, discontinued the use of all nitrate-based (pelletized urea) deicing/anti-icing products and replaced them with FAA-approved deicing/anti-icing products that offer better performance and ecological advantages.
- EMS Program 08-05: Energy Conservation, has delivered annual energy and cost savings. The conversion of existing lighting fixtures to LEDs resulted in an annual energy cost savings of more than $250,000. HVAC retrofit/upgrade projects resulted in an annual reduction in operating and maintenance costs of approximately $200,000. The installation of a 135kW solar photovoltaic system at the ARFF led to a reduction in the amount of electricity purchased and an electrical utility cost savings of approximately $30,000 annually.
- EMS Program 08-06: Asphalt/Concrete Deconstruction and Reuse, has led to the reuse of all demolished pavement.

Land Use, Zoning, and Local Planning Studies

The FAA recommends regulations, policies and guidance pertaining to compatible land use on and near airports, but it has no control over local land use decisions. Similarly, the State of Nevada does not implement and administer general purpose land use regulations; however, the State does give cities, towns, and counties the power to control local land use through enabling legislation. Several agencies or jurisdictions have land use authority over property on or near RNO, which include:

- RTAA
- City of Reno
- City of Sparks
- Washoe County
- Truckee Meadows Regional Planning Agency

Land Use and Planning

RNO is located entirely within the City of Reno and designated as a Regional Center in the City's Master Plan. The Airport is within the Truckee Meadows Regional Planning Area. Together, with the cities of Sparks and Washoe County, the Truckee Meadows Regional Planning Commission administers a regional plan for the area surrounding the airport. The cities of Reno and Sparks and Washoe County maintain their powers to administer zoning within their political boundaries. Within the City of Reno, the underlying zoning for RNO is Mixed Use with a RNO Regional Center Overlay District, which is further described below.

RNO Land Use

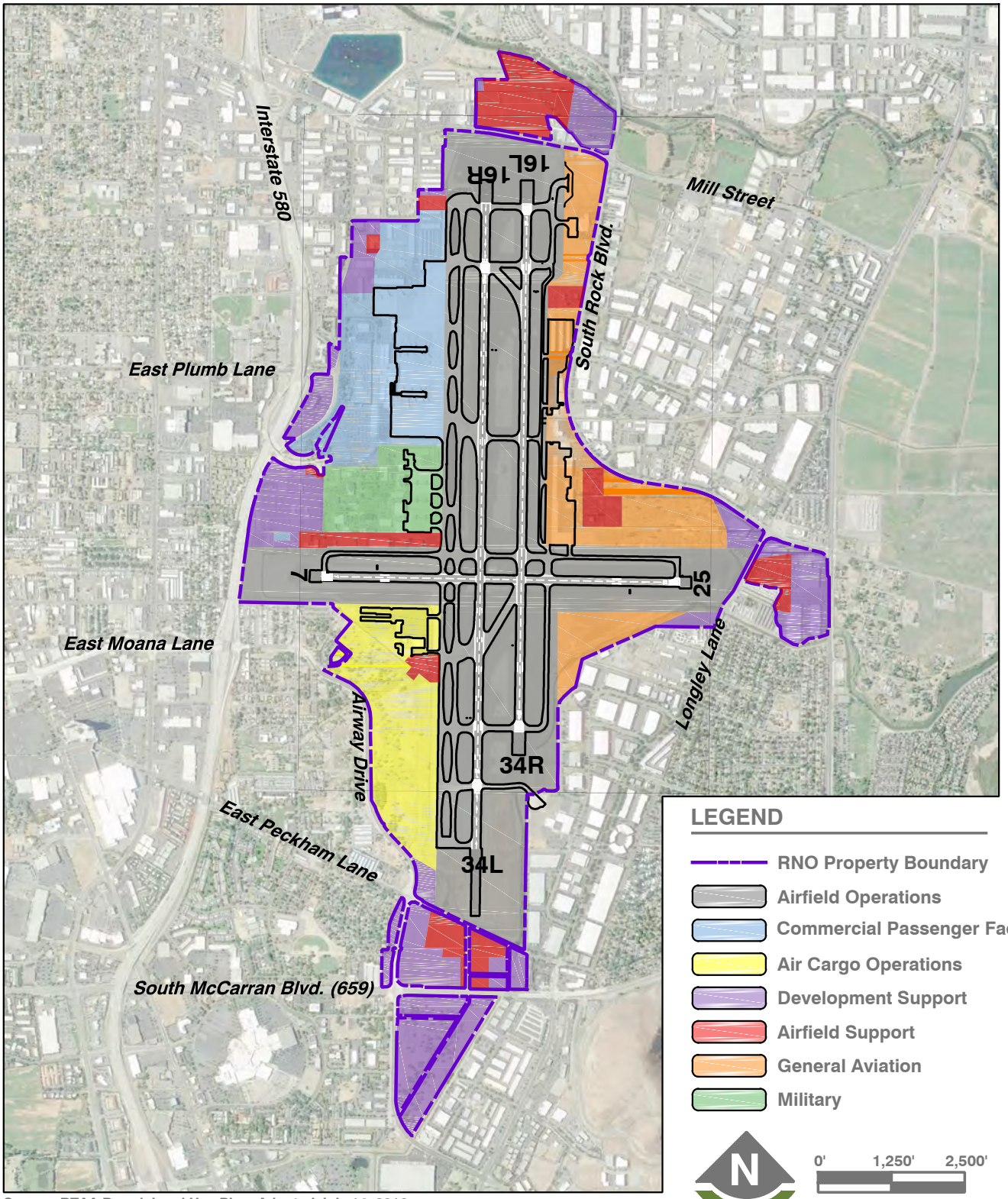
The RTAA develops and maintains the RNO Airport Land Use Plan. The Plan provides a map upon which to base future development decisions while identifying sufficient land for existing and future operations and facilities.

The RNO Land Use Map was revised in July 2016 to support the priorities in the *RTAA Strategic Plan* including: increasing air service, optimizing GA services, expanding cargo facilities and service, and facilitating economic development. **Figure 1-45** illustrates the 2016 RNO Land Use Map. **Table 1-27** presents the acreage associated with each land use.

Table 1-27: RNO Land Uses and Acreages

Land Use	Total Acres
Airfield Operations	707
Commercial Passenger Facilities	154
Air Cargo Operations	115
Development Support	210
Airfield Support	110
General Aviation	159
Military	62

Source: RNO Airport Land Use Plan, adopted July 14, 2016.



Source: RTAA Board, Land Use Plan, Adopted July 14, 2016

Figure 1-45
Amended Land Use

Runway Protection Zones

The Runway Protection Zone (RPZ) is a trapezoidal area at the end of the runway. This area is designated to enhance safety for aircraft operations and for people and objects on the ground. The FAA recommends that incompatible land uses, objects, and activities be located outside of the RPZ. The FAA also recommends that an airport operator maintain full control of an RPZ, ideally through fee simple property acquisition. If this is not feasible, land use control may be achieved through the use easements. Considerations, such as cost and environmental process, associated with acquisition of property within the RPZs will be evaluated in **Chapter 4 – Airport Alternatives**.

The dimensions of the RPZ vary depending on the design classification for a particular runway. **Figure 1-46** illustrates the RPZs at RNO**,** with acreages provided for on and off-site parcels at each end of the runway that are owned through fee simple property acquisition. The RPZs within the existing airport property and under RTAA control are shaded green, and the portion outside RNO property boundaries are shaded yellow. Specific land uses within the RPZs will be illustrated later in this section.

Vacant Property

The RTAA provided data on vacant property at RNO that has the potential for aviation and non-aviation related development. Vacant property at RNO is located both inside and outside the Airport Operations Area (AOA)/Security Perimeter, an area referred to as “the fence.” Property inside the fence usually has unconstrained access to the runway and taxiway system, and therefore, is more attractive to aviation-related users. Vacant property outside of the fence typically has better access to public roads and is not constrained by airside security, and therefore, is more attractive to non-aviation related businesses. **Figure 1-47** illustrates the vacant property at RNO, and **Table 1-28** lists the vacant parcels with location description, total and developable acres and whether the parcel is inside or outside the RNO fence.

Table 1-28: Vacant RNO Property

ID on Figure	Vacant Parcel	Location	Total Acres[1]	Develop-able Acres[1]	Inside / Outside Fence
V1	Ferrari Farms	Steele Nash Ranch 3701 Mill Street	54.0	6 to 8	Outside
V2	Northeast Quadrant - Rock & Mill	Southwest corner of Mill and Rock	15.15	15.15	Inside
V3	Northeast Quadrant - South of Dassault	West of Rock Boulevard	7.86	7.86	Inside
V4	Airport East	700 South Rock Boulevard	50	50	Inside
V5	Southeast Quadrant	Gravel area north of Boynton Slough	25	25	Inside
V6	Home Gardens Central	East side of Home Gardens Drive and South of Peckham	12.6	12.6	Outside
V7	Longley South	East side of Luther Lane between E. Peckham and S. McCarran	4.39	2.785	Outside
V8	Home Gardens South	East side of Airway Dr. and South of McCarran	49.43	49.43	Outside
V9	Home Gardens North	East side of Airway Dr. between E. Peckham and S. McCarran	31.93	19.5	Outside
V10	Home Gardens West	West side of Airway Dr. between E. Peckham and S, McCarran	5.22	5.22	Outside
V11	Southwest Quadrant	Large area west of Runway 34L and south of ARFF	65	65	Inside
V12	General Aviation West	South of GA West hangars and west of ARFF	18.9	18.9	Inside
V13	Gateway Center	Gateway parcel minus Hyatt Place	6.3	6.3	Outside
V14	SW corner of Terminal and Airmotive	APN 013-332-14 (once 1460 Terminal Way)	0.48	0.48	Outside
V15	Conductor Heights Property	1978 Hymer Ave, Sparks	0.174	0.174	Outside
V16	Conductor Heights Property	1977 Frazer Ave, Sparks	0.321	0.321	Outside
V17	Conductor Heights Property	1961 Frazer Ave, Sparks	0.161	0.161	Outside
V18	Conductor Heights Property	1957 Frazer Ave, Sparks	0.161	0.161	Outside
V19	Conductor Heights Property	1759 Shaber Ave, Sparks	0.161	0.161	Outside

Source: RTAA Property Inventory XLS

1. Acreages from RTAA data. Vacant parcel boundaries on Figure 1-47 may not equal this total. Developable acres may vary based on FAA standards, required setbacks and land use controls. Full vacant land development options to be evaluated in **Chapter 3 – Facility Requirements**.

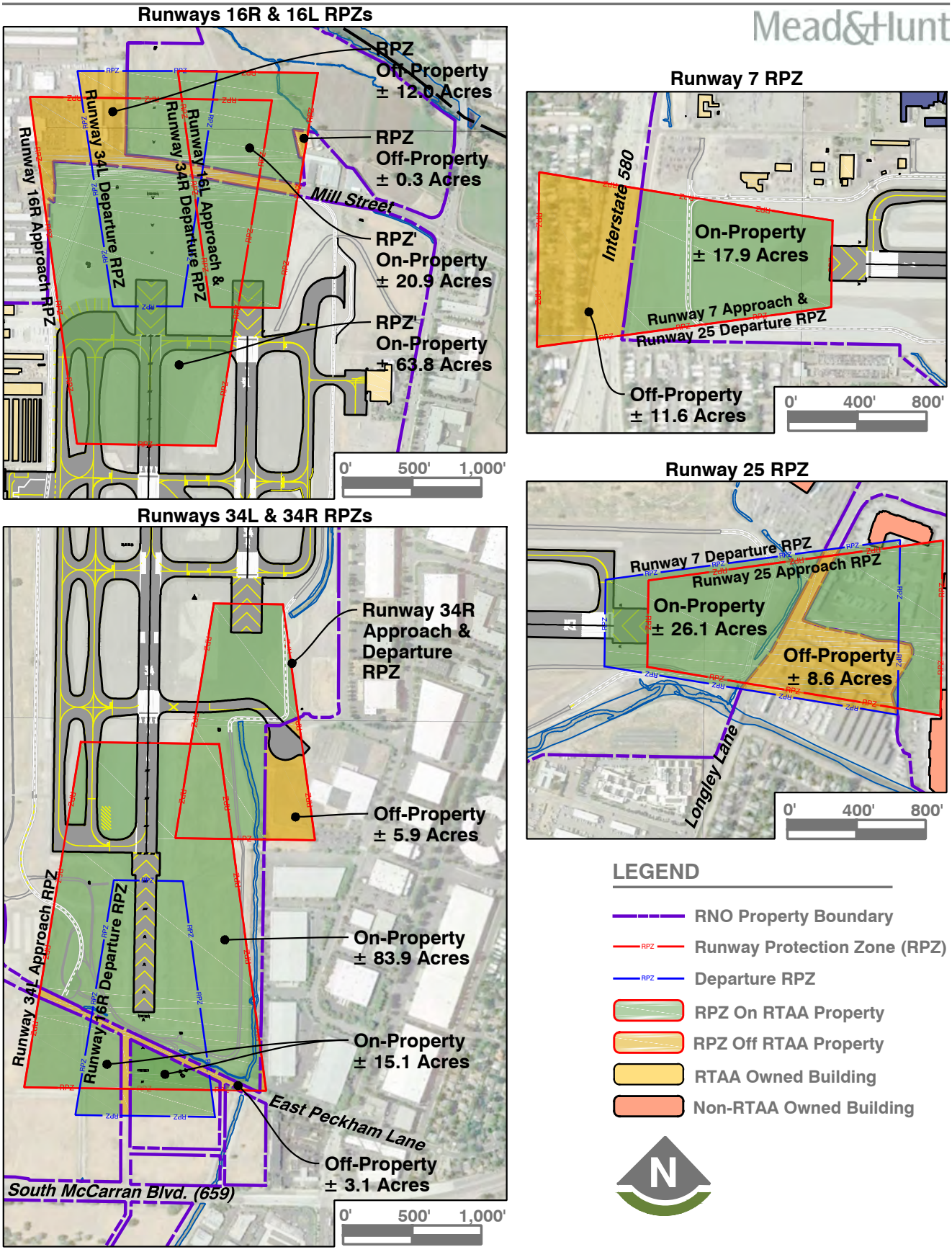
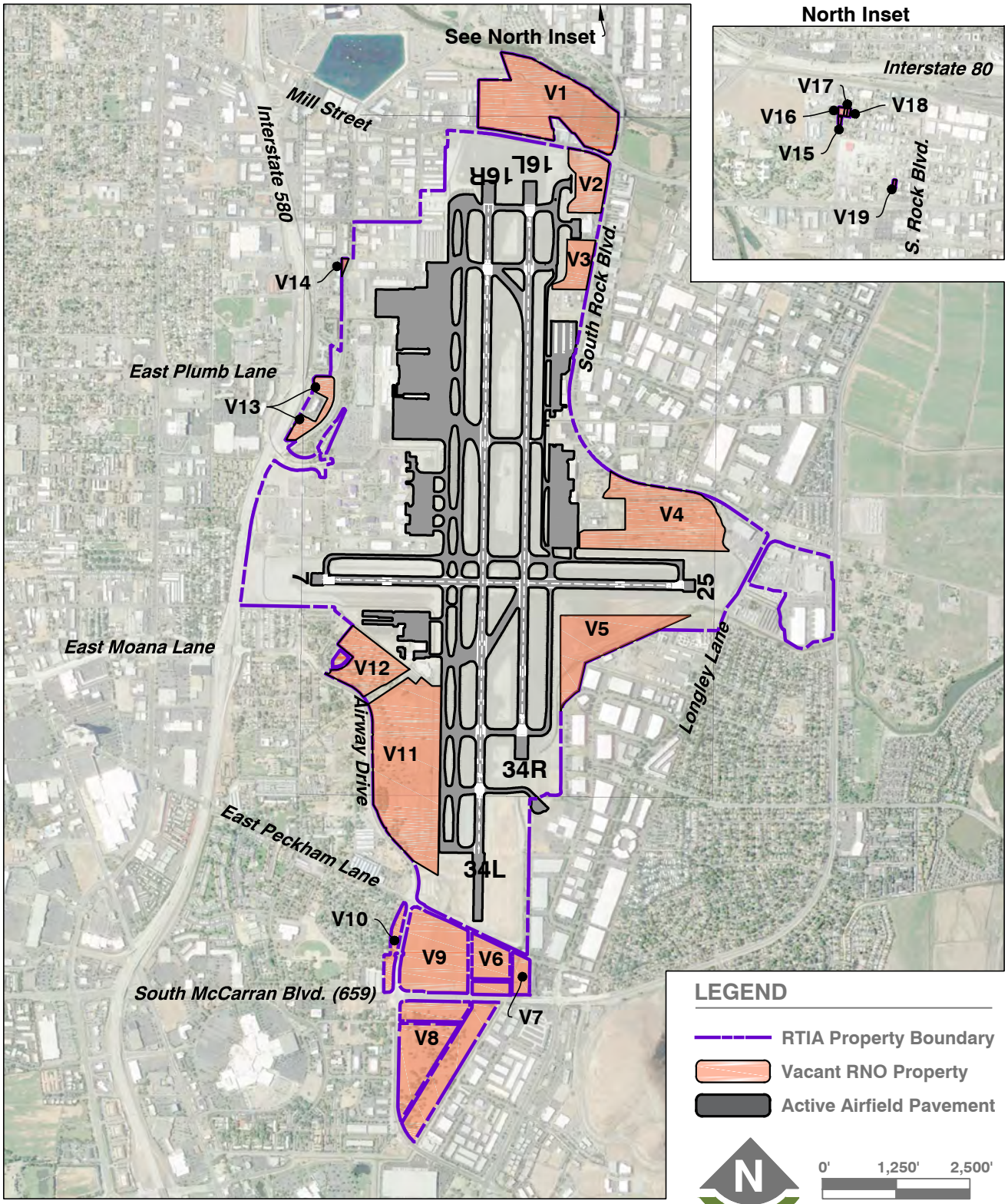


Figure 1-46
Runway Protection Zones



Source: RTAA Properties Inventory XLS (Nov. 23, 2016). Vacant parcel boundaries are approximate.

Figure 1-47
Vacant RTAA Property

Local Land Use

City of Reno

RNO is designated as a Regional Center in the City of Reno Master Plan (2010). The Land Use Element identifies that the City's Master Plan includes three types of plans:

- Citywide plans, which apply to the City and its sphere of influence;
- Center and Corridor Plans, such as Reno-Tahoe International Airport Regional Center Plan (RNO Reno-Tahoe Regional Center Plan), which apply to designated city centers and transit-oriented development corridors in the city and its sphere of influence; and
- Neighborhood plans, which cover areas not in centers or corridors, but have been designated for more detailed planning.

The Reno-Tahoe Regional Center Plan, which was adopted in 2003 and amended in 2007, includes all RTAA-owned property. The primary focus of the Reno-Tahoe Regional Center Plan is to support development at RNO and to promote airport compatible development on adjacent property. The plan recognizes and plans for land use compatibility associated with development near a commercial-service airport.

The development concept for the Reno-Tahoe Regional Center Plan categorizes the Airport into two districts: the Airport Core District and the Airport Compatible Development District. The Core District will include only facilities directly related to airport operations. The Airport Compatible District will include public and private development that will not conflict with or constrain airport operations.

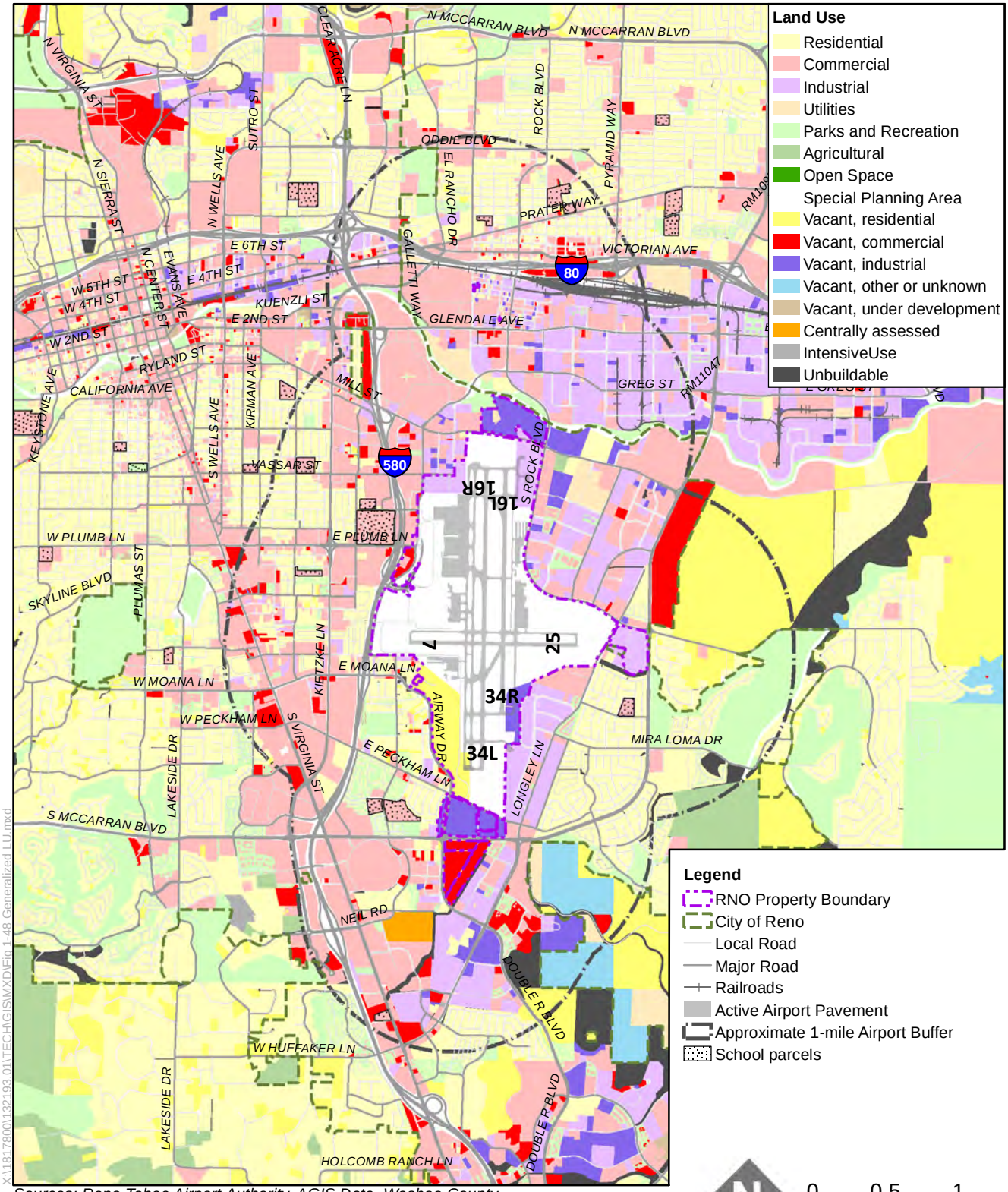
The Reno-Tahoe International Airport Regional Center is designated as Mixed Use/ Reno-Tahoe International Airport Regional Center Overlay Zoning District (MU/RTIARC). The underlying mixed-use base zoning district permits mixed-use development. The Reno Municipal Code identifies special modifications to allowable land uses, development standards, and processing requirements for the Overlay District.

Provisions of the Regional Center Plan govern land use and development within the Regional Center Plan Area boundaries. The Regional Center is designated as a "Special Planning Area." As identified in the adopted 2010 City of Reno Land Use Plan, conforming zoning districts associated with special planning areas include Planned Unit Development, Specific Plan Districts, Open Space, and Mixed Use.

The City's Land use Plan was last amended in 2010. As of January 2017, the City was in the process of revising its Master Plan. The data presented in the Environmental Overview will be revised following the adoption of a revised or amended Master Plan by the City of Reno.

Land Use within RNO Vicinity

Figure 1-48 presents a generalized Land Use Map for the area within one mile of RNO, which includes portions of the Cities of Reno and Sparks and unincorporated areas of Washoe County. Land uses west of RNO are mostly categorized by commercial lands adjacent to I-580 and South Virginia Street and residential lands in the remaining areas. North of RNO, between the Truckee River and I-80, existing land uses are mostly industrial and commercial, with residential areas north of I-80. Immediately east and south of RNO are commercial and industrial lands. Further east is dominated by residential and parklands.



Sources: Reno Tahoe Airport Authority, AGIS Data, Washoe County

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Figure 1-48
Generalized Land Use
Within 1 mile of Airport

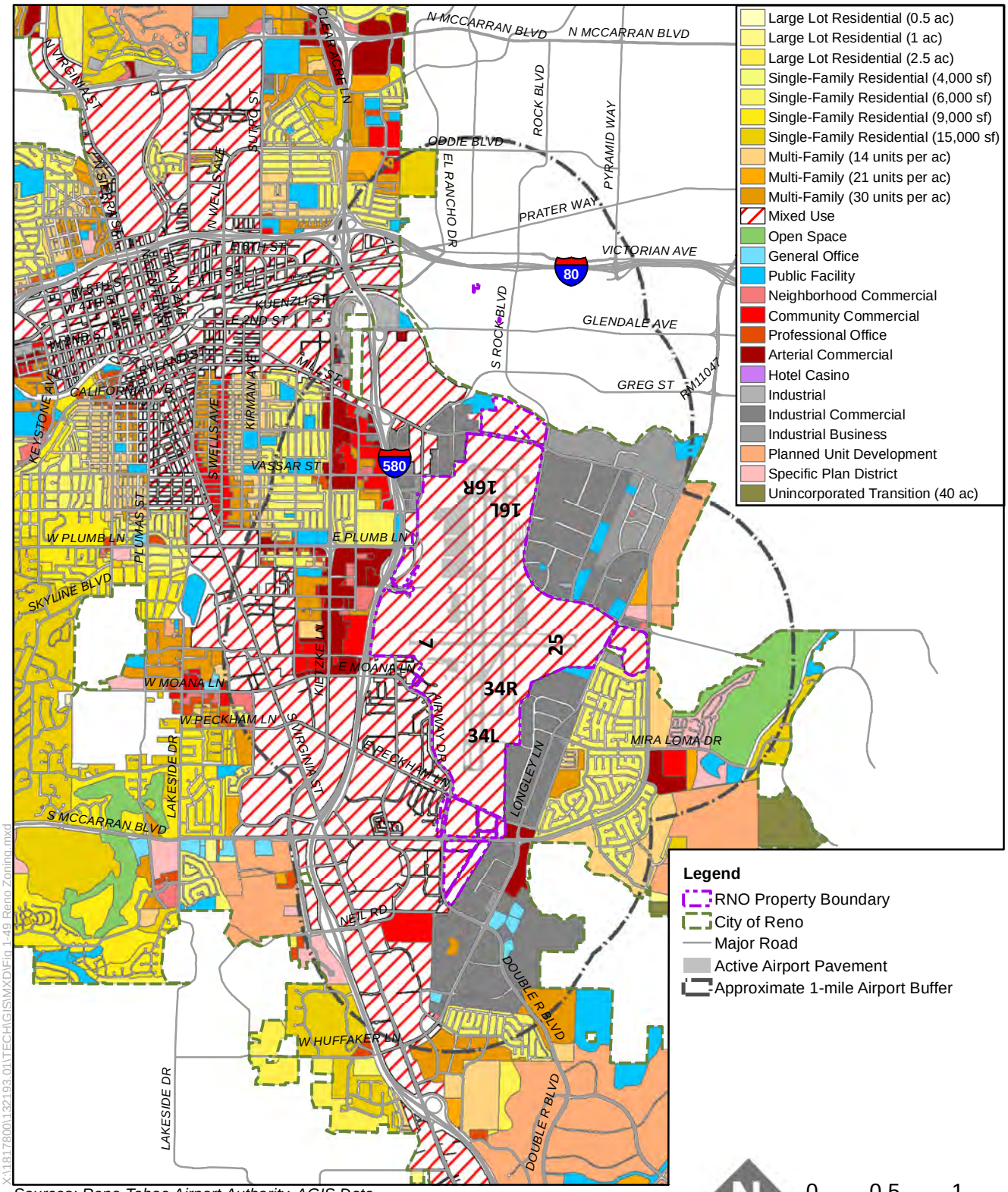
Zoning

Zoning on and around RNO includes portions of three jurisdictions: City of Reno (**Figure 1-49**), City of Sparks (**Figure 1-50**), and Washoe County (**Figure 1-51**). RNO and the lands immediately surrounding it on the west, south, and east are within the City of Reno's jurisdiction. RNO and the lands to the southwest of the Airport and along South Virginia Street are within the Mixed Use District, which promotes high intensity mixed use development. Other zoning districts west of the Airport and east of South Virginia Street include single-family with 6,000-square-foot lots, arterial commercial, community, commercial, and public facilities. Lands immediately east of RNO are zoned industrial and farther east are zoned residential, commercial, open space, planned unit development, and public facility. The area of the City of Sparks between the Truckee River and I-80 is almost exclusively zoned industrial with a small portion of land zoned public facility. Lands north of I-80 within the City of Sparks are primarily zoned mixed use. Washoe County zoning to the east and southeast of the airport consists of public and semi-public facilities, open space, general rural and medium-density suburban. Lands in Washoe County to the southwest are zoned mostly high-density rural and open space.

Truckee Meadows Regional Planning Agency

The Nevada State Legislature created the Truckee Meadows Regional Planning Agency in 1989 to foster coordination among the Cities of Reno and Sparks and Washoe County. Three representatives each from the Cities of Reno, Sparks, and Washoe County form the Truckee Meadows Regional Planning Commission (RPC), which administers a regional plan for the area surrounding the airport. The Cities of Reno and Sparks and Washoe County maintain their powers to administer zoning within their political boundaries.

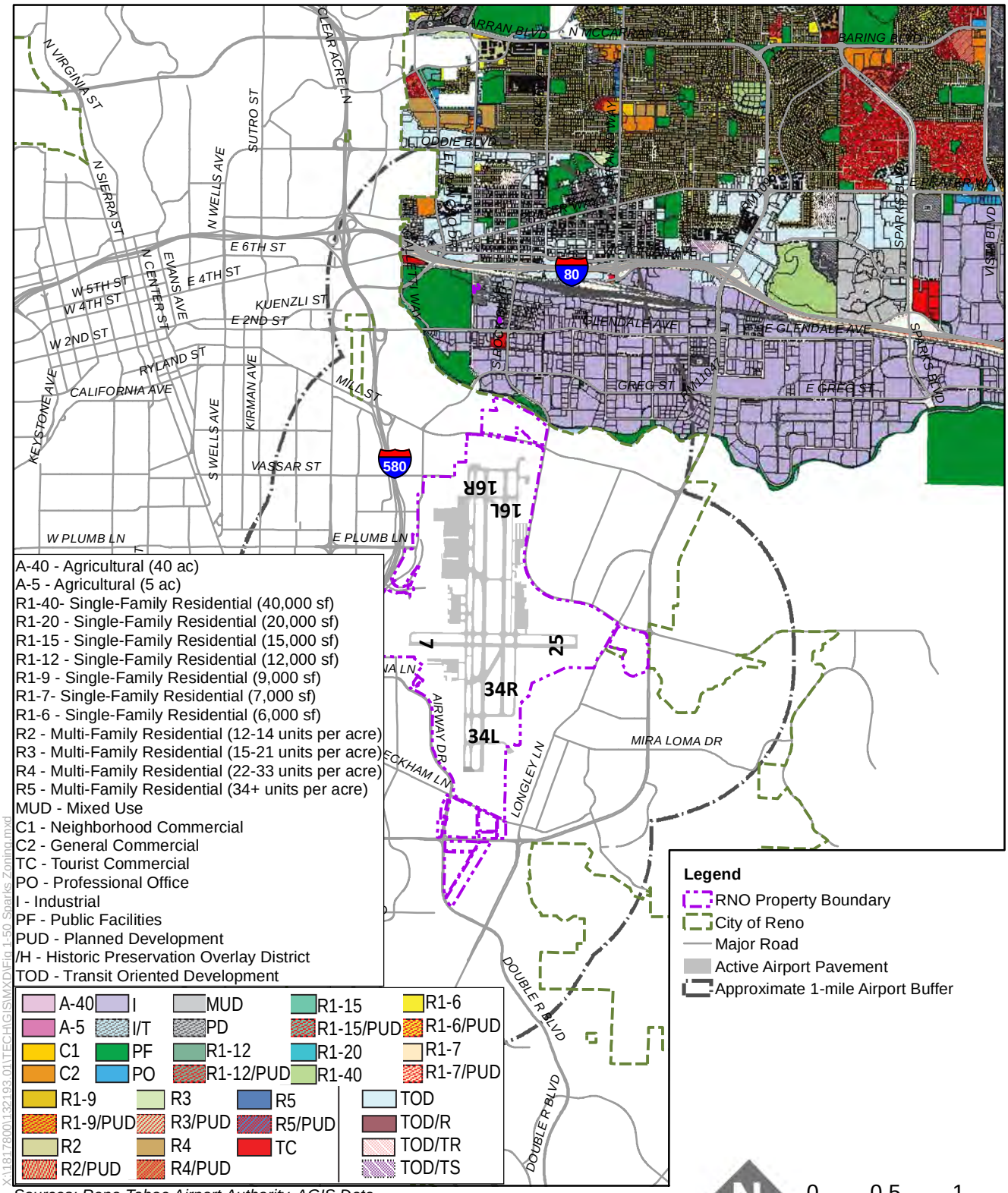
The Truckee Meadows Regional Plan (Regional Plan) is implemented through a cooperative effort that includes the three jurisdictions as well as other agencies and districts including the RTAA. The purpose of the plan is to direct growth through cooperation among the local governments in the region. The RPC adopts guidelines for determining whether a project is a Project of Regional Significance (PRS) in accordance with subsections 5 and 6 of Nevada Revised Statutes 278.026. Before a city or the county issues final approval to a PRS, the RPC must review the project to determine that it conforms to the Regional Plan. The RPC also reviews master plans, facilities plans, and other similar plans of local governments and affected entities to determine whether they conform to the Regional Plan.



X:\181780\132193 01\TECH\GIS\MXD\Fig 1-49 Reno Zoning.mxd

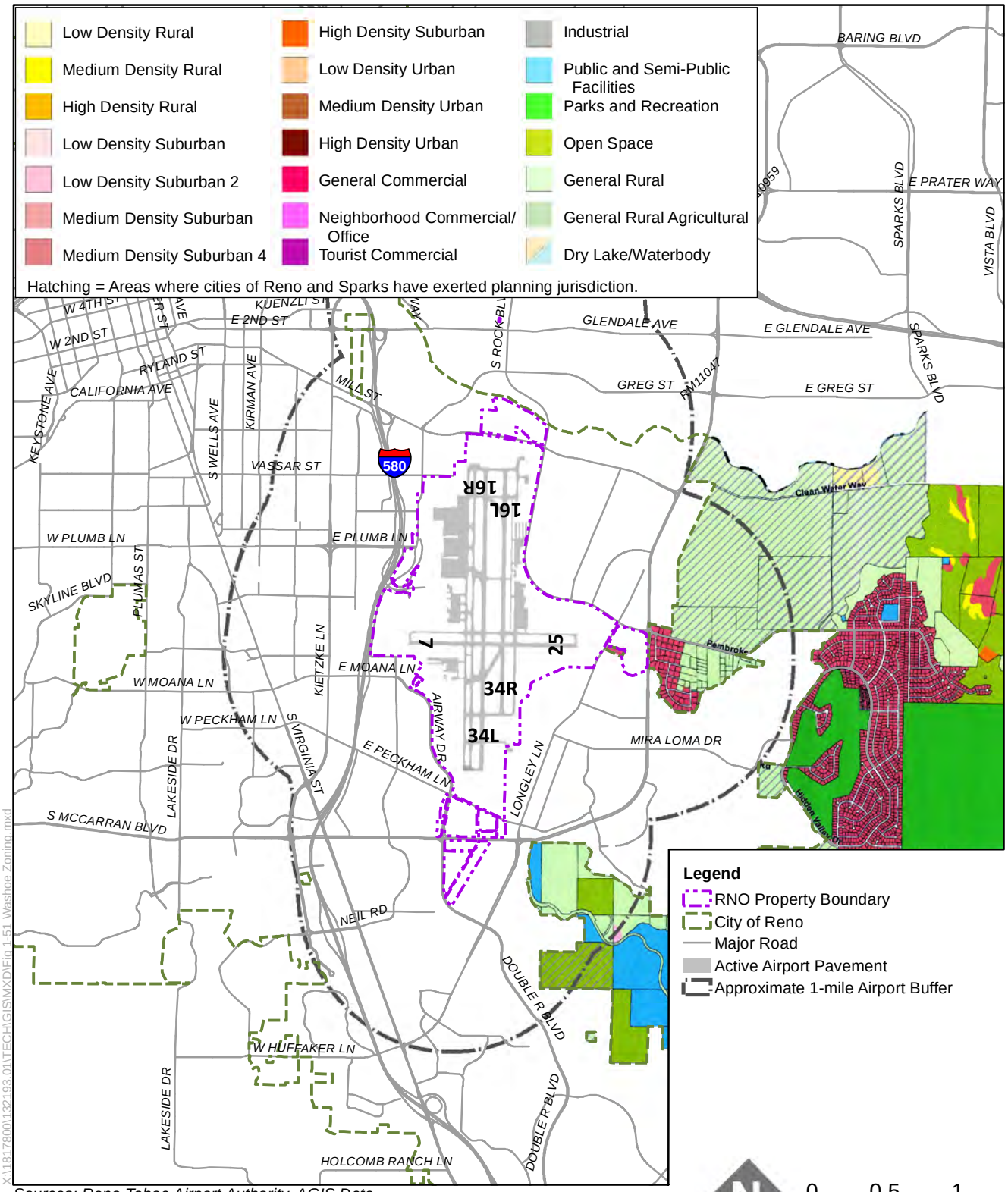
Sources: Reno Tahoe Airport Authority, AGIS Data, City of Reno, City of Sparks, Washoe County

Figure 1-49
City of Reno Zoning Map



Sources: Reno Tahoe Airport Authority, AGIS Data, City of Reno, City of Sparks, Washoe County

Figure 1-50
City of Sparks Zoning Map



X:\181780\0132193.01\TECH\GIS\MXD\Fig 1-51 Washoe Zoning.mxd

Sources: Reno Tahoe Airport Authority, AGIS Data, City of Reno, City of Sparks, Washoe County

Figure 1-51
Washoe County Zoning Map

The Truckee Meadows Regional Plan (TMRP) identifies the Airport as a Regional Center that serves a population beyond the plan area boundaries. One of the goals of the TMRP is to promote compatibility of land use and development with regional airport operations. The Reno-Tahoe International Regional Center Plan complies with the TMRP.

Truckee River Flood Management Authority

The Truckee River floods regularly, causing damages to residents, businesses and infrastructure, and the frequency of floods appears to be increasing according to 2016 Truckee River Flood Management Authority (TRFMA) data. RNO has sustained flooding and damage on several occasions due to its location adjacent to the south bank of the Truckee River, and it is likely that the airport will flood again unless additional flood management measures are undertaken.

The TRFMA is an interagency partnership that includes Washoe County, the Cities of Reno and Sparks, the U.S. COE, the RTAA, and several other federal and state agencies including: the USFWS, U.S. Bureau of Reclamation, U.S. Bureau of Land Management, FEMA, State of Nevada Emergency Management Division, Environmental Protection Division, and State Lands. The TRFMA Board of Directors consists of six elected officials representing the City of Reno, City of Sparks, and Washoe County. TRFMA strives to facilitate and coordinate flood management protection on the Truckee River. As shown on **Figure 1-41**, the floodplain associated with the south bank of the Truckee River is adjacent to RNO, and TRFMA flood management activities could constrain airport operations and development.

The TRFMA proposed and advocated for a Truckee River Flood Protection Plan, which received congressional authorization in 2014. The mission of the Truckee River Flood Project is to reduce the impact of flooding in the Truckee Meadows, restore the Truckee River ecosystem, and improve recreational opportunities by managing the development and implementation of the Truckee River Flood Project.

The overall goal of the Truckee River Flood Protection Plan is to achieve flood damage protection from at least a 100-year flood event on the Truckee River, and the plan includes numerous individual projects to meet that goal. To the extent possible, the final design of the flood project should enhance and work with the river's dynamic natural functions. The 2015 TRFMA Flood Protection Plan document provides an overview of the planned improvements. The following improvements associated with the Flood Protection Plan could affect facility development and operations at RNO:

- Proposed floodwall: The plan proposes a 3,000-foot-long, six-foot-high floodwall near the northwest airport boundary (west of Greg Street). The floodwall would be constructed on the south bank of the Truckee River between Glendale Avenue and Greg Street.
- Levee relocation: Directly north of the Airport (east of Greg Street), the plan proposes to move the levee closer to the southern bank of the Truckee River and reduce the width of the terraced floodplain.
- Improvements northeast of the airport: Several improvements are planned east of South Rock Boulevard including: reducing the width of floodplain terracing along the south bank, moving the levee closer to the Truckee River, providing erosion protection along the south bank, and placing the Pioneer Ditch in a pipe.

Compatible Land Use

Nearby land uses can affect the safety of aircraft operations for both air travelers and those living and working near an Airport. Land uses that pose potential hazards to aircraft operations can affect the ability of an airport operator to expand or improve its facilities or can constrain airport operations. Specific areas of concern associated with airport land use compatibility include:

- Obstructions: Tall structures and objects, such as buildings, towers, antenna, light poles, trees and other objects, can pose hazard to aircraft through intrusions into navigable airspace;
- Navigational Interference: Antenna, satellite dishes and other items that transmit signals can interfere with navigational equipment on aircraft or at the airport;
- Lights and Glare including Solar Panel Glare: Lighting and glare can reduce visibility for pilots and air traffic control staff and interfere with aviation lighting and NAVAIDs;
- Wildlife and Wildlife Attractants: Landscaping and water features that attract wildlife for nesting or feeding purposes can increase the risk of a wildlife strike with aircraft;
- Noise, which can affect speech, sleep, and learning and annoy those living and working near an airport; and
- High Population Density Uses: Uses that encourage large congregations of people may not be appropriate within those areas closest to the ends of the runways.

Regulations and Guidance

Federal Aviation Administration

The FAA addresses compatible land use through various ACs. The FAA is responsible for establishing federal regulations and policies associated with airport operations. However, FAA does not have the ability to impose its regulations and policies on local jurisdictions. The ability to implement and enforce FAA policies and regulations rests with local jurisdictions. **Table 1-29** identifies and summarizes some of the pertinent FAA advisory circulars pertaining to land use on and near airports.

Table 1-29: FAA Regulations and Guidance Addressing Compatible Land Use

Regulation/Guidance	Purpose
Title 14 CFR Part 150 (FAR Part 150), Airport Noise Compatibility Planning **(Aircraft Noise Exposure and Land Use Compatibility)**	FAA regulation that prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs. Also identifies normally compatible and incompatible land uses for areas subject to aircraft noise.
Title 14 CRR Part 77 (FAR Part 77), Safe, Efficient Use, and Preservation of the Navigable Airspace **(Tall Structures/Obstructions to Navigable Airspace**	FAA regulation that identifies the standards used to identify areas that must remain free of obstructions to air navigation, and identifies the standards used to determine obstructions to air navigation, and navigational and communication facilities. Incudes the process for aeronautical studies to determine the effect on the safe and efficient use of navigable airspace, air navigation facilities or equipment. Also includes requirements to notify FAA of certain proposed construction, or the alteration of existing structures. In addition, FAA AC 150/5190-4, *A Model Zoning Ordinance to Limit Height of Objects around Airports*, presents guidance for controlling the height of objects around airports.
AC 150/5200-13, *Airport Design* -13 (Compatible Land Use in RPZs)	FAA AC provides standards and recommendations for the geometric layout and engineering design of runways, taxiways, aprons, and other facilities at civil airports. AC provides guidance specific to compatible land uses within RPZs.
AC 150/5200-33C, Change 1, *Wildlife Hazard Attractants On and Near Airports*	FAA AC provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near airports. The AC also discusses airport development projects (including construction, expansion, and renovation) that have the potential to affect aircraft movement near hazardous wildlife attractants.

The RTAA works closely with the City of Reno, the City of Sparks, and Washoe County to promote compatibility with airport operations and prevent the development of land use conflicts. **Table 1-30** summarizes policies developed by the Cities of Reno and Sparks and the Truckee Meadows Regional Planning Agency to promote compatible land use. No specific policies were identified in Washoe County Planning documents.

Table 1-30: Plans and Policies to Promote Airport and Land Use Compatibility Near RNO

City of Reno Master Plan
ENVIRONMENT *Policy nos. 26-30 of the City of Reno Environment Element address land use compatibility near RNO.* 1. **POLICY E-26:** The City should guide noise sensitive development away from critical approach zones and areas subject to noise levels of 65 dB Ldn based on current noise contours and support the continuation of the Airport Authority's program of noise abatement measures. 2. **POLICY E-27:** The City should maintain an airport overlay zone which addresses land use compatibility for properties subject to noise levels of 65 dB Ldn or greater from airport activities. 3. **POLICY E-28:** The City should adopt amendments to the City building codes establishing soundproofing standards to use in airport noise overlay zones. 4. **POLICY E-29:** The City should adopt and maintain land use designations that are compatible with airport operations. **POLICY E-30:** New intense urban uses such as hotels, casinos, multi-family housing or places of public congregation should not be located within the critical zones of the Reno/Tahoe International or Stead Airports.
GENERAL INFRASTRUCTURE *Policy nos. 23-24 of the City of Reno General Infrastructure Element address the development of land uses that could affect potential conflicts with FAR Part 77 surfaces associated with RNO.* **POLICY GI-23**: The City should ensure that any project that proposes new or expanded above ground or underground electrical transmission infrastructure within the Federal Aviation Regulations (FAR) Part 77 areas of public use airports within the region or in close proximity to a private use airport be carried out in coordination with the Reno Tahoe Airport Authority or applicable airport operator. 5. **POLICY GI-24**: The City should support the placement of electrical transmission lines underground in circumstances where it can be determined that doing so will substantially mitigate the safety risk of above ground construction such as in proximity to airports. In these instances, the City should forward applications to the Regional Planning Commission and Regional Planning Governing Board and clearly demonstrate why and how the undergrounding element of the project is necessary for safety reasons.
TRANSPORTATION (T) *Policy nos. 14 and 23 of the City of Reno Transportation Element address circulation and traffic near RNO.* **POLICY T-14:** The City should promote efficient ground connections from the downtown and other major destinations to Reno/Tahoe International Airport, favoring high-occupancy vehicles and other alternative forms of transit over vehicles occupied by one person.

POLICY T-23: The City should encourage the Regional Transportation Commission and Reno-Sparks Convention and Visitors Authority to develop alternate transit systems such as a rubber wheeled trolley or double decker bus system linking the Reno and Sparks downtown areas, the Reno/Tahoe International Airport, Lawlor Events Center, and the Reno-Sparks Convention Center during special events or peak tourist seasons.

COMMUNITY DESIGN (CD)

Policy no. 8 of the City of Reno Community Design Element addresses light and glare to prevent conflicts near RNO.

POLICY CD-8: Existing non-restricted gaming uses, and non-restricted gaming allowed by land use, zoning and/or special use permits should be allowed in transit-oriented development (TOD) corridors unless eliminated through a Master Plan amendment, zoning map amendment, and/or the expiration or revocation of a special use permit. New and existing non-restricted gaming uses and non-restricted gaming allowed by land use, zoning and/or active special use permits should be allowed in the Downtown Reno Regional Center, Reno-Tahoe International Airport Regional Center, Convention Regional Center, Redfield Regional Center, and Western Gateway Regional Center.

Ignite Sparks Comprehensive Plan. The Plan Guiding the City of Sparks to the Year 2030.

CHAPTER 4, FRAMEWORK FOR THE FUTURE

Chapter 4 of the City of Sparks Comprehensive Plan, includes a discussion of land use in the Airport Development Area.

6. **GOAL MG3:** Maintain a land use plan which integrates land uses and facilitates access by multiple modes of transportation.

7. **MANAGING GROWTH**
   POLICY MG14: Work with Reno-Tahoe International Airport to enhance the compatibility of existing and proposed uses located within noise contours and airplane approaches to the airport.

8. **COMMUNITY FACILITIES AND SERVICES**

POLICY CF16: Work with the Reno-Tahoe Airport Authority to develop noise overlay zoning or similar measures to ensure compatibility of surrounding development to the operation of the airport.

Truckee Meadows Regional Plan

One objective of the Truckee Meadows Regional Plan is to promote compatibility of land use and development with regional airport operations

Policy 1.2.3

To conform with the Regional Plan, local governments, in consultation with affected entities, will develop Secondary TOD Corridor plans as a component of their master plans that:

1. establish the exact boundaries of the corridor;
2. require mixed-uses in the master plan land use, zoning code and development standards for Secondary Corridors;
3. promote public investment in services and facilities located in Secondary Corridors to encourage a more efficient delivery of services to demand;
4. promote compatibility of new development, in consultation with the Reno-Tahoe Airport Authority as applicable;
5. specify land use and street design elements that support increasing intensification and pedestrian friendly environments that encourage multi-modal transportation and allow for the provision of enhanced public transportation options over time;
6. include development and design standards that support higher density and intensity surrounding Secondary Corridors, and feathering, as appropriate, to provide for compatibility with existing neighborhoods along or adjacent to the corridor; and,
7. ensure that Secondary Corridors are linked to the community, in particular linked to Centers and TOD Corridors, through multi-modal access.

9. **Policy 1.2.9**

The Regional Plan defines the following Regional Centers, which are generally 1 mile in diameter.
To conform with the Regional Plan, local government master plans must further define the boundary and character of each Regional Center within their respective jurisdiction.

Policy 1.2.11

To conform with the Regional Plan, local governments, in consultation with affected entities, will develop Downtown and Regional Center, Primary TOD Corridor, and Station Area Plans as a component of their master plans that:

1. establish the exact boundaries of 1) Centers, Corridors, and Station Areas;
2. require mixed-uses through amendments of development codes for Centers, Corridors, and Station Areas;
3. promote public investment in services and facilities located in Centers, Corridors and Station Areas to encourage a more efficient delivery of services to demand;
4. promote compatibility of new development, in consultation with the Reno-Tahoe Airport Authority, with regional airport operations;
5. specify land use and street design that supports increasing intensification that enhances and encourages the use of public transportation and other multi-modal transportation options over time;
6. provide for development at a human scale;
7. include development and design standards that support density and intensity surrounding TOD Corridors, and feathering, as appropriate, to provide for compatibility with existing neighborhoods along or adjacent to the TOD Corridor; and,
8. ensure that TOD Corridors are linked to the community through multi-modal access.

Policy 1.2.12
The Regional Plan encourages local governments and the Reno-Tahoe Airport Authority to work together on the development of noise overlay zoning or similar measures to enhance the compatibility of surrounding development and airport operations.

Policy 1.2.21
The Regional Plan encourages a cooperative approach to infill which includes careful coordination of plans between local governments and affected entities at the early stages of planning and project conceptualization, and thoughtful consideration of:

- parks and greenways;
- natural resources;
- floodplains, floodways, and drainage ways;
- walkability;
- alternative modes of transportation;
- sustainable design and construction;
- public health impacts related to land use decisions;
- amenities;
- recreation opportunities; and
- airport and military installations.

Policy 3.8.8
To be in conformance with the Regional Plan, local government master plans must ensure that any project that proposes new or expanded above ground or underground electrical transmission infrastructure within the Federal Aviation Regulations (FAR) Part 77 areas of public use airports within the region such as the Reno-Tahoe International Airport, Reno-Stead Airport, Spanish Springs Airport, and Empire Airport, or in close proximity to a private use airport be carried out in coordination with the Reno Tahoe Airport Authority or applicable airport operator.

For informational purposes, the general locations of all public and private airports with Federal Aviation Administration (FAA) location identifiers are shown on Maps 9 and 10. The current locations of the FAR Part 77 areas overlaying and surrounding the Reno-Tahoe International, Reno-Stead, and Spanish Springs public use airports are included in Map 11.

Policy 3.9.1
To conform with the Regional Plan, local government master plans shall support the placement of electrical transmission lines underground in circumstances where it can be determined that undergrounding will substantially mitigate the safety risk of above ground construction. In some, but not all cases, above ground transmission lines may pose a safety risk when located in proximity to airports.

Sources:

Ignite Sparks. Comprehensive Plan, The plan Guiding the City of Sparks to the Year 2030. 2016. City of Sparks Community Services. Sparks, NV. Amended 2012. Available at http://cityofsparks.us/wp-content/uploads/2016/12/CS-Comprehensive-Plan-Final_s.pdf

The Great City Plan. The City of Reno Master Plan. 2008. Department of Community Development. Reno, NV. Amended 2012. Available at: http://www.reno.gov/government/departments/community-development-department/master-plan

Truckee Meadows Regional Plan. Adopted July 18, 2013. Truckee Meadows Regional Planning Agency. Reno, NV. Available at: http://www.tmrpa.org/wp-content/uploads/2012%20Regional%20Plan%20version%206.pdf

Aircraft Noise Exposure

Airport development actions that change airport runway configurations, operations, fleet mix, or movements may affect existing and future noise levels. FAA's noise analysis primarily focuses on how proposed airport actions would change the cumulative noise exposure of individuals to aircraft noise in areas surrounding the airport.

Airport noise may be a concern when determining potential effects on several other environmental resources as well. Such resources may include, but are not limited to, Section 4(f)-protected resources and historic and cultural sites. **Figure 1-34** in the **Environmental Section** identifies the location of the 75-, 70-, and 65-DNL noise contours based on FAA-approved 2010 forecasts within the FAR Part 150 Study. **Figure 1-34** shows portions of the 65- and 70-DNL noise contours extend off site to areas north and south of the Airport. These include industrial areas, which are located immediately adjacent to airport property and are considered compatible uses.

Noise-sensitive uses north of the area within the 65- and 70-DNL noise contours include single-, multi-family, and manufactured residential use areas, medical facilities, and school facilities. Noise sensitive-uses south of the area within the 65- and 70-DNL noise contours include single-, multi-family, and manufactured residential use areas, school facilities, and areas proposed for residential development. Twelve noise-sensitive institution locations (places of worship, schools, libraries, and one historic resource) are within the 65- and 70-DNL noise contours.

The TMRP provides specific policies to encourage local governments and the RTAA to work together on the development of noise overlay zoning or similar measures to enhance the compatibility of surrounding development and airport operations. As previously stated, the RTAA also works closely with jurisdictions to reduce aircraft noise exposure and prevent the development of incompatible land use. As described earlier, the RTAA has provided sound insulation for more than 5,000 homes, participates in FAA's Part 150 Program, implements operational measures to reduce flights over residential areas, and maintains an Aircraft Noise Monitoring System that is available to the public.

Runway Protection Zones

Figure 1-52 illustrates land uses within existing RPZs at RNO. As shown, all RPZs extend off-site to include areas that are not owned by the RTAA.

- Runways 16L and 16R: Portions of the approach and departure RPZs for Runways 16L and 16R are located outside of airport boundaries in areas designated for utilities, vacant industrial, general industrial and commercial use. The area designated as general commercial is not owned by the RTAA.
- Runways 34L and 34R: Portions of the RPZs are located outside of airport property boundaries in areas designated for vacant commercial, vacant industrial, and general industrial uses. The entire RPZ for Runway 34L is owned by the RTAA; however, the portion of the RPZ for Runway 34R designated as general industrial use is not owned by the RTAA.
- Runway 7: A portion of the RPZ located outside of airport boundaries includes a segment of I-580 and the area immediately west of I-580 that, as of 2016, is developed for multi-residential and manufactured housing use. The residential areas are not on property owned by the RTAA.
- Runway 25: A portion of the RPZ extends east of Longley Lane. The area is currently developed and designated primarily for industrial use. However, a small portion is designated for single-family development, and one small parcel is designated for commercial use. Only a portion of the general industrial area is owned by the RTAA.

Navigable Airspace

As a recipient of FAA grants, the Airport is required to protect its navigable airspace from obstructions to the extent possible. FAA regulatory authority does not include local land use; therefore, it is up to RTAA to work with the local land use jurisdictions to discourage development that would cause obstruction to navigable airspace. Airspace conflicts can be introduced by the government and private parties through the construction of tall structures, construction on hills and mountains at higher elevation than the Airport, and during construction activities through the use of cranes and other tall equipment. Airports work with surrounding jurisdictions to minimize and mitigate height obstructions, and both the City of Reno Master Plan's General Infrastructure Policies (policy nos. GI-23 and GI-24) and the TMRP (policy nos. 3.8.8 and 3.9.1) provide policies to prevent the construction of overhead power lines in areas that could conflict with FAR Part 77 surfaces.

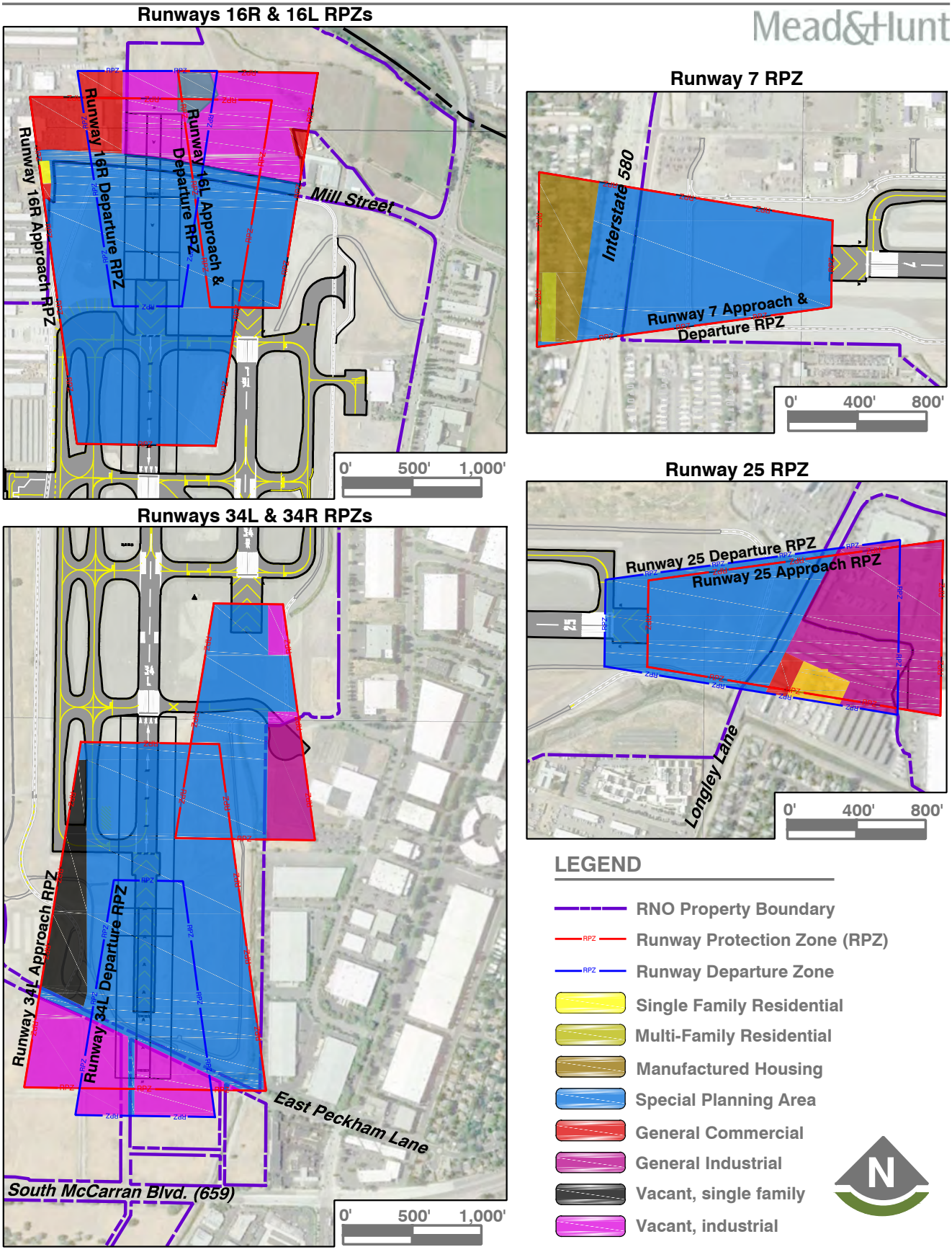


Figure 1-52
Land Use in RPZ's

Wildlife Hazards and Attractants

Applicable Regulations and Guidance

Land uses that may create a safety hazard to air transportation resulting from wildlife hazard attractants, such as retention ponds or municipal landfills, are not subject to RPZ standards. However, other FAA policies and standards do address them.

FAA AC 150/5200-33B, *Wildlife Attractants On and Near Airports*, identifies hazardous wildlife species and the type of land uses known to create habitat or otherwise attract potentially hazardous wildlife. Such land uses include:

- Waste disposal operations (landfills, transfer stations),
- Water management facilities (stormwater management ponds, sewage treatment facilities),
- Wetlands (natural and constructed),
- Dredge spoil containment areas,
- Agricultural activities,
- Golf courses,
- Landscaping, and
- Construction projects (seeding mixtures, sediment ponds, etc.).

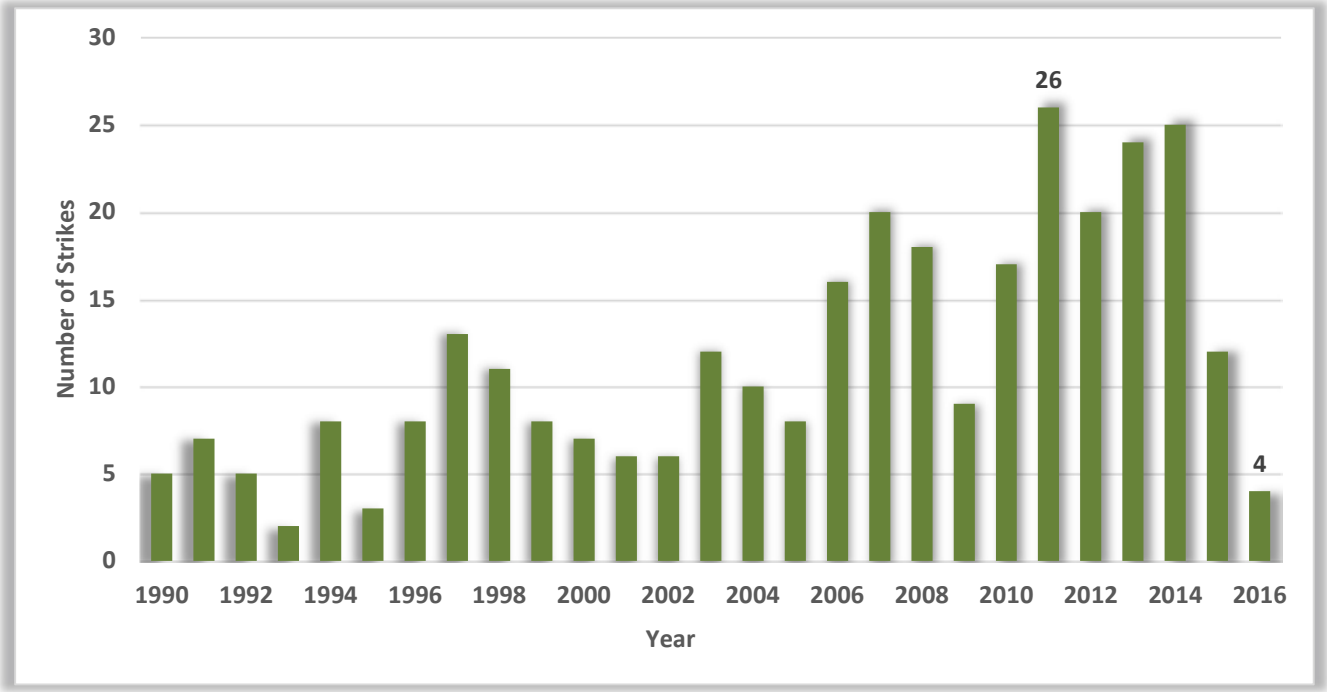
The FAA encourages airport operators, local planning agencies, and facility operators to work cooperatively to abate known hazards or prevent the creation of additional wildlife attractants.

Wildlife Hazard Management Plan

Records for the Airport referenced here are from review of the FAA's National Wildlife Strike Database. The FAA records helped to identify the species responsible for documented wildlife strikes that have occurred to date. However, wildlife strike data must be reviewed with caution. Wildlife strike reporting is voluntary, and the data shown may not accurately reflect the number of strikes that have occurred at RNO. The FAA estimates that only 20 percent of all strikes were recorded prior to 2009. Since 2009, the FAA estimates that approximately 40 percent of all strikes have been recorded.

The FAA database has a record of 310 reported wildlife strikes at RNO since 1990. **Figure 1-53** presents the frequency of wildlife strikes that have occurred at RNO. Of the 310 strikes, four resulted in substantial damage and 16 resulted in minor damage to aircraft.

Figure 1-53: Wildlife Strike Records Associated with RNO (1990-2016)



Source: National Wildlife Strike Database

The RTAA completed a WHMP in 2008 to actively reduce the number of wildlife attractions on RTAA property and to work cooperatively with adjacent property owners to discourage land use practices that might increase wildlife hazards.

The FAA defines the General Zone for wildlife hazard management as the area within five miles of aircraft movement areas. The FAA further defines the area within a 10,000-foot-radius of aircraft movement areas as the Critical Zone, because this is the area in which aircraft typically operate at altitudes below 500 feet AGL. Approximately 75 percent of all civil bird-aircraft strikes occur within 10,000 feet of the airfield from which aircraft depart or arrive.

As described in the environmental section of this chapter, on- and off-site surveys at RNO allowed observation of waterfowl, gulls, corvids, doves and pigeons, raptors, and mammals, and both on-site and nearby wildlife often brought species of concern to fly over or frequent the area within the air operations area. Specifically, flight paths between Virginia Lake and UNR Farms, and Virginia Lake and Sparks Marina brought species of concern over the runways or their extended centerlines. UNR Farms, the Truckee River, and Virginia Lake were documented as part of the 2008 WHMP as primary attractant areas of concern.

Nearby off-site attractants identified in the General Zone include:

- Nearby agricultural practices,
- Golf courses,
- Wetlands associated with the Truckee River and Boynton Slough,
- Community water detention/retention systems (Grand Sierra Pond, and Sparks Marina), and
- The Truckee River, Virginia Lake, and other open water sources.

Nearby Wildlife Attractants

Farmland is considered potentially incompatible with air operations. However, Reno and much of the surrounding area is already developed. The remaining farmland east of the airport, owned by the University of Nevada, can attract potentially hazardous wildlife. **Figure 1-17** in the **Environmental – Wetlands** Section shows the locations of on-site wetlands, which are also identified as potential wildlife attractants.

Floodplains and floodways, as shown in **Figure 1-18**, can accumulate water and attract potentially hazardous wildlife. Planned flood management activities have the potential to affect airport operations and create new wildlife attractants by creating areas of open water. However, projects to eliminate open water, such as a proposed project to enclose a portion the Pioneer Ditch near airport property, can help to reduce wildlife hazards.

Financial Overview

The financial overview includes a summary of the business and operating relationship between RTAA and the airlines operating at the Airport; a review of the RTAA's existing Capital Improvement Program (CIP); and the financial resources available to RTAA for the Master Plan CIP. A financial capacity analysis, included in **Appendix E**, assesses RTAA ability to fund future capital projects that will be recommended in the Master Plan.

Airline-Airport Use and Lease Agreement

The Airline-Airport Use and Lease Agreement (Agreement) has a term through June 30, 2020, with one additional five-year period available upon mutual agreement of RTAA and the airlines. The Agreement employs a rate-making methodology that is considered hybrid in nature, which is summarized below:

- A cost center residual landing fee rate is used for the Airfield Cost Center with total airline landed weight as the divisor. The Signatory Airlines bear the financial risk for the Airfield Cost Center, and pay the same landing fee rate at the Airport.
- A commercial compensatory terminal rental rate is used for the Terminal Cost Center with total rentable square feet as the divisor. RTAA and the Signatory Airlines share the financial risk in the Terminal Cost Center. Terminal rental rates are differentiated based on type and function of space.
- A revenue sharing component is included in the Agreement. Fifty percent of the remaining surplus net revenues of RTAA are transferred to the Signatory Airlines in the current Fiscal Year, which ends June 30, as a credit to their terminal rents. This revenue sharing provision helps maintain competitive airline costs and demonstrates the business partnership between RTAA and the Signatory Airlines at the Airport.

RTAA Airport Improvement Funding Sources

Airport improvement projects may be eligible for funding outside of RTAA-generated revenue. The FAA issues grants for certain project types, and the Airport elects to collect passenger and customer facility charges (PFCs and CFCs) from airport users to offset the cost of providing facilities. Sources of funding are described below.

Federal Grants

Federal funding for airport capital projects is from FAA airport improvement program (AIP) grants as reauthorized under the FAA Modernization and Reform Act of 2012, which was updated under the FAA Extension, Safety, and Security Act of 2016 (FESSA). The FESSA extends the FAA's authority and provides funding through September 2017. The RTAA receives federal entitlement and discretionary grants for airport-related capital projects under the FAA AIP. All FAA entitlement and discretionary grants are funded by FAA at 93.75 percent (federal share) with the remaining 6.25 percent being funded using local matching funds (local share). FAA grants are based upon:

- Levels of funding authorized and appropriated by Congress for the program, and
- The number of passengers and amount of cargo at the Airport.

RTAA received $5.16 million of FAA AIP passenger, cargo, and non-primary entitlement grants for federal fiscal year 2016. RTAA receives AIP discretionary grants for specific projects that exceed available entitlement funds. FAA discretionary grant awards are a function of the amounts authorized and appropriated by Congress and the FAA's prioritization of competing projects nationwide. Discretionary funds are not guaranteed, and the FAA does not have enough money to fund all eligible projects nationwide in the same fiscal year.

The FAA AIP grants do not cover 100 percent of eligible project costs. The airport sponsor is required to provide a certain amount of funding from local sources to fund the balance of an FAA AIP-eligible project. Typically for an airport classified by the FAA as a small-hub, the maximum federal share of FAA AIP funding is 90 percent. However, the FAA increases the federal share for airports in states that have more than five percent public or Native American land as defined by the U.S. Department of the Interior's Bureau of Land Management. The State of Nevada meets this requirement; therefore, the maximum federal share for the RTAA is 93.75 percent. RTAA must provide the remaining 6.25 percent using local funds, described below.

A summary of projects that were funded with FAA AIP grants between 2012 and 2015 is presented below on **Table 1-31**.

Table 1-31: RTAA Projects Funded with FAA AIP Grants (dollars in thousands)

Project	Federal Fiscal Year	Grant Number	Total Project Cost	Federal Share	RTAA Share	% Federal Share
Apron Phase 16 Rehabilitation	2012	3-32-0017-93-2012	$3,508	$3,288	$219	93.75%
Taxiway Q Rehabilitation	2012	3-32-0017-94-2012	$3,340	$3,131	$209	93.75%
Sound Insulation Program Phase 22	2012	3-32-0017-95-2012	$2,130	$1,997	$133	93.75%
Apron Phase 17 Rehabilitation and Apron Phase 18 Design	2013	3-32-0017-97-2013	$3,257	$3,053	$204	93.75%
Runway 16L/34R Touchdown Rehabilitation	2013	3-32-0017-98-2013	$5,702	$5,345	$356	93.75%
Taxiway C and Connectors Design	2014	3-32-0017-100-2014	$599	$562	$37	93.75%
Taxiway C and Connectors	2015	3-32-0017-101-2015	$9,117	$8,547	$570	93.75%

Note: Amounts may not total exacty due to rounding.
Source: RTAA management records, January 2017

Passenger Facility Charges (PFCs)

As of November 2016, RTAA is imposing a $4.50 PFC at the Airport in accordance with the Aviation Safety and Capacity Expansion Act of 1990, as amended by the Aviation Investment and Reform Act for the 21st Century. RTAA collects more than $6 million in PFCs annually. Of this total amount, approximately $1.8 million of PFCs pay a portion of the debt service on the Series 2011A and 2011B subordinate note bonds, which are expected to be paid off after FY 2016-17. RTAA is tentatively planning, depending solely upon demand for additional cargo facilities, to issue more than $10 million of future revenue bonds, or Series 2018, to fund the Southwest Air Cargo Ramp project. Beginning in FY 2018-19, RTAA is preliminarily intending to apply approximately $1.5 million of PFC revenue annually to the payment of associated debt service if this project goes forward. All remaining PFC collections are anticipated to be used on a "pay-as-you-go" basis toward the existing CIP.

Customer Facility Charges (CFCs)

Implemented in August 2012, CFC revenues are derived from a $1.25 fee assessed to each rental car transaction day. These fees are dedicated to funding property management, repairs, improvements, and replacement to RTAA-owned rental car facilities. RTAA collects approximately $1.4 million in CFCs annually.

Airport Funds

After payment of Operational and Maintenance (O&M) Expenses, debt service, airline revenue sharing, and other required fund deposits, any unrestricted funds deposited into RTAA's General Purpose Fund and Special Fund are generally available to fund the Airport's CIP projects. The Airport typically applies between $2 million and $3 million in airport funds toward its CIP projects annually.

Existing Airport Capital Improvement Program

RTAA operates RNO and RTS, a GA reliever airport, as an Airport System. Therefore, RTAA's financial resources must provide for the operation and maintenance of both of these airports. For the eight-year period of FY 2016-17 through FY 2023-24, RTAA's CIP, in escalated dollars, is $196.2 million. The CIP primarily consists of projects that renew and replace airport system infrastructure with a focus on airside facilities at RNO, summarized below. A summary of the CIP is presented in **Table 1-32**.

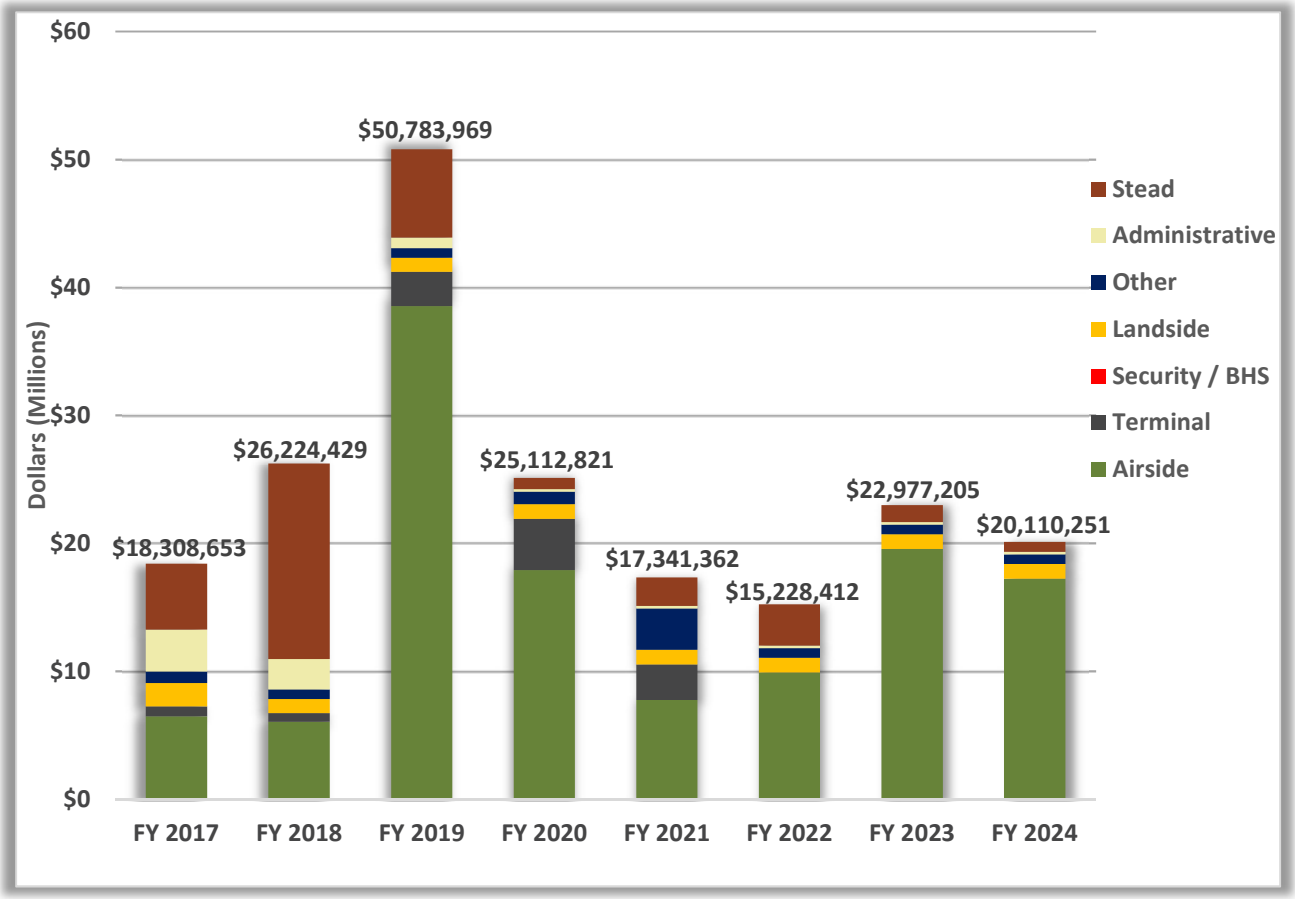
- Repair of Runway 16R/34L Keel Section, at $22.3 million,
- Design and Reconstruction of Runway Shoulder and Overrun, at $12.3 million,
- Rehabilitation of Runway 8-26 at Stead, at $21.9 million, and
- Southwest Air Cargo Ramp, at $19.9 million.

Table 1-32: Existing RTAA CIP for FY 2016-17 through FY 2023-24 (dollars in thousands)

Business Area	Total Project Cost	Federal Grants	PFC (pay as you go)	CFC (pay as you go)	RTAA Funds	Future Bond Proceeds
Airside	$123,424	$80,333	$26,404	$0	$6,762	$9,925
Terminal	$10,899	$0	$10,599	$0	$290	$0
Landside	$9,782	$0	$0	$4,796	$4,986	$0
Other	$8,850	$2,531	$232	$0	$6,087	$0
Administrative	$7,482	$1,874	$2,635	$0	$2,973	$0
Reno Stead	$35,747	$29,751	$0	$0	$5,996	$0
Total CIP Project Costs	$196,175	$114,489	$39,870	$4,796	$27,095	$9,925
Note: Amounts may not total exactly due to rounding.						

The Southwest Air Cargo Ramp is demand-driven based on future cargo operator needs; therefore, the timing for this project is not certain. **Figure 1-54** below presents the CIP project costs by year and by project type.

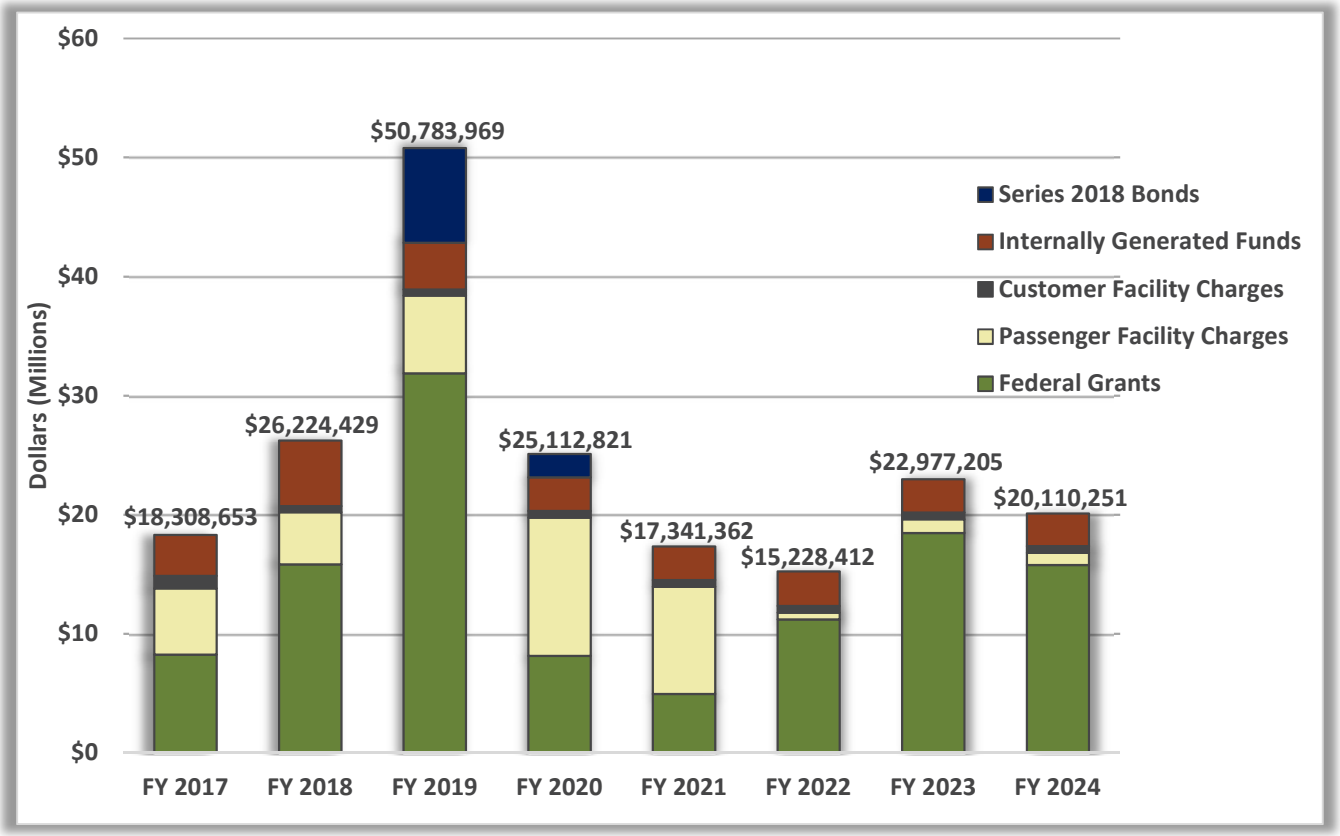
Figure 1-54: Existing RTAA CIP by Project Location



Source: RTAA management records, November 2016

Over half of the anticipated costs in the CIP are for airside improvements; therefore, FAA AIP grants are expected to fund much of the work. Approximately $114.5 million of FAA AIP funding, both discretionary and entitlement grants, are expected to be used for existing CIP projects. PFCs are expected to be used for approximately $39.9 million of projects on a pay-as-you-go basis. CFCs are anticipated to fund approximately $4.8 million of rental car projects. Approximately $9.9 million of the CIP is expected to be funded through revenue bond proceeds. The remaining portion of capital projects totaling approximately $27.1 million is expected to be funded from other RTAA funds including available RTAA cash. **Figure 1-55** below presents the existing CIP project costs by year by funding source.

Figure 1-55: Existing RTAA CIP by Funding Source



Source: RTAA management records, November 2016