AIRPORT MASTER PLAN

Final Report

MINDEN-TAHOE AIRPORT

MINDEN, NEVADA | DECEMBER 2016

ARMSTRONG

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Appendix E – Acronyms

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Chapter One

Airport Master Plan Overview

Minden-Tahoe Airport
Airport Master Plan

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1.1 Introduction

Minden-Tahoe Airport (three letter identifier MEV) is a general aviation airport located in northwest Nevada and is owned by Douglas County. The Minden-Tahoe Airport desires to remain a general aviation airport with no intent or interest in accommodating commercial air carrier service.

Douglas County is conducting this airport master plan study to comprehensively study the short, medium and long-term development plans for the airport in order to meet current and future aviation demands. This study will be used by the County, State and Federal officials to plan, prioritize and fund the maintenance and development for the airport.

Airport Master Plans are prepared by the operators of individual airports and are usually completed with the assistance of consultants. Douglas County is completing this master plan with the assistance of Armstrong Consultants, Inc.

Figure 1-1 Airport Entrance Sign

Source: Armstrong Consultants, Inc.

1.2 Purpose

The purpose and goal of an airport master plan (AMP) is to provide the framework needed to guide future airport development that will cost-effectively satisfy local and regional aviation demand, while producing an efficient facility that meets the current Federal Aviation

Administration (FAA) design standards. As part of the planning process consideration will be given to the potential environmental and socioeconomic impacts associated with alternative development concepts as well as the possible means of avoiding, minimizing, or mitigating potential impacts to sensitive resources.

The master plan report describes and depicts the long-term development concepts of the airport. The document also presents the concepts graphically in the ALP drawing set and includes the supporting data and logic on which the concepts are based.

1.3 Objectives

The primary objective of the master plan is to provide guidance to decision makers, airport users and the general public in implementing airport development actions, while remaining in line with both the airport's and community's concerns and objectives.

The master plan's recommended development is presented for three planning periods—short-term (5 years), intermediate-term (10 years), and long-term (20 years). The recommended development program is to satisfy aviation demand and be compatible with the environment, community development, and other transportation modes. The following objectives serve as a guide in the preparation of this study.

Specific objectives of the Minden-Tahoe Airport Master Plan include, but are not limited to:

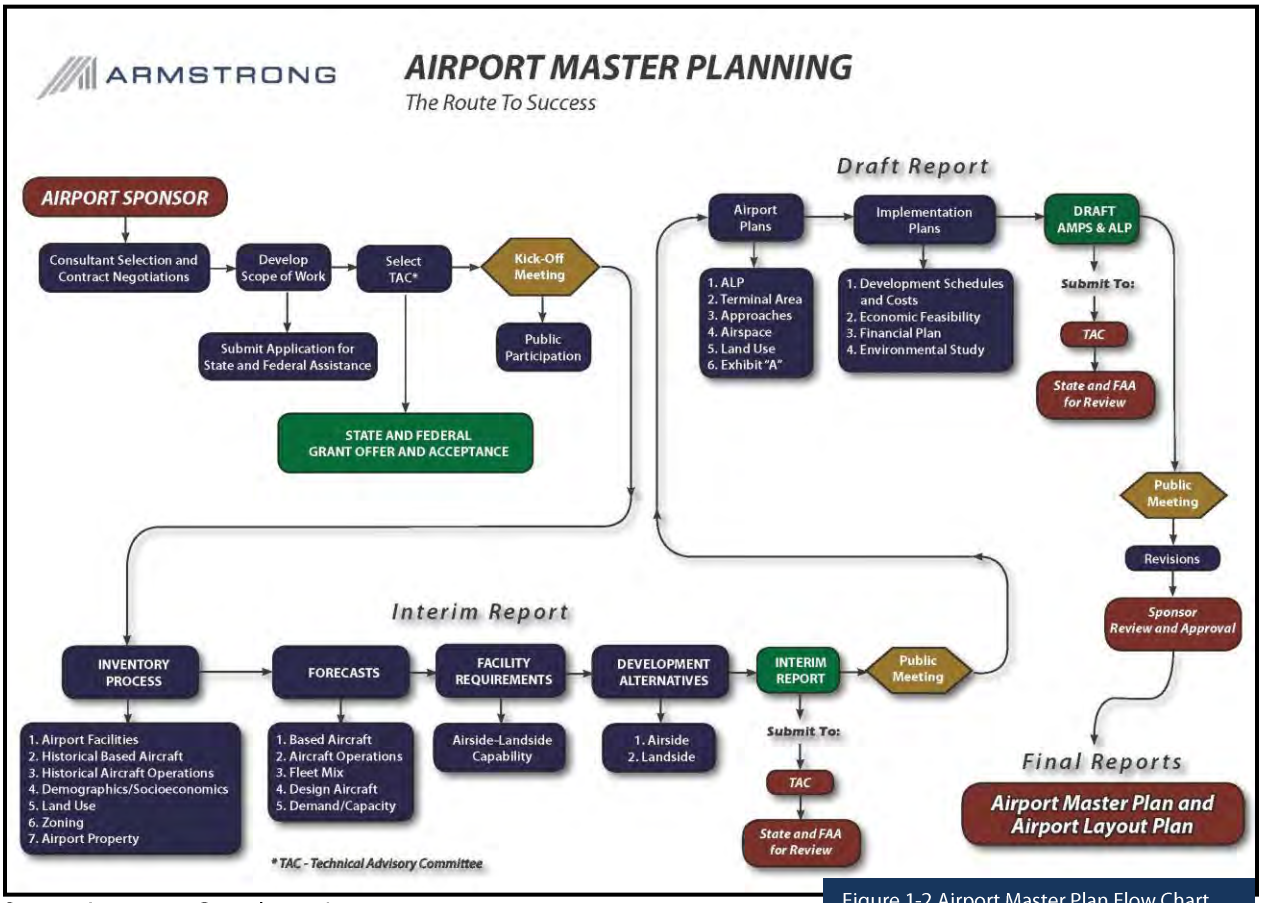
- Clearly identify the present and future roles of Minden-Tahoe Airport;
- Depict design standards for the determined Airport Reference Code (ARC);
- Provide the basis for future federal, state, local government and private investment in the airport;
- Develop realistic, phased development and maintenance plans for the airport;
- Provide an Airport Layout Plan (ALP) in accordance with the current FAA ALP checklist and Standard Operating Procedures (SOPs);
- Identify future land acquisition requirements, if necessary;
- Prepare an Environmental Overview for proposed development indicating the nature of alternatives that must be reviewed;
- Develop an achievable financial plan for the airport to support the implementation schedule and operation and maintenance costs; and
- Present for public consideration, a plan which addresses the needs and satisfies local, state and federal regulations.

The airport master planning process involves collecting data, forecasting demand, determining facility requirements, studying various alternatives and developing plans and schedules. The flow chart in **Figure 1-2** depicts the steps in the master planning process.

This process will take into consideration the needs and concerns of the airport sponsor, airport tenants and users, as well as the general public.

When completed, this airport master planning study will be incorporated into a larger airport planning effort that takes place at a national, state, and local level. On the Federal level, the National Plan of Integrated Airport Systems (NPIAS) is a ten-year airport system plan that FAA continually updates and publishes biannually. This publication lists developments at public use airports that are considered to be of national interest and identifies development needs based on input from airport master plans. To be eligible for Federal financial assistance for airport planning and development, an airport must be included in the NPIAS.

Statewide airport system planning identifies the needs of existing airports and identifies location and characteristics of new airports needed to meet statewide air transportation goals. This planning is performed by state transportation or aviation planning agencies. In Nevada, this state airport planning is performed by the Nevada Department of Transportation, Division of Aviation (NDOT). Using Federal and local input, state system plans are coordinated with other transportation planning and comprehensive land use planning.



Source: Armstrong Consultants, Inc.

Figure 1-2 Airport Master Plan Flow Chart

Chapter Two

Inventory of Airport Assets

Minden-Tahoe Airport
Airport Master Plan

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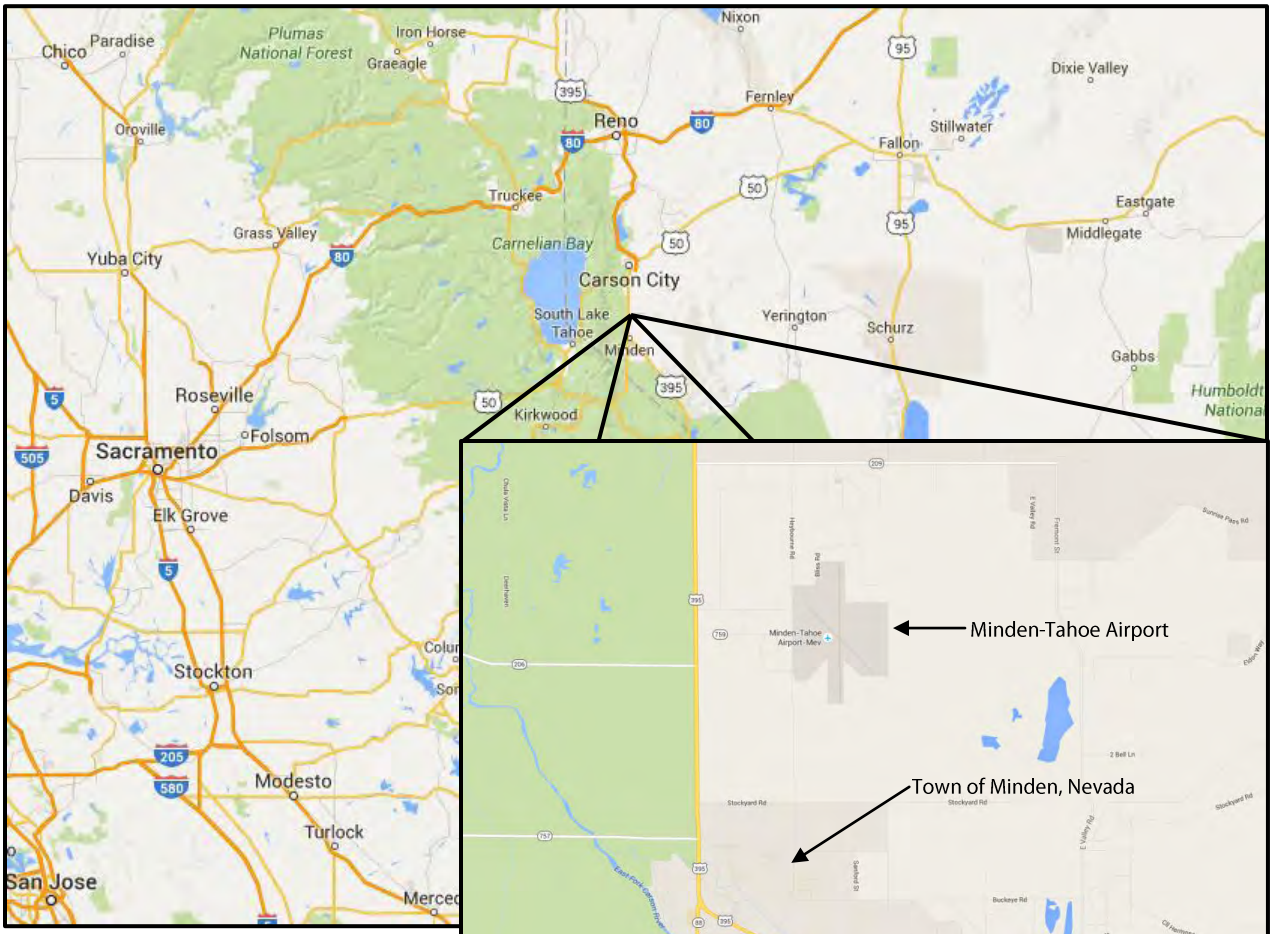
2.1 Introduction to Airport Setting and History

Airport Setting

Minden-Tahoe Airport is a general aviation airport located in north-west Nevada, approximately four miles north of the Town of Minden in Douglas County, Nevada. The Airport is approximately 12 miles south of the state capitol, Carson City, Nevada and approximately 47 miles south of Reno, Nevada.

An airport's location is defined by its Airport Reference Point (ARP), which is the geometric center of the runway system. ARPs are calculated based on existing and future runway lengths and locations. The existing ARP at Minden-Tahoe Airport is located at 39°00.03.30"N latitude, 119°45.06.90"W longitude. The Airport encompasses approximately 996 acres of land at an elevation of 4,723 feet. The Airport is owned and operated by Douglas County and managed by ABS Aviation, Inc. The location of Minden-Tahoe Airport is depicted in **Figure 2-1**.



Source: www.google.com/maps, 2015

Figure 2-1 Location Map

Airport History

Minden-Tahoe Airport (MEV) was founded as the Carson Valley Airport during World War II. Construction of the Airport commenced in July 1942 and was completed in October 1942. Initially envisioned as a military air base; the Airport was instead used as a military training facility. During the 1960's the Airport gained a reputation as a location for exceptional glider flying. To this day, the Minden-Tahoe Airport is renowned as one of the premier glider facilities worldwide. Section 2.2, *Airport Grant History*, provides additional details on historical improvement projects at the Airport.

2.2 Airport Grant History

The Airport Improvement Program (AIP) is the Federal Aviation Administration (FAA) grant program that provides grants to public agencies for the planning and development of public-use airports that are included in the National Plan of Integrated Airport Systems (NPIAS). For non-primary, reliever, and general aviation airports in the State of Nevada, the grants cover 93.75 percent of eligible costs, with the remaining 6.25 percent covered by the local sponsor. Eligible projects include improvements related to enhancing airport safety, capacity, security, noise control and environmental concerns. Airports can use AIP funds on most airfield capital improvements or repairs and in some specific situations, for terminals, hangars, and revenue generating development. Professional services necessary for eligible projects such as planning, surveying, and design are also eligible; however, aviation demand at the airport must justify the projects. The projects must also meet federal environmental and procurement requirements. **Table 2-1** contains a summary of Federal grants issued to Minden-Tahoe Airport under the current Federal airport grant program, AIP, since 2000.

Airport sponsors agree to certain obligations, or grant assurances, when they accept Federal grant funds or Federal property transfers for airport purposes. These obligations serve to protect the public's interest in civil aviation and ensure compliance with Federal statutes and requirements, including FAA safety standards. As a recipient of AIP funds, Douglas County has accepted the contractual obligation to comply with Federal grant assurances.

FAA Order 5190.6B, *Airport Compliance Manual*, contains 39 grant assurances that are accepted by an airport sponsor whenever federal grant funds are used to fund a project. The assurances promise that the airport will remain open to the public for at least the useful life of the improvement. In most cases the useful life is considered to be 20 years from the date of acceptance of the grant. Grant assurance agreements associated with land acquisition run in perpetuity.

Table 2-1 FAA Grant History

Year	Project Description	Entitlement	Discretionary	Total
2000	Improve Access Road	$0	$998,675	$998,675
2000	Construct Taxiway	$0	$334,219	$334,219
2000	Construct Apron	$0	$476,250	$476,250
2001	Rehabilitate Apron	$168,125	$0	$168,125
2001	Rehabilitate Runway	$0	$304,688	$304,688
2001	Rehabilitate Taxiway	$85,000	$602,005	$690,005
2002	Acquire Land for Approaches	$1,554,934	$0	$1,554,934
2003	Rehabilitate Taxiway	$350,469	$0	$350,469
2003	Rehabilitate Runway	$1,265,625	$0	$1,265,625
2004	Acquire Land for Approaches	$227,600	$0	$227,600
2004	Install Perimeter Fencing	$144,875	$0	$144,875
2004	Construct Access Road	$970,625	$0	$970,625
2005	Remove Obstructions	$800,020	$0	$800,020
2005	Rehabilitate Runway	$190,000	$0	$190,000
2005	Acquire Land for Approaches	$940.500	$0	$940.500
2006	Conduct Airport Master Plan Study	$325,585	$0	$325,585
2007	Rehabilitate Apron	$300,000	$0	$300,000
2007	Security Enhancements	$30,000	$0	$30,000
2007	Remove Obstructions	$443,915	$0	$443,915
2008	Rehabilitate Runway	$61,000	$0	$61,000
2008	Improve Airport Drainage	$105,450	$0	$105,450
2008	Rehabilitate Taxiway	$311,002	$0	$311,002
2008	Install Weather Reporting System	$87,400	$0	$87,400
2008	Construct Apron	$269,048	$0	$269,048
2009	Rehabilitate Apron	$99,750	$0	$99,750
2011	Conduct Miscellaneous Study	$10,000	$0	$10,000
2011	Rehabilitate Taxiway	$212,298	$0	$212,298
2012	Rehabilitate Taxiway	$565,256	$0	$565,256
2012	Rehabilitate Taxiway	$550,178	$0	$550,178
2013	Rehabilitate Apron	$524,361	$0	$524,361
2013	Rehabilitate Taxiway	$83,672	$0	$83,672
2014	Install Miscellaneous NAVAIDS	$62,432	$0	$62,432
2015	Rehabilitate Taxiway	$1,071,100	$0	$1,071,100
2015	Rehabilitate Apron	$309,275	$0	$309,275
2015	Update Airport Master Plan Study	$520,132	$0	$520,132
2016	Install Perimeter Fencing	$3,622,930	$834,098	$4,457,028
	Total	**$15,322,998**	**$3,549,935**	**$18,875,933**

Source: Federal Aviation Administration, Phoenix Airport District Office, 2015

2.3 Airport Service Level and Role

Airport Service Level

Since 1970, the FAA has classified a subset of the 5,400 public-use airports in the United States as being vital to serving the public needs for air transportation, either directly or indirectly, and therefore may be made eligible for federal funding to maintain their facilities. These airports are classified within the NPIAS, where the airport service level reflects the type of public use the airport provides. The service level also reflects the funding categories established by Congress to assist in airport development.

The categories of airports listed in the NPIAS are:

Commercial Service – These are public airports that accommodate scheduled air carrier or air taxi service provided by the world's certificated air carriers. Commercial service airports are either:
Primary – a public-use airport that enplanes more than 10,000 passengers annually, or

Non-primary – a public-use airport that enplanes between 2,500 and 10,000 passengers annually.

Reliever – This is an airport designated by the FAA as having the function of relieving congestion at a commercial service airport by providing more general aviation access. These airports comprise a special category of general aviation (GA) airports and are generally located within a relatively short distance of primary airports. Privately owned airports may also be identified as reliever airports.

General Aviation – These are airports used exclusively by private and business aircraft not providing scheduled air carrier passenger service. Within the General Aviation category, there are four subcategories to further classify airports:

- **National** – Serves national-global markets. Very high levels of activity with many jets and multiengine propeller aircraft averaging about 200 total based aircraft including 30 jets.
- **Regional** – Serves regional-national markets. High levels of activity with some jets and multiengine propeller aircraft averaging about 90 total based aircraft including 3 jets.
- **Local** – Serves local-regional markets. Moderate levels of activity with some multiengine propeller aircraft averaging about 33 based propeller-driven aircraft and no jets.
- **Basic** – Often serving critical aeronautical functions within local and regional markets. Moderate to low levels of activity averaging about 10 propeller-driven aircraft and no jets.

There are many GA airports that are not included in the NPIAS, however, some criterion for inclusion in the basic airport category is that the airport has at least 10 based aircraft, is located at least 30 miles away from the nearest NPIAS airport, or that the airport is a facility identified and used by certain federal agencies (U.S. Forest Service, U.S. Customs and Border Protection, etc.) or has Essential Air Service (EAS).

Minden-Tahoe is categorized in the NPIAS as General Aviation – Regional airport. The Airport is located approximately 16 miles south of Carson City Airport (CXP) in Carson City, Nevada and 28 miles east from Lake Tahoe Airport (TVL) in South Lake Tahoe,

California. The nearest primary commercial service airport to Minden-Tahoe Airport is the Reno-Tahoe International Airport (RNO), located approximately 43 miles to the north in Reno, Nevada. **Figure 2-2** depicts Minden-Tahoe Airport's location in relation to other NPIAS airports in the State of Nevada.

Figure 2-2 NPIAS Airports in Nevada

Source: Federal Aviation Administration, 2015

Airport Role

Minden-Tahoe Airport serves as a premier general aviation airport serving the Lake Tahoe Region and Carson Valley. The Airport is a gateway to well-known tourist attractions including Lake Tahoe. Minden-Tahoe Airport is also a world-famous facility for glider activity due to its position adjacent to the Sierra Mountains. The local topographical and meteorological conditions provide superior gliding conditions and constitute a substantial portion of the Airport's activity. The Airport also serves a critical role by providing air ambulance access to high-level treatment centers located in Nevada or California and as an aerial firefighting center to combat wildlife fires in the region.

The aircraft utilizing the airport include a wide range of single-engine piston, multi-engine piston, turboprop, turbo jet, gliders and rotorcraft. Users include the following aircraft types and operations:

Business and Personal Transportation

These users prefer the utility and flexibility offered by general aviation aircraft. This category includes business as well as tourism related activities. The types of aircraft utilized for personal and business transportation include a mix of single-engine, multi-engine, turboprop, and turbo jet aircraft.

Air Ambulance Services

Organizations such as Summit Air Ambulance provide essential emergency medical transportation for life threatening situations and assists in patient transfers by air from Carson Valley Medical Center to higher level care facilities. The air ambulance services provide quick and efficient transportation in emergency situations when time is of the essence.

Flight Training

These users conduct local and itinerant flights in order to meet flight proficiency requirements for obtaining FAA pilot certifications. These flights include touch-and-goes, day and night local and cross-country flights and practice approaches. Pilot certifications include Sport, Private, Instrument, Commercial, Instructor and Airline Transport ratings. Depending on the level of interest and aircraft availability, a multi-engine rating may or may not be available. A commercial rating may be accomplished with either a single-engine or multi-engine aircraft. Air transport ratings are usually obtained at larger regional FAR Part 141 certificated flight schools. Flight training at the Airport is provided by Reno-Tahoe Helicopters, Hutt Aviation, Sierra Skyport and SoaringNV.

Aircraft Maintenance

There are facilities located on the airport that provide maintenance services to based and transient aircraft including Aces Aircraft Maintenance, Hutt Aviation, Rebuilt Aircraft and Walker Aviation. Services include but are not limited to: 100-hour inspections, annual inspections, powerplant rehabilitation and various repairs.

Military

The airport is currently utilized by military helicopters and fixed-wing aircraft for occasional fuel stops and local training operations.

Recreational and Tourism

These users include transient pilots flying into the region to visit recreational and tourist attractions. These users typically utilize single-engine piston aircraft; however, a small percentage may operate multi-engine piston or larger aircraft. Other types of aircraft in this category often include home-built, experimental aircraft, gliders and ultralights. Recreational aviation operators at Minden-Tahoe Airport include Skydive Lake Tahoe and SoaringNV. The recreational aviation operators at Minden-Tahoe Airport typically operate single-engine piston and turbine driven aircraft and gliders.

Aerial Firefighting

The Airport has an aerial firefighting center, the Sierra Front Interagency Dispatch Center. The center serves as a base of operation for aerial firefighting aircraft such as the AirTractor 802, BAe-146, P-2, multiple helicopters such as the Sky Crane, Blackhawks, CH 46 and 47, K-Max, UH-1 and Single Engine Air Tankers (SEATs). There are also facilities for the aircraft to refuel and replenish their fire retardant supply.

2.4 Existing Activity Levels

According to airport management, there are 400 based aircraft. Airport management estimates there were approximately 90,000 annual operations in 2016. The FAA Form 5010 and FAA TAF do not accurately reflect existing activity and will be updated based on inventory and forecasts approved as part of this master plan.

2.5 Airport Service Area

An airport service area is defined by the communities and surrounding areas that are served by the airport facility. Generally, the airport service area includes the area within a thirty-minute drive or twenty-mile radius, of the airport. However, the actual service area is dependent upon several factors including the airport's surrounding topographic features, proximity to its users, quality of ground access and the proximity of the facility to other airports that offer the same or similar services.

Aircraft operators will usually operate at the closest airport to their residence, place of business or destination that provides adequate facilities and services to accommodate their aircraft. To define the service area for Minden-Tahoe Airport, the airports in the vicinity and their facilities were reviewed.

The Minden-Tahoe service area generally includes Douglas County. The Town of Minden is situated at the junction of U.S. Highways 395 and Nevada State Highway 88. U.S. Highway 395 is connected to Interstate 580 in Carson City approximately 17 miles north of the Minden-Tahoe Airport. Interstate 580 connects with Interstate 80 in Reno approximately 45 miles north of the Minden-Tahoe Airport.

Figure 2-3 depicts the Minden-Tahoe Airport service area and other airports in the region. **Table 2-2** provides information on the six closest airports to Minden-Tahoe Airport.

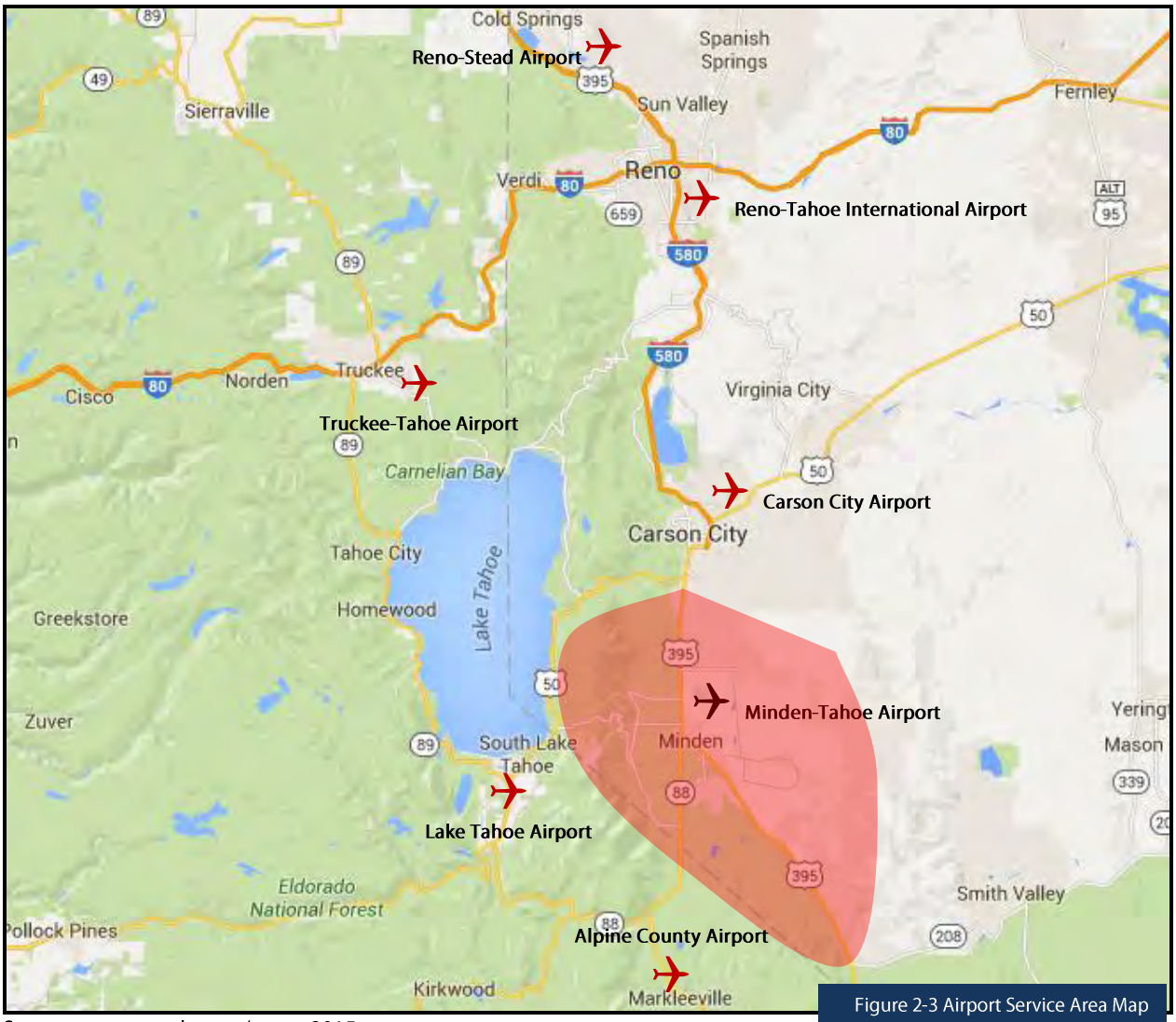


Figure 2-3 Airport Service Area Map

Source: www.google.com/maps, 2015
Note: Airport locations have been approximated

Table 2-2 Airports Near Minden-Tahoe Airport

Airport Name	Distance (NM)	NPIAS Status	Runway Dimensions	Pavement Type	Instrument Approaches	Fuel Available
Minden-Tahoe Airport Minden, NV	0	GA	7,399′ x 100′ 5,298′ x 75′ 2,049′ x 60′	Asphalt Asphalt Dirt	GPS	100LL Jet-A
Carson City Airport Carson City, NV	12	GA	6,101′ x 75′	Asphalt	GPS	100LL Jet-A
Lake Tahoe Airport South Lake Tahoe, CA	13	GA	8,541′ x 100′	Asphalt	GPS VOR/DME	100LL Jet-A
Alpine County Airport Markleeville, CA	16	N/A	4,443′ x 50′	Asphalt	N/A	N/A
Truckee-Tahoe Airport Truckee, CA	26	GA	7,000′ x 100′ 4,650′ x 75′	Asphalt Asphalt	GPS	100LL Jet-A
Reno-Tahoe International Airport Reno, NV	30	Primary Small Hub	11,002′ x 150′ 9,000′ x 150′ 6,102′ x 150′	Concrete Concrete Concrete	ILS/LOC GPS VOR/DME TACAN	100LL Jet-A
Reno-Stead Airport Reno, NV	40	GA	9,000′ x 150′ 7,608′ x 150′	Asphalt Asphalt	ILS GPS	100LL Jet-A

Source: www.airnav.com, 2015

2.6 Local Profile

Examining the specific socioeconomic characteristics of Douglas County helps to determine the factors influencing aviation activity in the area and the extent to which aviation facility developments are needed. Characteristics, such as population, employment and income will provide a foundation upon which to base the potential growth rate of aviation activity at the airport.

Douglas County is located in north-west Nevada. The county seat for Douglas County is located within the Town of Minden. Gardnerville Ranchos is the largest populated area in Douglas County.

2.6.1 Population

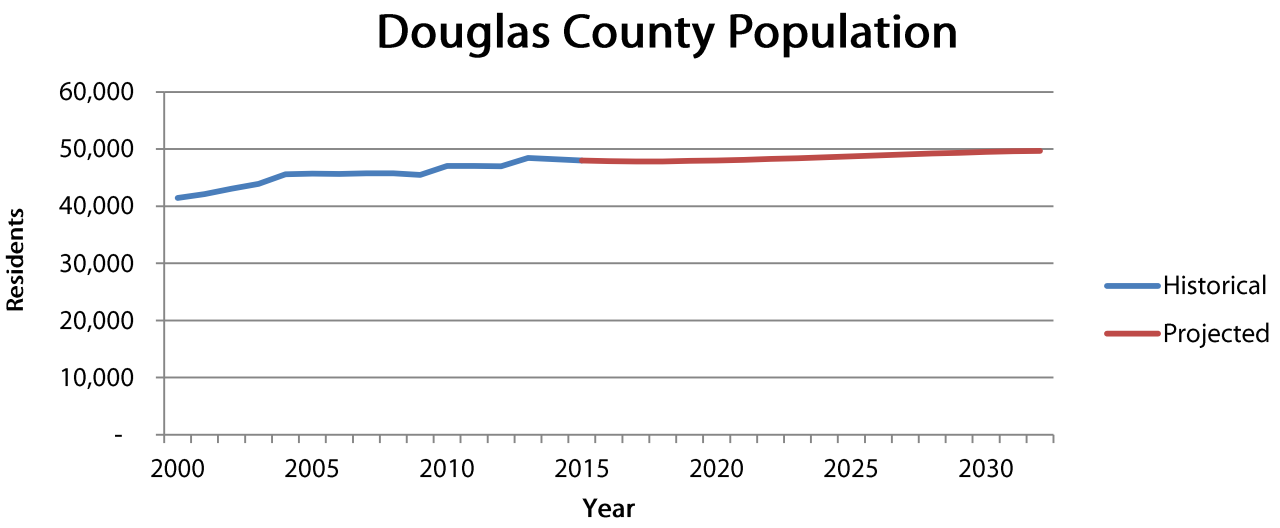
According to the Nevada State Demographer's Office, the population for the State of Nevada increased from 2,018,700 in 2000 to 2,855,061 in 2015 with Douglas County's population increasing from 41,429 in 2000 to 48,003 in 2015.

The Nevada State Demographer's Office also developed population projections for all Nevada counties and the State. Population projections for Douglas County and the State of Nevada are shown in **Table 2-3**, **Figure 2-4** and **Figure 2-5**. The population forecast indicates an increase of 16.6 percent population for the State of Nevada and an increase of 3.57 percent for Douglas County between 2015 and 2032.

Table 2-3 Population Projections for Douglas County and Nevada

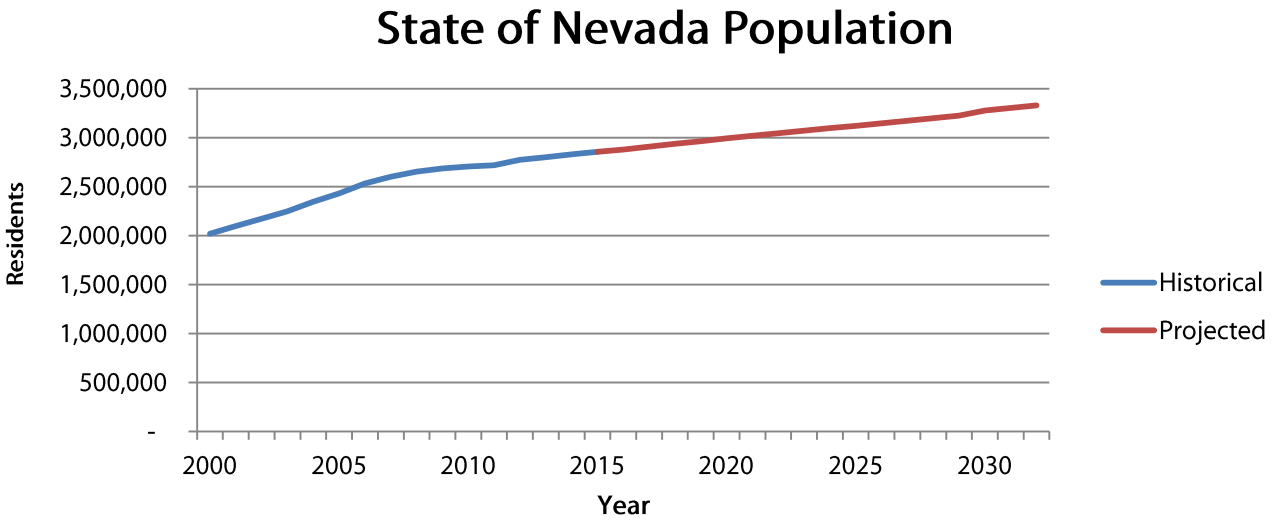
	2015	2020	2025	2030	Average Annual Growth Rate
Douglas County	48,003	48,035	48,727	49,503	0.21%
State of Nevada	2,855,061	2,992,313	3,122,313	3,277,384	0.98%

Source: Nevada State Demographer's Office, 2013



Source: Nevada State Demographer's Office, 2013

Figure 2-4 Douglas County Population



Source: Nevada State Demographer's Office, 2013

Figure 2-5 State of Nevada Population

2.6.2 Employment and Largest Industries

According to the U.S. Census Bureau, the unemployment rate in Douglas County was 7.2 percent in April 2015. This is above the unemployment rate for the State of Nevada and the United States which is 7.1 percent and 5.5 percent, respectively. The largest industries in Douglas County are the education/health/social service and tourism sectors according to the U.S. Census Bureau. The employment distribution by industry for Douglas County is shown in **Table 2-4** and **Figure 2-6**.

Table 2-4 Douglas County Employment Distribution by Industry

Industry	Number of Employed County Residents	Percent of Employed County Residents
Agriculture, forestry, fishing and hunting, and mining	333	2%
Construction	1,683	8%
Manufacturing	1,691	8%
Wholesale trade	386	2%
Retail trade	2,372	11%
Transportation and warehousing, and utilities	774	4%
Information	199	1%
Finance and insurance, and real estate and rental and leasing	1,283	6%
Professional, scientific, and management, and administrative and waste management services	1,961	9%
Educational services, and health care and social assistance	3,658	18%
Arts, entertainment, and recreation, and accommodation and food services	3,511	17%
Other services, except public administration	1,018	5%
Public Administration	1,819	9%

Source: U.S. Census Bureau, 2015

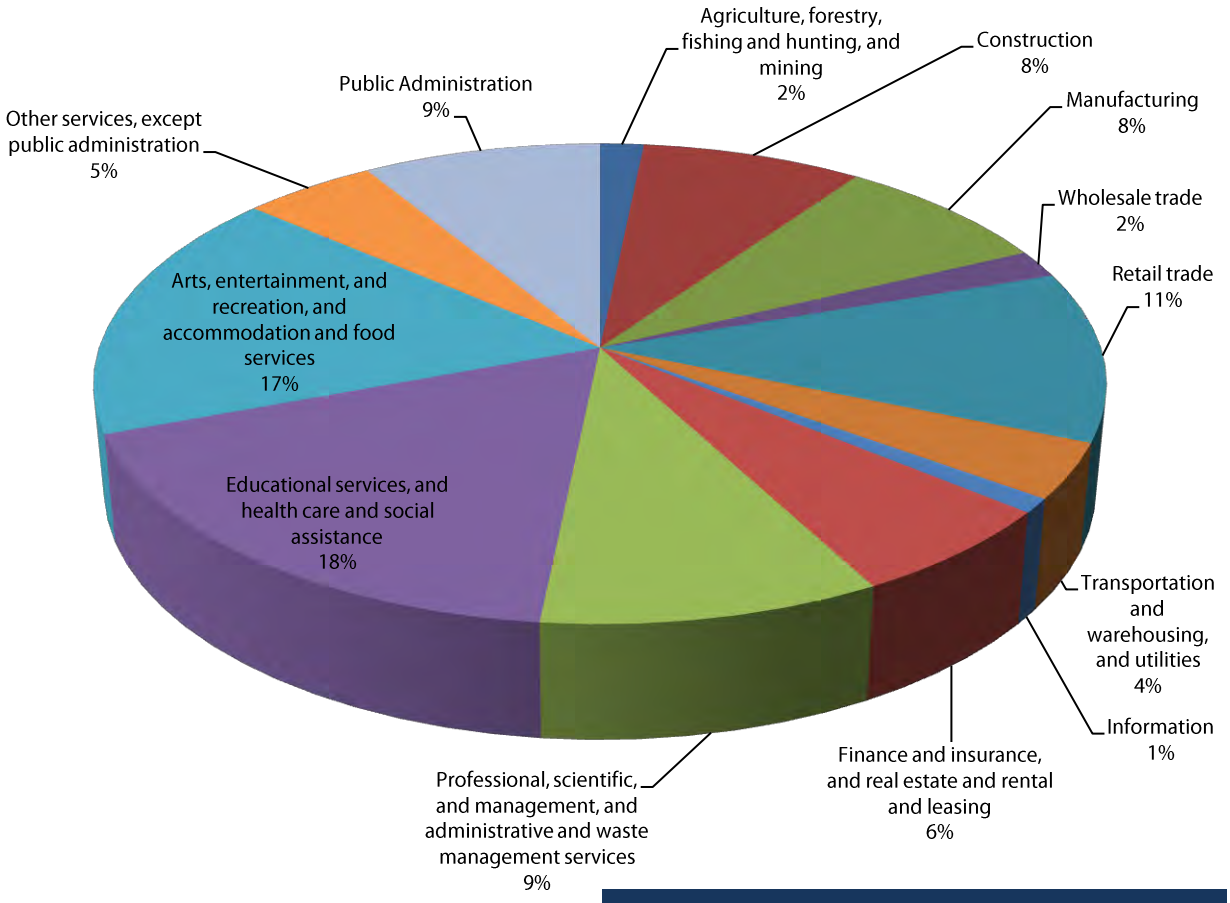


Figure 2-6 Douglas County Employment Distribution by Industry

Source: U.S. Census Bureau, 2015

2.6.3 Income

According to the U.S. Census Bureau, the median household income for the Town of Minden and Douglas County is $63,631 and $60,100, respectively. This is higher than the median household incomes for the State of Nevada and the United States which is $52,800 and $53,046, respectively. The per capita income is $34,844 for the Town of Minden and $34,123 for Douglas County.

2.6.4 Area Attractions

As previously mentioned, tourism is a strong driver of the economy for Douglas County. The county is situated on the southeastern shores of Lake Tahoe and within the Sierra Nevada Mountains. These areas provide several activities and destinations drawing tourists from throughout the world. Some of the major destinations located in the area include:

- Lake Tahoe, North America's largest alpine lake
- The Sierra Nevada Mountains
- Over 15 ski-resorts within a 50-mile range

Additionally, the area's topography and climate provide visitors with the ability to participate in a wide range of activities year-round. These activities include, but are not limited to:

Winter Season

- Downhill and cross-country skiing
- Ice skating
- Snowboarding
- Snowmobiling
- Sledding

Summer Season

- All-Terrain Vehicles
- Biking
- Camping
- Fishing
- Hiking
- Horseback riding

Year-Round Activities

- Dining, shopping and outfitters
- Cultural activities such as festivals and museums
- Natural attractions
- Casino gambling

2.7 Existing Airside Facilities at Minden-Tahoe Airport

Airside facilities include the runway, taxiway system, aircraft parking area and visual or electronic approach navigational aids. Existing airside facilities are further described within this section and are depicted in **Figure 2-7.**

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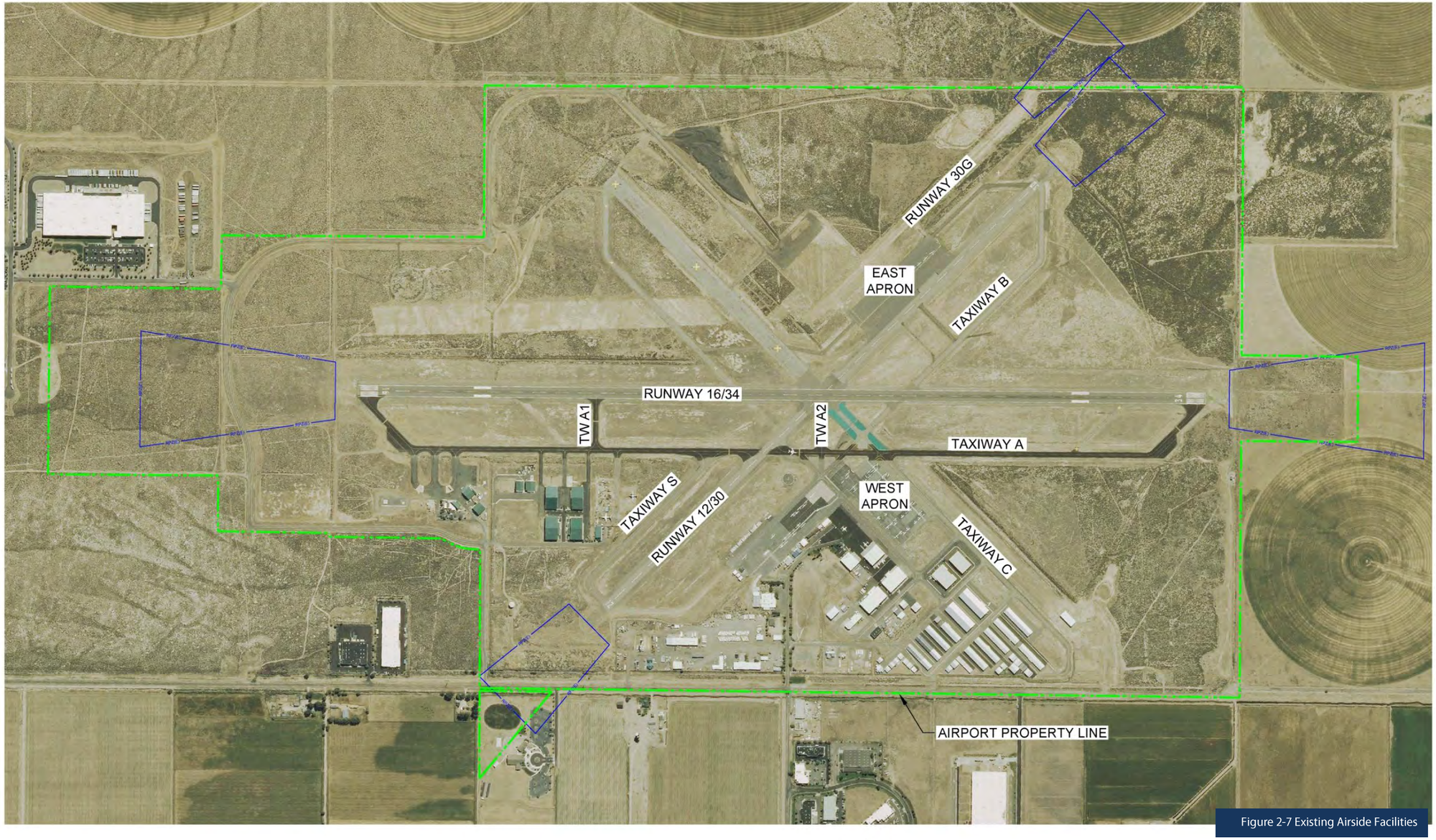

Figure 2-7 Existing Airside Facilities

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2.7.1 Runway System

Runways are a defined rectangular surface on an airport, prepared or suitable for the landing or takeoff of aircraft. The runway configuration relates to the number and orientation of runways. The number of runways provided at an airport depends largely on the volume of air traffic and prevailing wind conditions. As aircraft takeoff and land into the wind, the orientation of the runways depends primarily on the direction of the prevailing wind patterns in the area. The size and shape of the area available for development, local land-use requirements and airspace restrictions in the vicinity of the airport also will influence runway orientation.

The runway configuration at Minden-Tahoe Airport consists of two asphalt runways, Runway 16-34 and Runway 12-30. There is also one dirt runway, Runway 30G. The runway system previously included Runway 3-21, which has been closed for several years.

Runway 16-34, the primary runway at Minden-Tahoe Airport, is 7,399 feet long by 100 feet wide. According to the *2013 Nevada Department of Transportation Pavement Management System Update*, Runway 16-34 has pavement strength of 99,000 pounds single wheel gear (SWG) and 140,000 pounds dual wheel gear (DWG). The runway pavement is in excellent condition. Runway 16-34 is lighted with Medium Intensity Runway Edge Lights. Both Runways 16 and 34 are marked with non-precision runway markings and the markings are in good condition. Runway 16-34 is depicted in **Figure 2-8**.

Runway 12-30, the crosswind runway at Minden-Tahoe Airport, is 5,298 feet long by 75 feet wide. According to the *2013 Nevada Department of Transportation Pavement Management System Update*, Runway 12-30 has pavement strength of 27,000 pounds SWG and 40,000 pounds DWG. The runway pavement is in good condition. There is no edge lighting for Runway 12-30. Both Runway 12 and 30 are marked with basic runway markings and the markings are in good condition.

Runway 30G is 2,049 feet long by 60 feet wide dirt runway. The runway serves as a landing only area for gliders and glider tow aircraft.

Figure 2-8 Runway 16-34

Source: Armstrong Consultants, Inc.

2.7.2 Taxiway System

Taxiways provide aircraft access between aircraft parking aprons and corresponding runways. They are intended to expedite aircraft departures from the runway and thereby increase operational safety and efficiency.

The taxiway system at Minden-Tahoe Airport consists of one full-length parallel taxiway and three partial parallel taxiways. The full-length parallel taxiway, Taxiway A, serves Runway 16-34. There are two entrance/exit taxiways, Taxiways A1 and A2, which connect Taxiway A to Runway 16-34. Runway 12-30 is served by two partial parallel taxiways. Taxiway S extends from Taxiway A to the Runway 12 threshold. Taxiway B extends from Taxiway A and crosses Runway 16-34 to the Runway 30 threshold. Taxiway C provides connection between Taxiway A and the aircraft parking apron and hangars. Taxiways A, A1, A2 and S have a width of 50 feet. Taxiways B and C have a width of 35 feet. Taxiway A1 is lighted with Medium Intensity Taxiway Edge Lighting with the remainder of the taxiway system outfitted with retroflectors. The taxiway pavement surfaces and markings are in excellent condition. Taxiway A is shown in **Figure 2-9**.

Figure 2-9 Taxiway System

Source: Armstrong Consultants, Inc.

2.7.3 Aircraft Parking Apron

The aircraft apron provides an area for aircraft to park. The aprons are connected to the runway via taxiways or taxilanes. There are two apron areas serving Minden-Tahoe Airport operators. The West Apron is the main apron serving the Airport and is situated on the west side of Runway 16-34. The East Apron is primarily utilized for glider operations and is situated on the east side of Runway 16-34 between Runway 12-30 and Runway 30G. The western aircraft parking apron is shown in **Figure 2-10**. **Table 2-5** provides further details on each apron at the Airport.

Figure 2-10 West Aircraft Parking Apron

Source: Armstrong Consultants, Inc.

Table 2-5 Minden-Tahoe Airport Apron Information

Apron	Area Size	Pavement Type	Pavement Condition	Number of Tie Downs
West	99,020 S.Y.	Asphalt / Concrete	Good	132
East	16,500 S.Y.	Asphalt	Fair	0

Source: Armstrong Consultants, Inc., 2015

2.7.4 Airfield Pavement Conditions

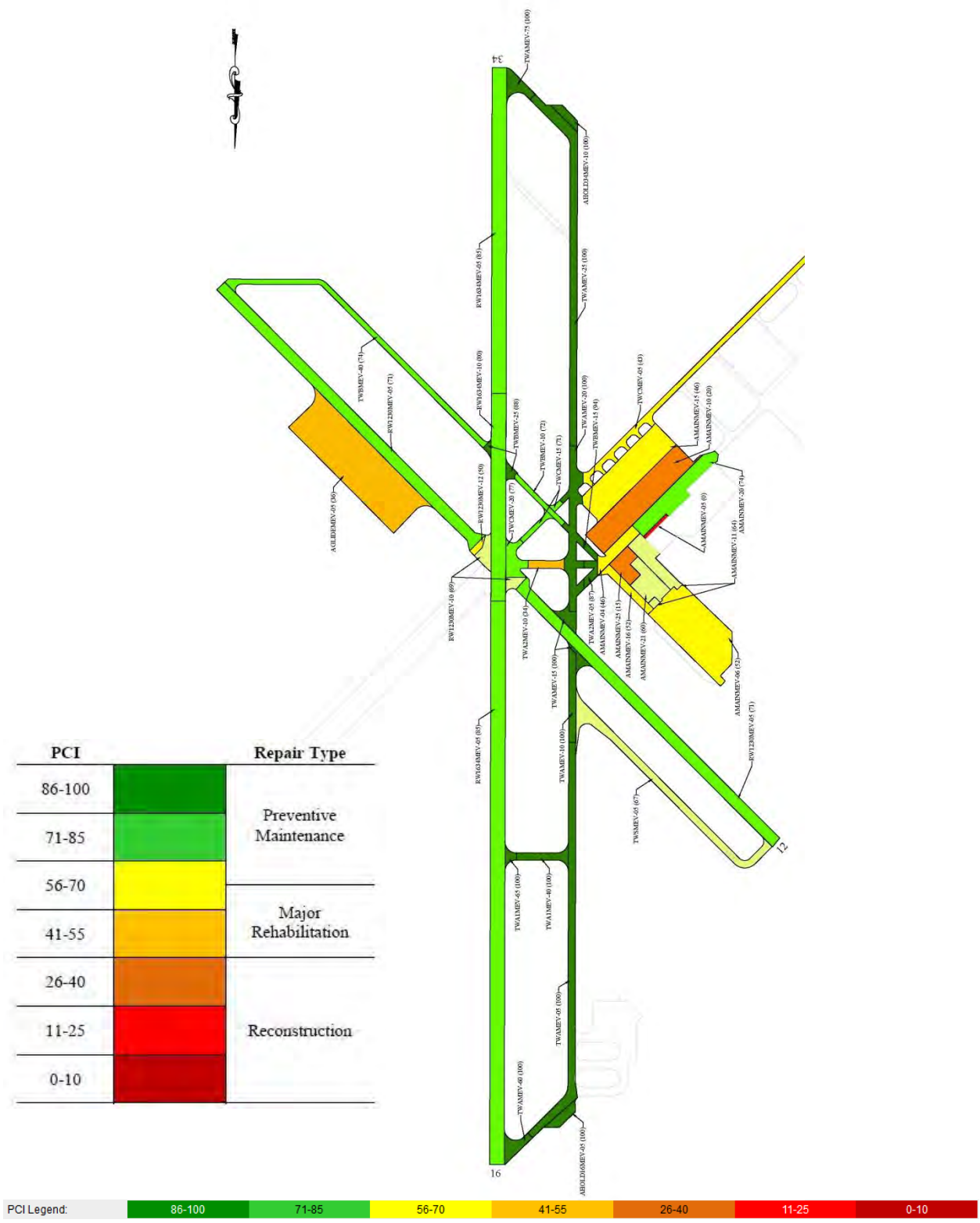
The Pavement Condition Index (PCI) is a numerical index between 0 and 100 and is used to indicate the condition of the pavement. The PCI, as outlined by the Nevada Department of Transportation, is based on a visual survey of the pavement and a numerical value between 0 and 100 defining the condition. Condition levels are defined as Preventative Maintenance, Major Rehabilitation, and Reconstruction.

Table 2-6 depicts the results of the 2013 PCI inspection report for Minden-Tahoe Airport. According to the 2013 PCI inspection report, the Airport's runway and taxiways are all in good condition. The aprons are in fair to good condition. The specific ratings and recommended corrective actions are listed for each pavement area. Condition levels are shown in the legend of **Figure 2-11.**

Table 2-6 Pavement Condition Indexes

Location	Pavement Condition Index	Recommended Action
Runway 16-34	80 to 85	Preventative Maintenance
Runway 12-30	50 to 71	Preventative Maintenance
Taxiway A	100	Preventative Maintenance (As Needed)
Taxiway A1	100	Preventative Maintenance (As Needed)
Taxiway A2	34 to 87	Reconstruction, Major Rehabilitation or Preventative Maintenance
Taxiway B	72 to 94	Preventative Maintenance
Taxiway S	67	Preventative Maintenance
West Apron	0 to 74	Reconstruction, Major Rehabilitation or Preventative Maintenance
East Apron	36	Reconstruction

Source: Nevada Department of Transportation, 2013



Source: Nevada Department of Transportation, 2013

Figure 2-11 Pavement Condition Index Map

2.7.5 Airfield Lighting and Visual Aids

Airport lighting enhances safety during periods of inclement weather and nighttime operations by providing visual guidance to pilots in the air and on the ground. Examples of various airfield lighting and visual aids can be found in **Figure 2-12**. Several common airfield lighting features of general aviation airports and those at Minden-Tahoe Airport are listed below:

- **Precision Approach Path Indicator (PAPI)** located on the left side of the runway, consists of two or four lights installed in a single row. A PAPI provides visual approach path guidance by emitting a series of white and red lights. These lights can be seen for up to five miles during the day and up to twenty miles at night and provides guidance to the runway touchdown zone.

  There are no PAPIs at Minden-Tahoe Airport.

- **Visual Approach Slope Indicators (VASIs)** is another type of visual approach path guidance that consist of two sets of lights and typically provides less precise visual guidance than a PAPI. One set marks the start of the runway, while the other set marks twenty feet down the runway. Each set of lights are designed to appear either white or red, depending on the angle at which the lights are viewed. When an aircraft is on the glide slope, the first set of lights appears white, while the second set appears red. If an aircraft drops below the glide slope both sets appear red and if an aircraft is above the glide slope both sets will indicate white.

  There are two-box VASIs on each end of Runway 16-34.

- A **rotating beacon** is used to guide pilots to lighted airports with a sequence of yellow, green and/or white lights. Most general aviation airports are considered to be civilian land airports, consisting of alternating white and green lights or a water airport, consisting of alternating white and yellow lights. A beacon is normally operated from dusk until dawn. If the beacon is on during other hours it typically indicates that the airport is operating under instrument flight rules.

  The Airport has a rotating beacon located adjacent to the main vehicle parking lot. The beacon was recently replaced and is located on a tip-down tower allowing for easy maintenance and bulb replacement.

- **Runway edge lights** consist of a single row of white lights bordering each side of the runway, outlining the runway edges during periods of darkness or low visibility. Runway edge lights are classified into three types according to the intensity of light of which they are capable of producing: they include High Intensity Runway Lights (HIRL), Medium Intensity Runway Lights (MIRL) and Low Intensity Runway Lights (LIRL). Both HIRLs and MIRLs have variable intensity settings, whereas LIRLs have only one. Instrument runway lights include yellow edge lights on the last 2,000 feet of runway to visually inform pilots of the amount of runway remaining.

  Runway 16-34 is outfitted with MIRLs. The airfield lighting and visual aids at Minden-Tahoe Airport are pilot controlled on the Common Traffic Advisory Frequency (CTAF) frequency 123.05 MHz.

- **Runway End Identifier Lights (REIL)** consist of a pair of synchronized high intensity white flashing lights placed on each side of the runway to enable rapid identification of the runway threshold.

  There are no REILs at Minden-Tahoe Airport.

- **Runway markings** vary depending on whether the runway is used exclusively for visual flight rule operations (VFR) or instrument flight rule (IFR) operations. A visual runway is typically marked with the runway designator numbers and a dashed white centerline. Threshold bars and aiming point markings are added to provide non-precision instrument markings. A precision instrument runway includes touchdown zone markings.

  Runway 16-34 is marked with non-precision instrument markings. Runway 12-30 is marked with basic markings. Runway 30G is not marked.

- **Threshold lights** consist of a single row of green lights used to indicate the beginning of the usable landing surface. These lights are two-directional and appear red from the opposite end of the runway to mark the end of the usable runway.

  Runway 16-34 has eight threshold lights on both runway ends.

- **Taxiway edge lights** consist of a single row of blue lights bordering each side of the taxiway. These lights mark the edge of the taxiways and guide aircraft from the runway to the ramp or apron area.

There are taxiway edge lights on Taxiway A1 only.

- **Retroreflectors**, used in lieu of taxiway lighting, consists of a single row bordering each side of the taxiway of reflective tape mounted on a pole.

  The taxiways, except Taxiway A1, at Minden-Tahoe Airport are outfitted with retroflectors.

- A **wind direction indicator** consists of a windcone, wind tee or tetrahedron. A windcone aligns itself into the wind as the wind blows through a truncated cloth aligning itself with the wind indicating both wind direction and approximate velocity. The tail of a wind tee aligns itself in the wind similar to that of a weather vane. A tetrahedron may either swing around to align the small end pointing into the wind or it may be manually positioned to show landing direction. Wind indicators can be lighted for use during periods of darkness and low visibility.

  The primary windcone at Minden-Tahoe Airport is co-located with the segmented circle between Taxiway A and the West Aircraft Parking Apron.

- A **segmented circle** is located around the wind direction indicator. The segmented circle has two purposes, including identifying the location of the wind direction indicator and identifying non-standard traffic patterns.

  The segmented circle at Minden-Tahoe Airport is located between Taxiway A and the West Aircraft Parking Apron.

- **Lighted signs** indicate locations within the airfield to aircraft.

  The lighted signs at Minden-Tahoe Airport use non-standard location indicators.

The airfield lighting infrastructure is in poor condition with the lighting fixtures in fair condition. The lighting signs and visual aids are in fair condition. The locations of the airfield lighting and visual aids are shown in **Figure 2-13**. A summary of the airfield lighting and visual aids at Minden-Tahoe Airport are listed in **Table 2-7**.

Table 2-7 Airfield Lighting and Visual Aid Summary

Lighting or Visual Aid	Availability at Airport
PAPIs	No
VASIs	Yes
Rotating Beacon	Yes
Runway Edge Lights	Runway 16-34: MIRLs Runway 12-30: No Runway 30G: No
REILs	All Runways: No
Runway Markings	Runway 16-34: Non-Precision Runway 12-30: Basic Runway 30G: None
Threshold Lights	Runway 16-34: Yes Runway 12-30: No Runway 30G: No
Taxiway Edge Lights	Taxiway A1
Retroreflectors	Yes
Wind Direction Indicator	Yes
Segmented Circle	Yes
Lighted Signs	Yes

Source: Armstrong Consultants, Inc., 2015

Visual Approach Slope Indicators (VASI)

Guides pilots to airports during nighttime or IFR conditions

Precision Approach Path Indicator (PAPI)

Guides pilots to airports during nighttime or IFR conditions

Runway End Identifier Lights (REIL)

Identifies runway threshold

Runway Edge Lighting

Outline runway boundary during nighttime or IFR conditions

Threshold Lights

Identifies beginning and end of usable landing area

Retroflectors

Reflectors outlining airfield pavement

Taxiway Edge Lighting

Outlines taxiway boundary during nighttime or IFR conditions

Rotating Beacon

Guides pilots to airports during nighttime or IFR conditions

Wind Direction Indicator

Provides current wind direction at airport

Segmented Circle

Identifies wind direction indicator and non-standard traffic patterns, if any

Source: Armstrong Consultants, Inc.

Figure 2-13 Existing Lighting and Visual Aid Locations

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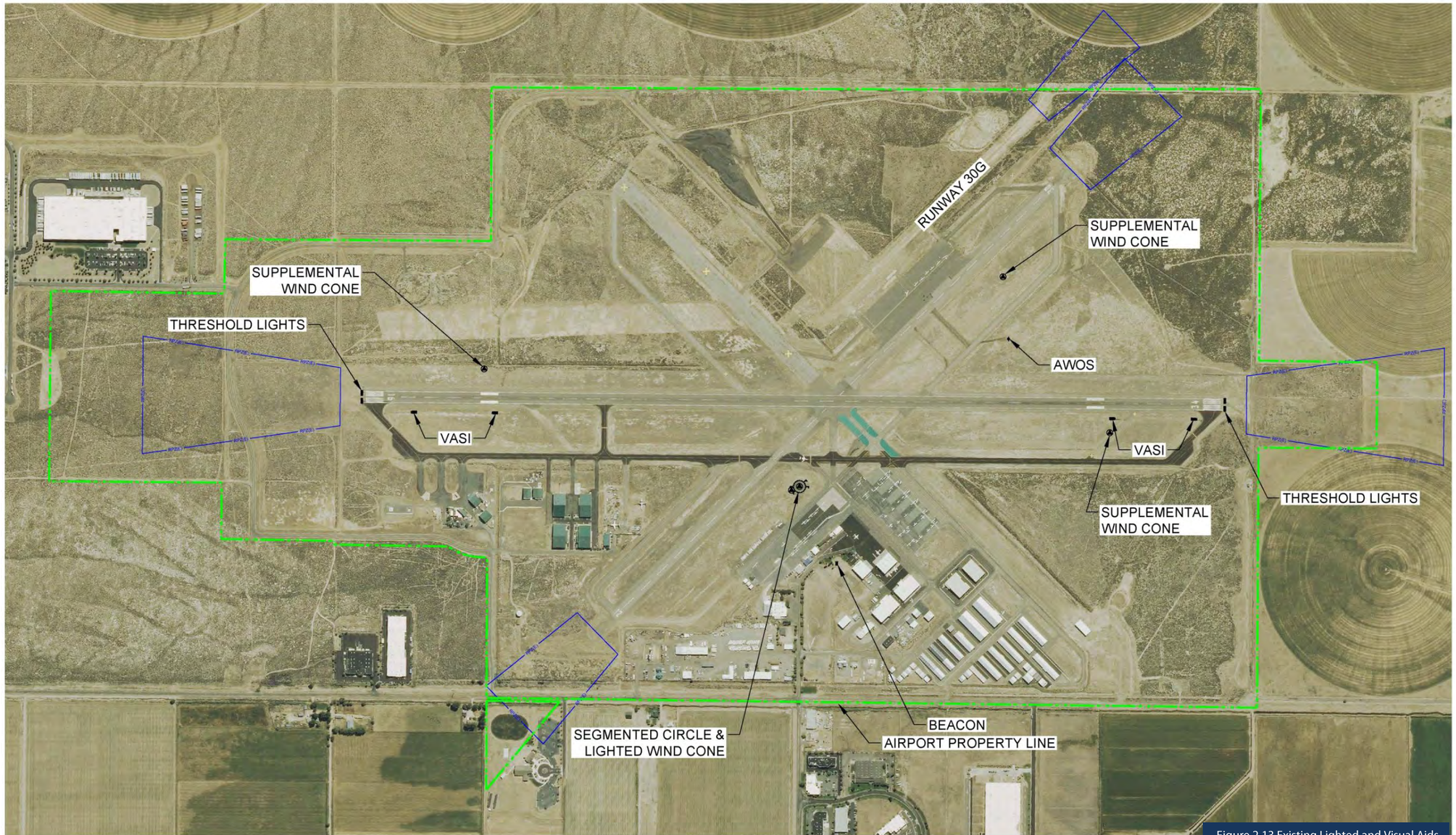

Figure 2-13 Existing Lighted and Visual Aids

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2.7.6 Navigational Aids and Air Traffic Control

A Navigational Aid (NAVAID) is any ground based visual or electronic device used to provide course or altitude information to pilots. NAVAIDs include Very High Omni-directional Range (VORs), Very High Frequency Omni-directional Range with Tactical Information (VOR-TAC), Non-directional Beacons (NDBs) and Tactical Air Navigational Aids (TACANs), as examples.

There are no NAVAID's currently located on Minden-Tahoe Airport. The nearest NAVAID is the Squaw Valley VOR which is located 26.4 nautical miles west of the airport.

There are currently two published circling instrument approach procedures for Minden-Tahoe Airport. Each approach procedure has visibility minimums of 1 ¼-statute mile and are circling which does not provide an approach to a particular runway end. Enroute radar and air traffic control coverage for Minden-Tahoe Airport is provided by Oakland Air Route Traffic Control Center (ARTCC). The Reno Flight Service Station (FSS) provides additional weather data and other pertinent weather information to pilots on the ground and enroute. There is no air traffic control tower (ATC) located at the airport. Instead, pilots coordinate their position over the CTAF.

2.7.7 Weather Reporting Systems

Automated Weather Observation Systems (AWOS) use various sensors, a voice synthesizer and a radio transmitter to provide weather data. There are four types of AWOS. An AWOS-A only reports altimeter setting while an AWOS-I also measures and reports wind speed, direction, gusts, temperature and dew point. AWOS-II provides visibility information in addition to everything reported by an AWOS-I. The AWOS-III also includes cloud and ceiling data. The AWOS-III also has an optional feature which provides present weather conditions (P), local thunderstorm activity (T) or both (P/T). The AWOS transmits over a VHF frequency or the voice portion of a NAVAID. The transmission can be received within 25 nautical miles of the site or above 3,000 feet above ground level (AGL). The frequency for the AWOS is published on Aeronautical charts as well as in the airport facilities directory.

An AWOS-III P/T is available at Minden-Tahoe Airport on frequency 119.325 MHz. It also provides weather information via telephone (775) 782-6264. The AWOS-III is located between the Runway 34 and Runway 30 thresholds in the southern half of the Airport property.

2.7.8 FAA Design Standards

2.7.8.1 Airport Reference Code (ARC)

FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design* establishes design standards for use in the design and development of civil airports. Each runway and operational area serving the particular design aircraft must be identified. Generally, runway standards are related to aircraft approach speed, aircraft wingspan and designated or planned approach visibility minimums. Each runway is assigned a Runway Design Code (RDC). The Aircraft Approach Category (AAC), Airplane Design Group (ADG) and approach visibility minimums (runway visual range - RVR) are combined to determine the RDC. The RDC provides the information needed to determine applicable design standards. The first component, depicted by a letter is the AAC and relates to aircraft approach speed (operational characteristic). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics) whichever is most restrictive. The third component relates to the visibility minimum expressed by RVR values in feet which include 1,200, 1,600, 2,400, 4,000, and 5,000 feet. The third component will read "VIS" for runway designed with visual approaches only.

The Airport Reference Code (ARC) of the airport signifies the airport's highest RDC. The ARC is used for planning and design purposes only and does not limit the aircraft that may be able to operate safely on the airport. **Table 2-8** lists the RDC criteria.

The current RDC for Runway 16-34 and ARC for Minden-Tahoe Airport is C-III. The current RDC for Runway 12-30 is B-II. The current RDC for Runway 30G is B-I (small). The current design aircraft for Runway 16-34 is the Gulfstream G500. The current design aircraft for Runway 12-30 is the Beechcraft King Air 200. The current design aircraft for Runway 30G is the Piper PA-25 Pawnee. A more detailed discussion of RDCs and ARCs is included in Chapter Four, *Facility Requirements*. **Table 2-9** lists the FAA design standards for Minden-Tahoe Airport. **Figure 2-14** depicts the FAA design standards.

Table 2-8 Runway Design Code

Approach Category	Approach Speed	
Category A	less than 91 knots	
Category B	91 to 120 knots	
Category C	121 to 140 knots	
Category D	141 to 165 knots	
Category E	166 knots or more	
Design Group	**Wingspan**	**Tail Height**
Group I	< than 49 feet	< than 20 feet
Group II	49 to 78 feet	20 to 29 feet
Group III	79 to 117 feet	30 to 44 feet
Group IV	118 to 170 feet	45 to 59 feet
Group V	171 to 213 feet	60 to 65 feet
Group VI	214 to 261 feet	66 to 79 feet
Runway Visual Range (in feet)	**Flight Visibility Category (Statute Mile)**	
VIS	Visual	
5,000	1-mile or greater	
4,000	Lower than 1 mile but not lower than 3/4 mile (APV ≥ 3/4 but < 1 mile)	
2,400	Lower than 3/4 mile but not lower than 1/2 mile (CAT - I PA)	
1,600	Lower than 1/2 mile but not lower than 1/4 mile (CAT - II PA)	
1,200	Lower than 1/4 mile (CAT - III PA)	

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

Table 2-9 Existing Design Standards

	Runway 16-34	Runway 12-30	Runway 30G
Runway Design Code (RDC)	C-III-5000	B-II-5000	B-I (small) - VIS
Runway Centerline to Parallel Taxiway Centerline	400′ (500′ Actual)	240′ (500′ Actual)	240′
Runway Centerline to Aircraft Parking Apron	500′	250′	250′
Runway Width	100′*	75′	60′
Runway Safety Area Width	500′(497′ Actual)	150′	120′
Runway Safety Area Length Beyond RW End	RW 16: 1,000' (998′ Actual) RW 34: 1,000′	300′	240′
Runway Object Free Area Width	RW 16: 800′ (550′ Actual) RW 34: 800′ (732′ Actual)	500′ (458′ Actual)	250′
Runway Object Free Area Length Beyond RW End	RW 16: 1,000′ (214′ Actual) RW 34: 1,000′ (300′ Actual)	RW 12: 300′ (0′ Actual) RW 30: 300′	240′
Runway Obstacle Free Zone Width	400′	400′	250′
Runway Obstacle Free Zone Length Beyond RW End	200′	200′	200′
Runway Protection Zone	500′ x 1,010′ x 1,700′	500′ x 700′ x 1,000′	250′ x 450′ x 1,000′
Taxiway System			
Taxiway Design Group (TDG)	3	2	2
Taxiway Width	50′	35′	35′
Taxiway Safety Area Width	118′	79′	79′
Taxiway Object Free Area Width	186′	131′	131′
Taxilane Object Free Area Width	162′	115′	115′
Runway Centerline to Aircraft Hold Lines	250′	200′	200′

Source: FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*
*Note: C-III runway standard width is 150 feet unless the pavement strength is less than 150,000 pounds, then a 100 foot width is acceptable.

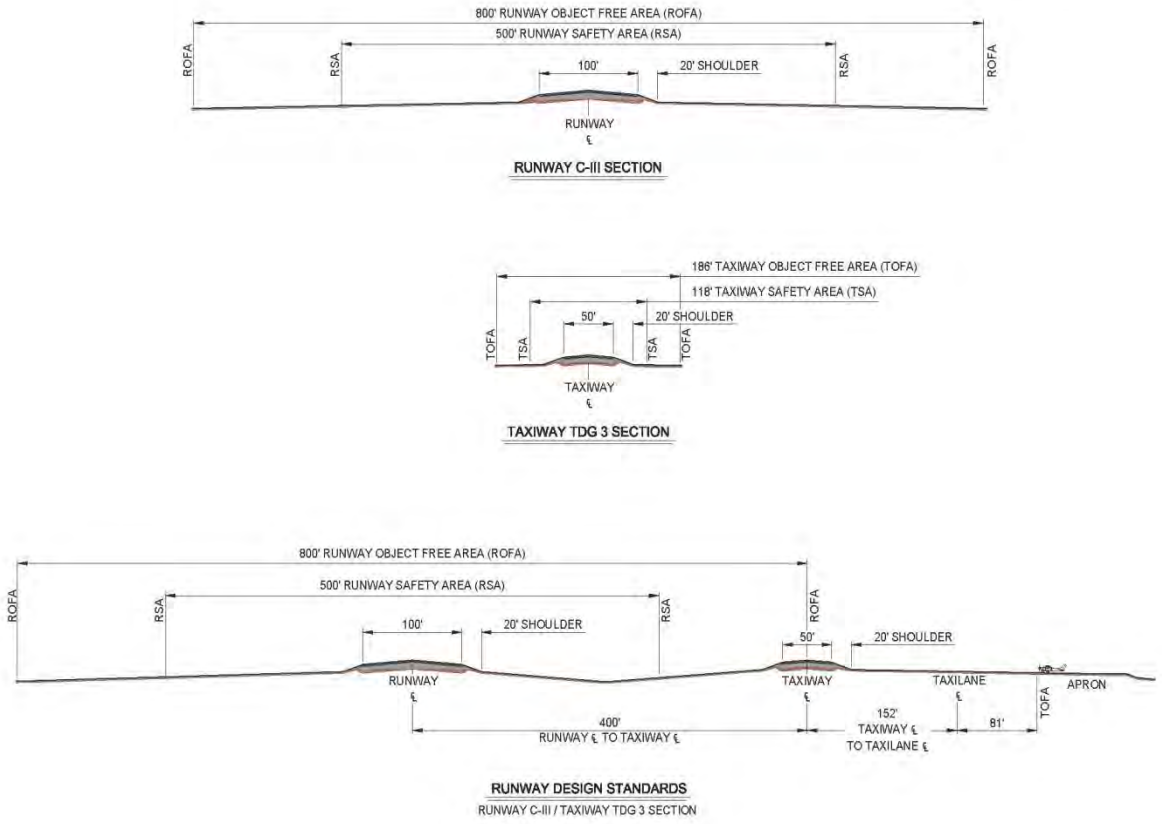


Figure 2-14 FAA Design Standards (C-III with less than 150,000 lbs. pavement strength)

Source: Armstrong Consultants, Inc. and FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*

2.7.8.2 Safety Areas

Runway and taxiway safety areas (RSAs and TSAs) are defined surfaces surrounding the runway and taxiways that are prepared specifically to minimize bodily injury and reduce damage to aircraft and property in the event of an under-shoot, over-shoot or excursion from a runway or taxiway.

According to FAA Advisory Circular 150/5300-13A, Change 1, safety areas must be:

- Cleared and graded and have no potentially hazardous surface variations.
- Drained so as to prevent water accumulation.
- Capable, under dry conditions of supporting snow removal equipment (SRE) and aircraft rescue and firefighting (ARFF) equipment and the occasional passage of aircraft without causing structural damage to the aircraft.
- Free of objects, except for objects that need to be located in the runway or taxiway safety area because of their function.

The RSA beyond the Runway 16 end is penetrated by the existing perimeter fence by three feet. Minden-Tahoe Airport meets all other RSA and TSA standards.

2.7.8.3 Obstacle Free Zones and Object Free Areas

The runway Obstacle Free Zone (OFZ) is a three dimensional volume of airspace that supports the transition of ground to airborne aircraft operations. The clearing standard precludes taxiing and parked airplanes and object penetrations, except for frangible visual NAVAIDs that need to be located in the OFZ because of their function. The OFZ is similar to the Part 77 Primary Surface insofar that it represents the volume of space longitudinally centered on the runway.

The Object Free Areas (OFA) are two-dimensional areas centered on the ground on a runway, taxiway, or taxilane centerline provided to enhance the safety of aircraft operations by remaining clear of objects. This excludes objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

The Runway 16-34 OFA width is penetrated by the existing perimeter fence by 41 feet on the west side and 27 feet on the east side south of the Runway 34 threshold. The aforementioned perimeter fence also penetrates the OFA beyond the Runway 34 end by 700 feet. The Runway 16-34 OFA width is also penetrated by the existing perimeter fence by 150 feet and by Bliss Road by 100 feet on the west side north of the Runway 16 threshold. The Runway 16-34 OFA beyond the Runway 16 end is also penetrated by the perimeter fence and Bliss Road by 786 feet. The Runway 12-30 OFA width is penetrated by the existing perimeter fence by 42 feet south of the Runway 12 threshold. This Runway 12-30 OFA beyond the Runway 12 end is also penetrated by the aforementioned perimeter fence by 300 feet. Tahoe Airport meets all other OFA and OFZ standards.

2.7.8.4 Displaced Thresholds

A displaced threshold is a threshold located at a point other than that of the physical end of the runway. The displaced portion of the runway maybe used for takeoff but not for landing. Landing aircraft may only use the displaced area on the opposite end for roll out.

There are no displaced thresholds at Minden-Tahoe Airport.

2.7.8.5 Runway Protection Zone

The Runway Protection Zone (RPZ) is trapezoidal in shape and centered on the extended runway centerline that is intended to protect persons and property from aircraft that land short or overrun the runway. It begins 200 feet beyond the end of the area usable for takeoff or landing. The RPZ dimensions are functions of the design aircraft, type of operation and visibility minimums.

While it is desirable to clear all objects from the RPZ, uses that FAA may permit include:

- Farming that meets minimum buffers, irrigation channels as long as it does not attract birds
- Airport service roads, as long as they are not public roads and are directly controlled by the airport operator
- Underground facilities and unstaffed NAVAIDs and facilities, such as equipment for airport facilities that are considered fixed-by-function in regard to the RPZ.

Table 2-10 further describes the RPZs at Minden-Tahoe Airport. The RPZs are controlled through a combination of fee-simple ownership and avigation easements. Heybourne Road is located within the Runway 12 RPZ. The existing land uses within the RPZs are considered to be compatible.

Table 2-10 Minden-Tahoe Airport RPZ Information

Runway Protection Zone	Dimension	Ownership	Conveyance	Existing Land Uses
Runway 16	500′ x 1,010′ x 1,700′	Douglas County	Fee Simple	Open Space
Runway 34	500′ x 1,010′ x 1,700′	Douglas County	Avigation Easement	Open Space
Runway 12	500′ x 700′ x 1,000′	Douglas County	Fee Simple	Open Space and Heybourne Rd.
Runway 30	500′ x 700′ x 1,000′	Douglas County	Fee Simple	Open Space
Runway 30G	250′ x 450′ x 1,000′	Douglas County	Fee Simple	Open Space

Source: Armstrong Consultants, Inc., 2015

2.7.9 Airspace Surfaces

Title 14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace,* (Part 77) includes several imaginary surfaces that are used as a guide to provide a safe and unobstructed operating environment for aviation. These surfaces, which are typical for civilian airports, are shown in **Figure 2-15**. The primary, approach, transitional, horizontal and conical surfaces identified in Part 77 are applied to each runway at both existing and new airports on the basis of the type of approach procedure available or planned for that runway and the specific Part 77 runway category criteria.

For the purpose of this section, a visual/utility runway is a runway that is constructed for and intended for use by propeller driven aircraft of a maximum gross weight of 12,500 pounds or less. A visual/greater than utility runway is a runway intended for the operation of aircraft weighing greater than 12,500 pounds and using only visual approach procedures, with no straight-in instrument approach procedure and no instrument designation indicated on an FAA approved airport layout plan, a military service approved military airport layout plan or by any planning document submitted to the FAA by competent authority. A non-precision instrument runway is a runway with an approved or planned straight-in instrument

approach procedure that has no existing or planned precision instrument approach procedure. A precision runway is served by an instrument procedure with vertical and horizontal guidance that allows for lower visibility landings.

Minden-Tahoe Airport does not currently have any straight-in instrument approach procedures. Therefore, under Part 77 requirements, Runway 16-34 is currently considered visual, larger than utility runways and Runways 12-30 and 30G are currently considered a visual, utility runway.

The Part 77 airspace surfaces for these classifications are defined as follows:

- The **primary surface** is an imaginary surface of specific width, longitudinally centered on a runway. The primary surface extends 200 feet beyond each end of the paved surface of runways, but does not extend past the end of unpaved runways. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline. The width is 1,000 feet for precision instrument runways, 500 feet for visual larger than utility and non-precision instrument runways and 250 feet for visual-utility runways.

  The existing primary surface width for Runway 16-34 is 500 feet. The existing primary surface width for Runways 12-30 and 30G is 250 feet.

- The **approach surface** is a surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of the runway based upon the type of approach available or planned for that runway, with approach gradients of 20:1, 34:1 or 50:1. The inner edge of the surface is the same width as the primary surface. It expands uniformly to a width corresponding to the Part 77 runway classification criteria.

  At Minden-Tahoe Airport, the approach surface for Runways 16-34 is 500 feet by 1,500 feet by 5,000 feet, with 20:1 approach surface slopes. The approach surface for Runways 12-30 and 30G are 250 feet by 1,250 feet by 5,000 feet with a 20:1 approach surface slope.

- The **transitional surfaces** at all airports extend outward and upward at right angles to the runway centerlines from the sides of the primary and approach surfaces at a slope of 7:1 and end at the horizontal surface.

- The **horizontal surface** is considered necessary for the safe and efficient operation of aircraft in the vicinity of an airport. As specified in Part 77, the horizontal surface is a horizontal plane 150 feet above the established airport elevation. The airport elevation is defined as the highest point of an airport's useable runways, measured in feet above mean sea level. The perimeter is constructed by arcs of specified radius from the center of each

end of the primary surface of each runway. The radius of each arc is 5,000 feet for runways designated as utility or visual and 10,000 feet for all other runways.

The existing horizontal surface arc at Minden-Tahoe Airport is 5,000 feet.

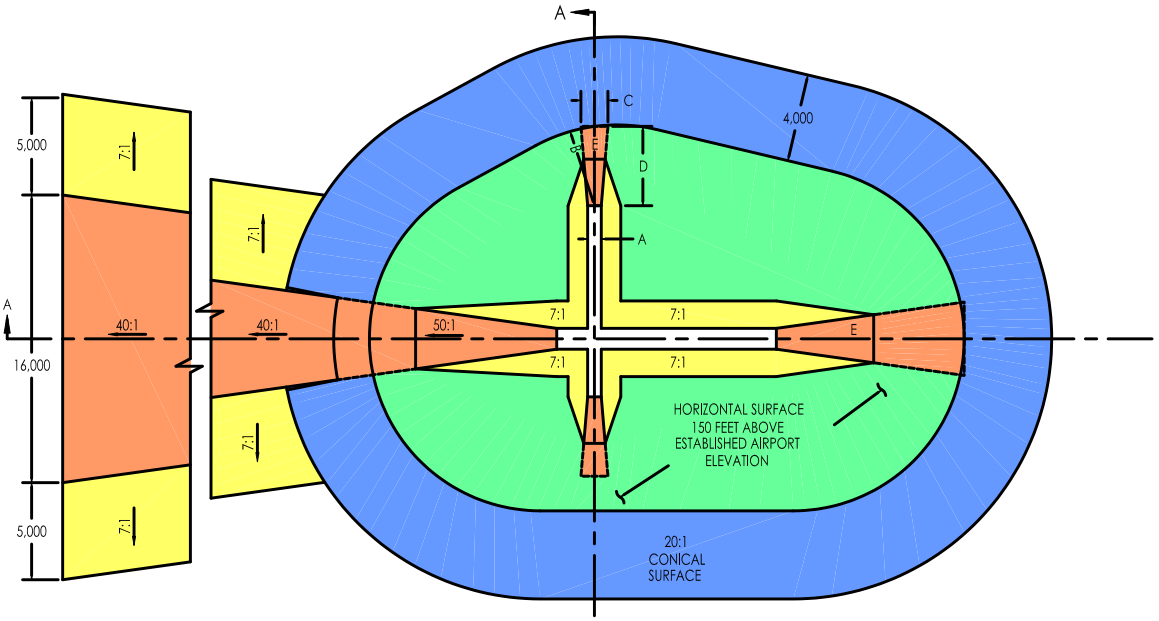
- The **conical surface** at all airports extends outward and upward from the periphery of the horizontal surface at a slope of 20:1 for a horizontal distance of 4,000 feet.

Table 2-11 summarizes the current Part 77 surfaces described above for Minden-Tahoe Airport.

Table 2-11 Part 77 Surfaces

Surface	Dimensions
Primary Surface width	RW 16: 500′ RW 34: 500′ RW 12: 250′ RW 30: 250′ RW 30G: 250′
Primary Surface beyond Runway end	RW 16-34: 200′ RW 12-30: 200′ RW 30G: 0′
Approach Surface dimensions	RW 16: 500′ x 1,500′ x 5,000′ RW 34: 500′ x 1,500′ x 5,000′ RW 12: 250′ x 1,250′ x 5,000′ RW 30: 250′ x 1,250′ x 5,000′ RW 30G: 250′ x 1,250′ x 5,000′
Approach Surface slopes	RW 16: 20:1 RW 34: 20:1 RW 12: 20:1 RW 30: 20:1 RW 30G: 20:1
Transitional Surface slope	7:1 (All Runways)
Horizontal Surface radius	5,000′ (All Runways)

Source: Title 14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*



DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON-PRECISION INSTRUMENT RUNWAY			PRECISION INSTRUMENT RUNWAY
		A	B	A	B		
					C	D	
A	WIDTH OF PRIMARY SURFACE AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF HORIZONTAL SURFACE	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON-PRECISION INSTRUMENT APPROACH			PRECISION INSTRUMENT APPROACH
		A	B	A	B		
					C	D	
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

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

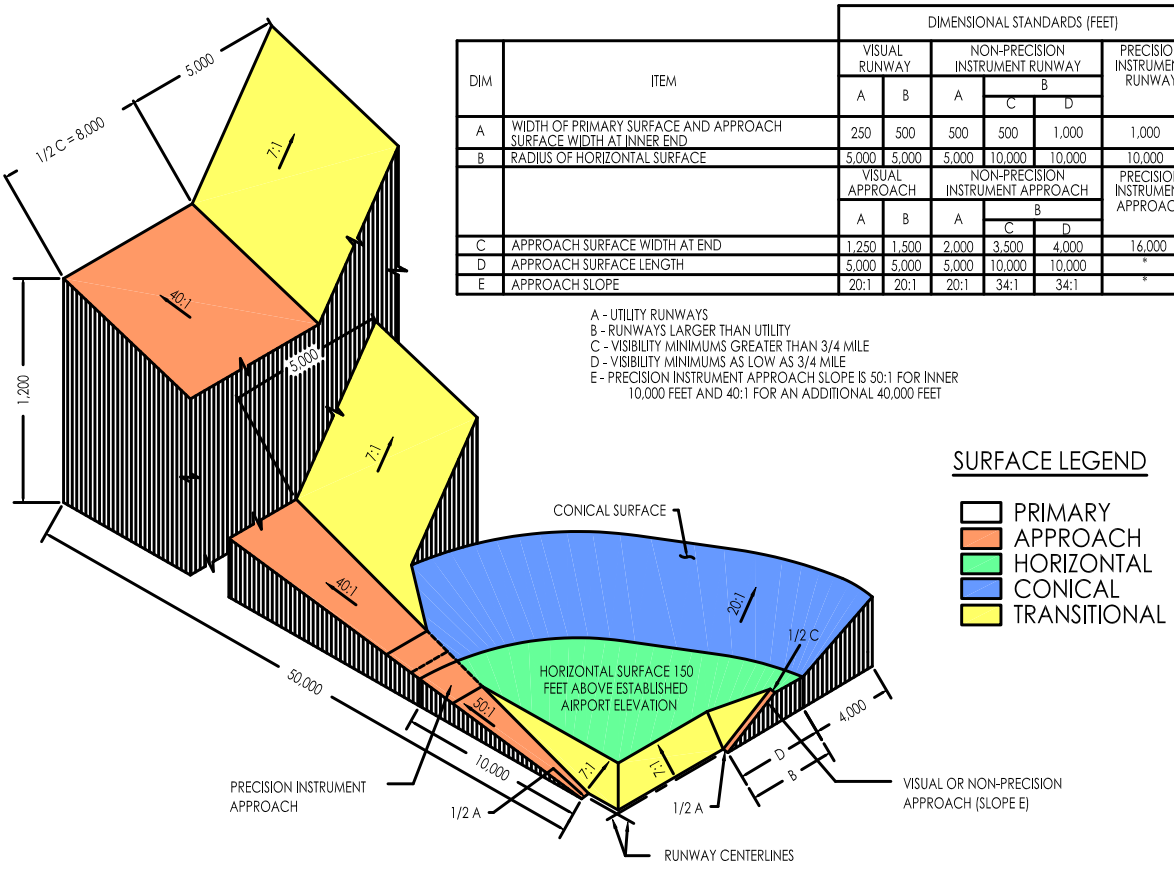


Figure 2-15 Part 77 Surfaces

Source: Federal Aviation Administration

2.7.10 Surrounding Airspace

2.7.10.1 National Airspace System

The National Airspace System consists of various classifications of airspace regulated by the FAA. Airspace classification is necessary to ensure the safety of all aircraft utilizing the facilities during periods of inclement weather, with the primary function of airspace classification being the separation of IFR traffic from VFR traffic. Pilots flying in controlled airspace are subject to air traffic control requirements and must either follow VFR or IFR regulations. These regulations, which include combinations of operating rules, aircraft equipment and pilot certification, vary depending on the class of airspace and are described in 14 CFR Part 91. **Figure 2-17** depicts the various airspace classifications.

Figure 2-16 Airspace Classification

Source: Federal Aviation Administration

Figure 2-17 shows the airport is located within uncontrolled Class G airspace. At 1,200 feet above the airport surface the airspace classification changes to controlled Class E airspace, which requires pilots to comply with more restrictive weather requirements and certain air traffic control procedures for IFR operations.

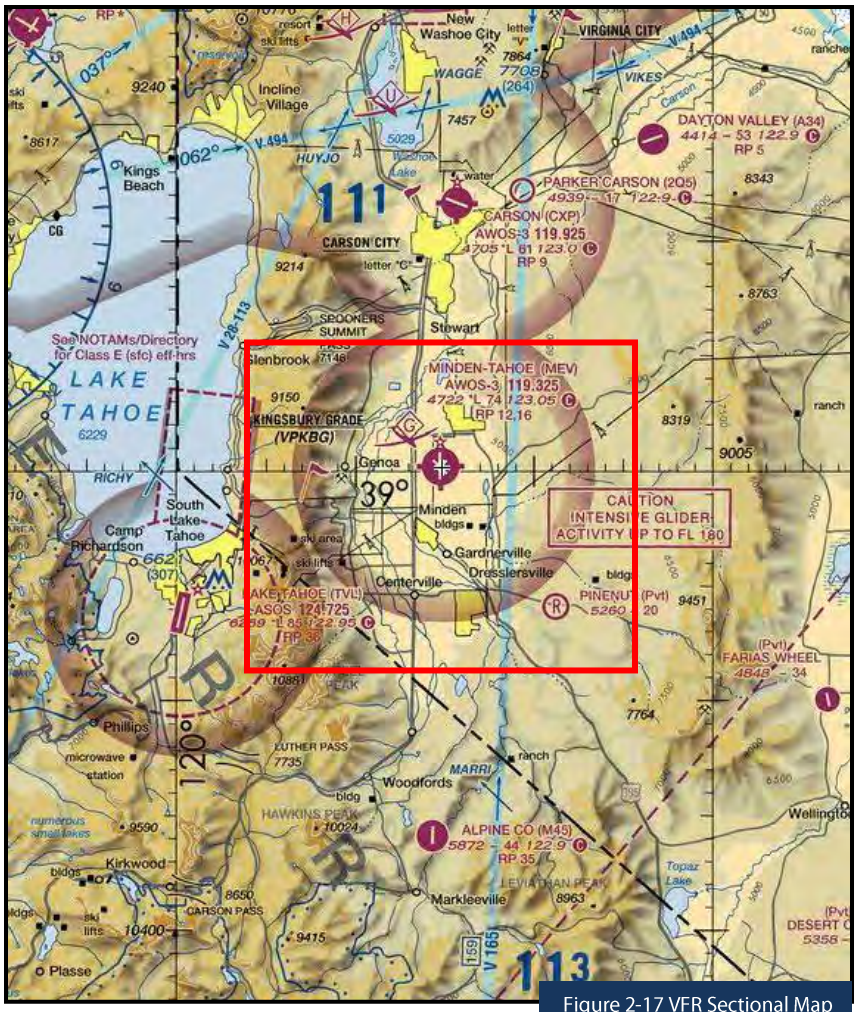


Figure 2-17 VFR Sectional Map

Source: www.skyvector.com, 2015

Victor airways are low altitude flight paths between ground-based VORs. There is a victor airway, Victor 165, east of the Airport.

Throughout most of the year, Minden-Tahoe is an uncontrolled airport; which means navigation and traffic awareness relies on the pilots using the airport. Pilots in the area can communicate or announce their intentions via the CTAF frequency of 123.05 MHz. A temporary air traffic control tower is utilized during fire season when there are frequent air tanker operations. The Airport is located within a controlled Class D airspace when the air traffic control tower is in use. Traffic patterns for powered aircraft at Minden-Tahoe are standard left hand traffic for Runways 34 and 30 and right hand traffic for Runways 16 and 12. Traffic patterns for gliders are right hand for all runways. Minden-Tahoe Airport has a traffic pattern altitude of 5,700 feet for light aircraft and 6,200 feet for heavy aircraft.

2.7.10.2 Airspace Jurisdiction

As previously discussed Minden-Tahoe Airport is located within the jurisdiction of the Oakland ARTCC and the Reno FSS. The altitude of radar coverage by the Oakland ARTCC may vary as a result of the FAA navigational/radar facilities in operation, weather conditions and the surrounding terrain. The Reno FSS provides additional weather data and other pertinent information to pilots operating into or out of Minden-Tahoe Airport.

2.7.10.3 Airspace Restrictions and Noise Abatement Procedures

Minden-Tahoe Airport is located within Class G airspace underlying class E airspace with a floor of 1,200 feet AGL shown on **Figure 2-16.** Military Operation Areas (MOAs) and low level military training routes (MTRs) are established for the purpose of separating certain military training activities, which routinely necessitate acrobatic or abrupt flight maneuvers, from IFR traffic. There are no MOAs or other restricted airspace within a 30 mile radius of Minden-Tahoe Airport.

Minden-Tahoe Airport has voluntary noise abatement procedures in order for aircraft to minimize their noise impacts on the surrounding area. Procedures at the Airport include, but are not limited to: pre-specified departure/arrival procedures and avoiding over flight of residential areas.

Minden-Tahoe Airport is at a disadvantage, as they do not have an Air Traffic Control tower to control movement within the terminal area and enforce noise abatement procedures. As a result, the community may be impacted by aircraft noise from aircraft which do not adhere to the voluntary procedures.

2.8 Existing Landside Facilities at Minden-Tahoe Airport

The landside facilities of an airport consist of those facilities that are not included as airside facilities and typically include any structure adjoining the airfield, terminal buildings, hangars, ground access routes to and from the airport, automobile parking areas, airport fencing, utilities, fuel provisions and snow removal equipment storage facilities. **Figure 2-18** illustrates the existing landside facilities at Minden-Tahoe Airport**.**

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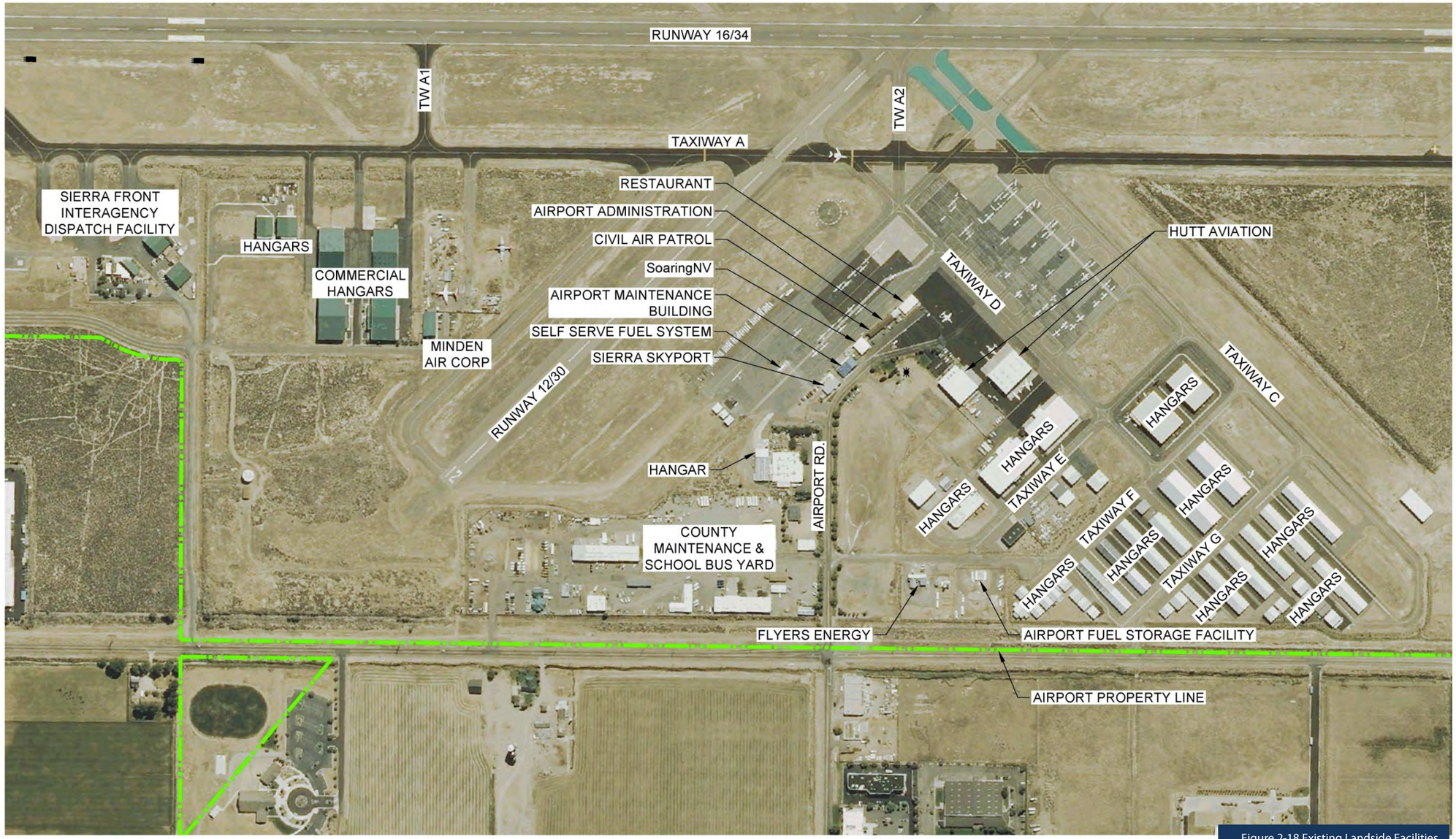

Figure 2-18 Existing Landside Facilities

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2.8.1 Pilot Services

A fixed base operator (FBO) is usually a private enterprise that leases land from the airport sponsor on which to provide services to based and transient aircraft. The extent of the services a FBO provides varies from airport to airport; but typically these services include aircraft fueling, minor maintenance and repair, aircraft rental and/or charter services, flight instruction, pilot lounge, flight planning facilities, aircraft tie down and/or hangar storage.

FBO services at Minden-Tahoe Airport are provided by Hutt Aviation and Sierra Skyport. Additionally, SoaringNV provides oxygen, flight training, aircraft rental and internet access. Aces Aircraft Maintenance, Rebuilt Aircraft and Walker Aviation also provide aircraft maintenance services at the Airport. Additional pilot facilities at the Airport include the Tail Dragger Café, a restaurant located adjacent to the aircraft parking apron. **Figure 2-19** shows Hutt Aviation and the Tail Dragger Café.

Figure 2-19 Tail Dragger Cafe and Airport Administration Building

Source: Armstrong Consultants, Inc.

2.8.2 Airport Administration Building

Minden-Tahoe Airport has a 1,600 square foot airport administration building. The building has five offices and office areas, conference room, two restrooms and a kitchen area. The building is considered to be in fair condition.

2.8.3 Hangar Facilities

Existing hangar facilities at Minden-Tahoe include a mix of 78 T-hangars and 80 conventional box hangars. The hangars at the Airport include a combination of private and county owned facilities. The hangars at Minden-Tahoe Airport are in good to fair condition. **Figure 2-20** depicts some of the hangars at Minden-Tahoe Airport.

Figure 2-20 Hangars at Minden-Tahoe Airport

Source: Armstrong Consultants, Inc.

2.8.4 Glider Facilities

Facilities for glider operations are generally located adjacent to the main West Aircraft Parking Apron at Minden-Tahoe Airport. There are dedicated areas for glider operations and support including office space, training rooms and vehicle parking. There are no physical structures by the East Aircraft Parking Apron which is utilized extensively by gliders.

2.8.5 Air Tanker Base

Minden-Tahoe Airport has an air tanker base, the Sierra Front Interagency Dispatch Center, located west of the Runway 16 threshold. Crews from both the U.S. Forest Service and Nevada Division of Forestry operate at this base. The base includes one central facility and two hangars along with two slurry loading pads. The base serves as a central command post for aerial firefighting coordination and response for northwestern Nevada.

2.8.6 Access Routes and Signage

The airport is located on Heybourne Road which is accessed via County Road 759. Downtown Minden can be accessed from the Airport via County Road 759 which connects with U.S. Highway 395. Signage is located throughout the Town of Minden and surrounding areas to guide visitors to the Airport.

2.8.7 Ground Transportation

Car rentals are available at Minden-Tahoe Airport through Hertz Rent-A-Car and Enterprise. Additional ground transportation can be obtained through various taxi cab operators or hotel/resort shuttles. The nearest rail and bus stations are located in Reno.

2.8.8 Automobile Parking

Automobile parking facilities are necessary for originating and terminating airport users and visitors. It is important that vehicle parking is adequate to serve the needs of all airport users and visitors. The automobile parking lot is located in the western portion of the Airport adjacent to the administration building and Tail Dragger Café. This lot offers a paved parking area of approximately 6,300 square yards, 87 parking spaces and three handicapped parking spaces.

2.8.9 Utilities

Available utilities at Minden-Tahoe Airport include electric, sewer, potable water, internet and phone. There are existing utilities in the western portion of the airport property with no utilities available in the eastern portion. A project is currently in progress to plan, design and install utility infrastructure within the eastern airport development area.

2.8.10 Fencing

The primary purpose of airport fencing is to prevent inadvertent intrusions by persons or animals entering airport property. Airport fencing also provides an increased level of safety and security for the airport. Fencing is commonly installed along the perimeter of the airport property and outside of any safety areas or below all imaginary surfaces as defined by FAA Advisory Circular 150/5300-13A, Change 1 and Part 77.

A six foot chain link with three strand barb wire fence partially encompasses the terminal area. Four-strand barbed wire fence encompasses the remainder of the Airport boundary. The Airport has electric vehicle access gates and manual gates that provide access to the airfield. **Figure 2-21** shows the existing perimeter fence at the Minden-Tahoe Airport.

Figure 2-21 Airport Fencing

Source: Armstrong Consultants, Inc.

2.8.11 Fuel Facilities

Minden-Tahoe Airport has two fuel providers at the Airport. Hutt Aviation owns and operates five 12,000 gallon above ground fuel storage tanks with a combination of Jet-A and 100 Low Lead (100LL) AvGas. Hutt Aviation also has three fuel delivery trucks. Their hours of operation are from 7:00 A.M. to 5:00 P.M., and after hours by request. Sierra Skyport owns and operates one 24-hour self-serve, 12,000 gallon, above ground, 100 LL AvGas fuel storage tank. The Hutt Aviation fuel tanks are shown in **Figure 2-22**. Spill Prevention, Control and Countermeasure (SPCC) and Storm-water Pollution Prevention (SWPP) Plans are maintained by both Hutt Aviation and Sierra Skyport.

Figure 2-22 Fuel Storage Tanks

Source: Armstrong Consultants, Inc.

2.8.12 Emergency and Security Services

The nearest hospital is the Carson Valley Medical Center located eight miles south of the Airport in Gardnerville. The Minden-Tahoe Airport is served by the East Fork Fire Protection District. The Fire Protection district operates 16 stations with two support facilities and 63 full-time personnel with 80 additional volunteers. The nearest station is located 4.6 miles north of the Airport. The station is equipped with one engine, one water tender, two brush trucks, one rescue vehicle and one utility vehicle. Security is provided through periodic patrols and incident response by the Douglas County Sheriff's Department. There is no designated security personnel located at the Airport.

2.8.13 Snow Removal and Maintenance Equipment

Snow removal and airfield maintenance is conducted by Airport operations personnel. Snow removal and maintenance equipment at the airport includes a Ford and GMC pickup, a Mac dump truck, a tractor and a Bobcat. All vehicles have snow plow attachments. The Bobcat also has a snow blower attachment. The Airport has a 3,000 square foot maintenance equipment storage building which is in good condition. The maintenance equipment storage building is shown in **Figure 2-23**.

Figure 2-23 Maintenance Equipment Storage Building

Source: Armstrong Consultants, Inc.

2.9 Land Use Compatibility

The FAA recommends that airport sponsors protect the areas surrounding an airport from incompatible development. Incompatible development includes those land uses which would be sensitive to aircraft noise or over flight, such as residences, schools, churches and hospitals and those uses which could attract wildlife and cause a hazard to aircraft operations such as certain agriculture crops, landfills, ponds and wastewater treatment facilities. The height of objects surrounding airports also needs to be considered in order to avoid airspace impacts to existing and future instrument approach procedures. Current land uses within the area surrounding the Airport are considered to be compatible.

Douglas County has zoned property north and west of the Airport as LI – Light Industrial with the remainder zoned R-19 – Agriculture or FR-19 – Forest Range. The County has zoning ordinances in effect for the Airport Influence Area. **Figure 2-24** illustrate Douglas County's zoning surrounding Minden-Tahoe Airport. **Figure 2-25** depicts the Airport Influence Zone.

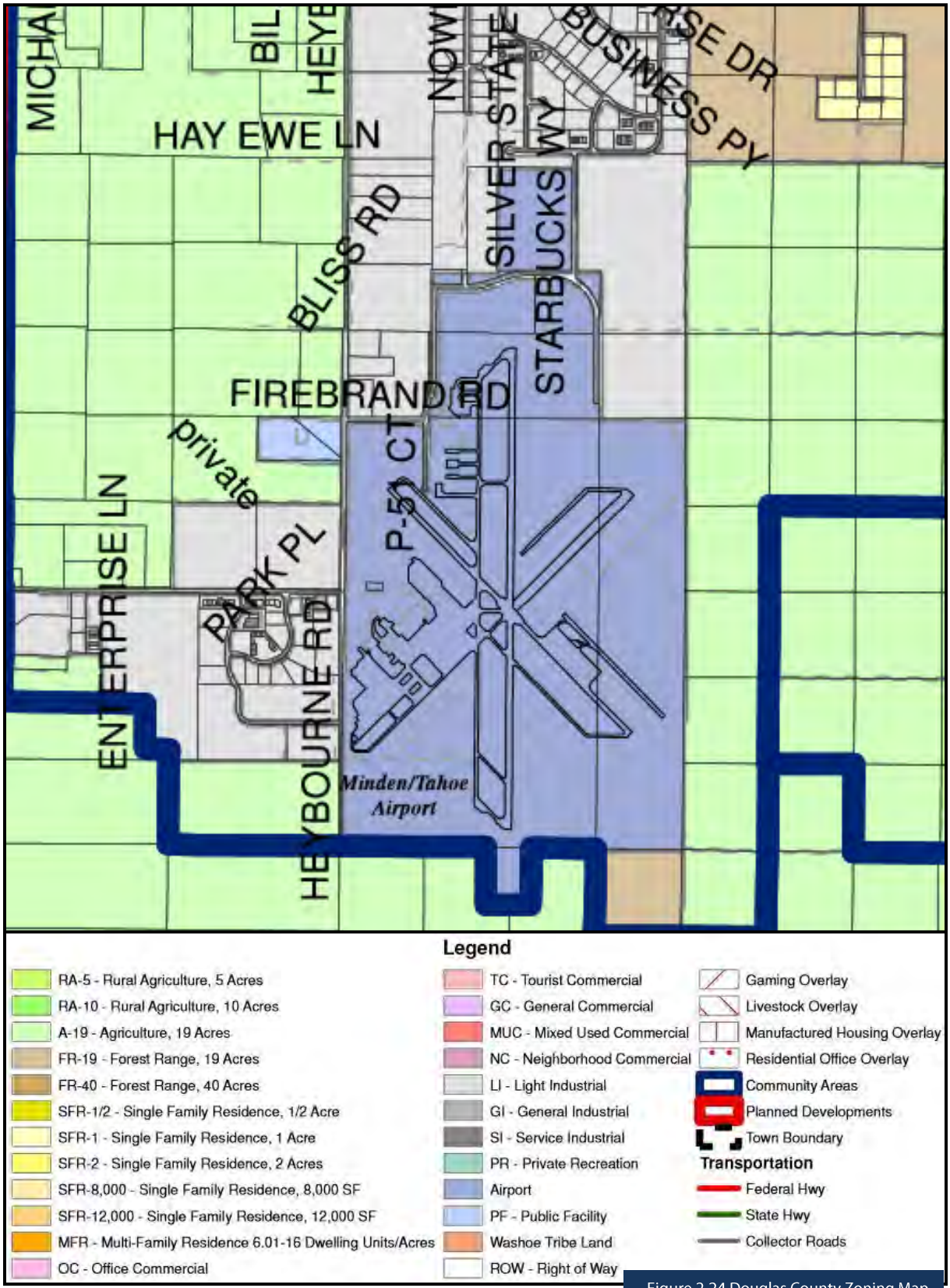


Figure 2-24 Douglas County Zoning Map

Source: Douglas County, 2015

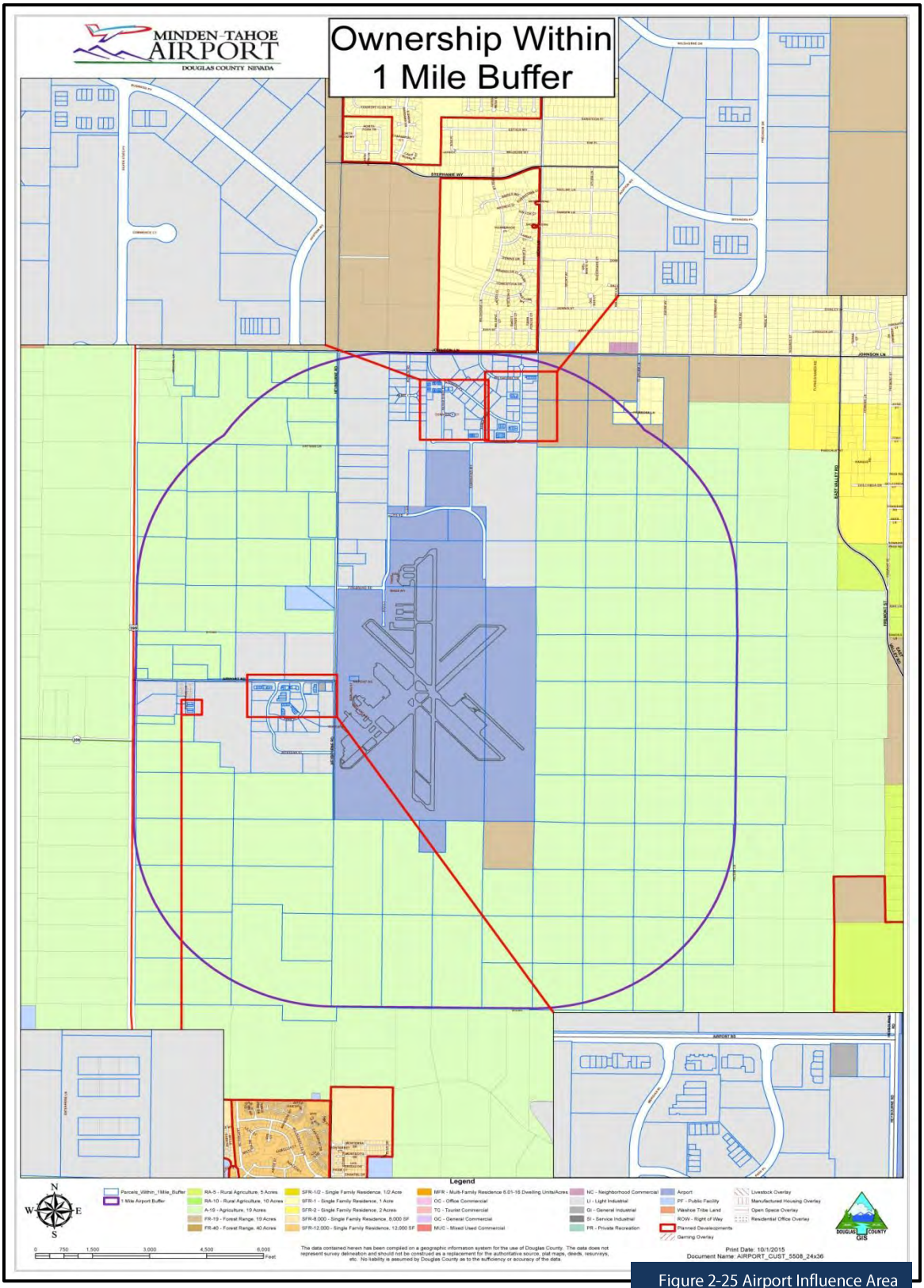


Figure 2-25 Airport Influence Area

Source: Douglas County, 2015

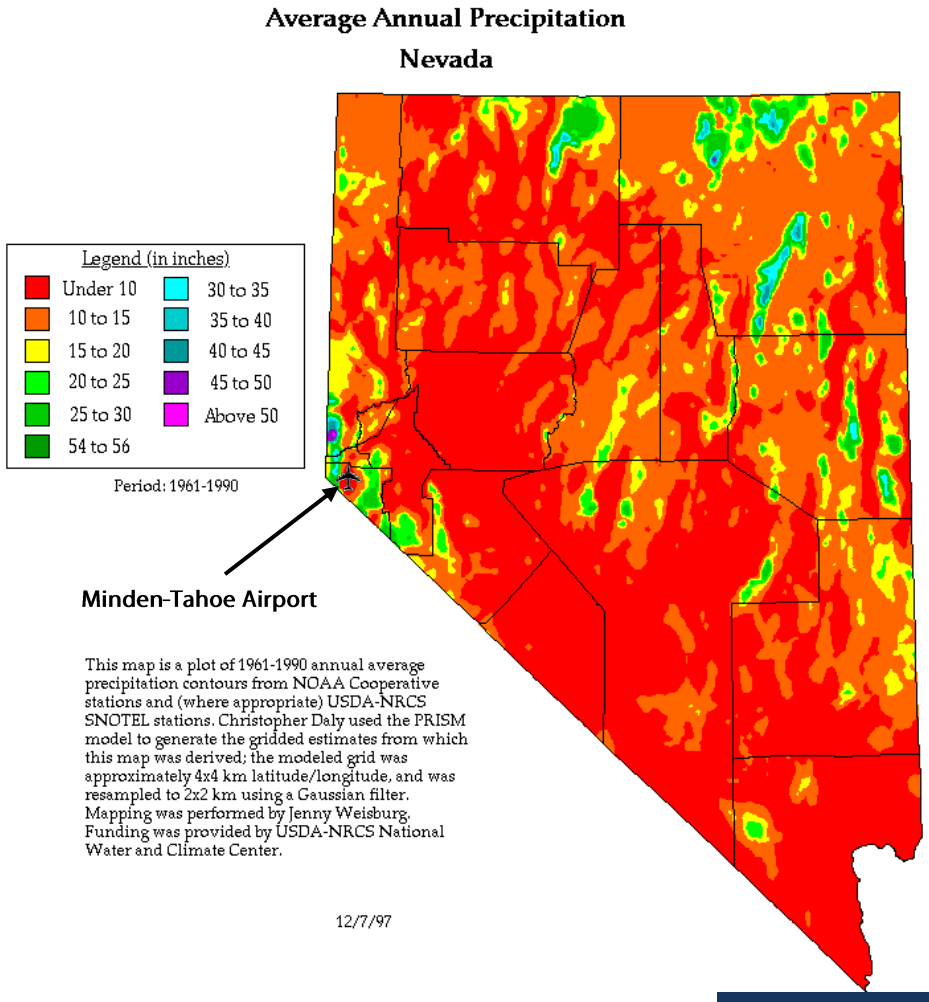
2.10 Meteorological Conditions

Meteorological conditions have a direct impact on the operational characteristics of an airport. These conditions determine the regulations under which operations may be conducted, the frequency of use for each operational configuration and the instrumentation required to assist aircraft in landing and departing. Temperatures combined with airport elevation also have an effect on aircraft performance capabilities. Precipitation levels, especially snowfall, can affect aircraft operations.

2.10.1 Local Climatic Data

According to the Western Regional Climate Center, the Town of Minden receives 8.4 inches of rainfall per year, with snowfall averaging 18.7 inches. The Town averages 41 precipitation days and 251 sunny days per year. Temperatures range from an average maximum temperature of 90 degrees Fahrenheit in July to an average minimum temperature of 17 degrees Fahrenheit in January.

As depicted in **Figure 2-26**, Douglas County is located within an area that receives an average of less than 10 inches of precipitation per year, according to the Western Regional Climate Center.



Source: Western Regional Climate Center, 2015

Figure 2-26 Nevada Precipitation Map

2.10.2 Ceiling and Visibility Conditions

Ceiling and visibility conditions are important considerations for an airport as the occurrence of low ceiling and/or poor visibility limits the use of the airport until conditions improve. The Town averages 69 percent sunny days per year. Minden-Tahoe Airport has a non-precision instrument approach procedure with circling visibility minimums to accommodate aircraft during inclement weather conditions.

2.10.3 Runway Wind Coverage

An analysis of wind is essential in determining the desired alignment and configuration of the runway system. It is beneficial to align runways as closely as practicable in the direction of the prevailing winds. Aircraft land and takeoff into the wind and, therefore, can only tolerate limited crosswind components (winds that blow perpendicular to the runway centerline). The maximum allowable crosswind depends on the aircraft size, design

characteristics and pilot proficiency. **Table 2-12** shows allowable crosswind components for aircraft according to their Airport Reference Code.

Table 2-12 Allowable Crosswind Component

Crosswind (knots)	Airport Reference Code
10.5	A-I, B-I
13.0	A-II, B-II
16.0	A-III, B-III, C-I through D-III
20.0	A-IV through D-VI

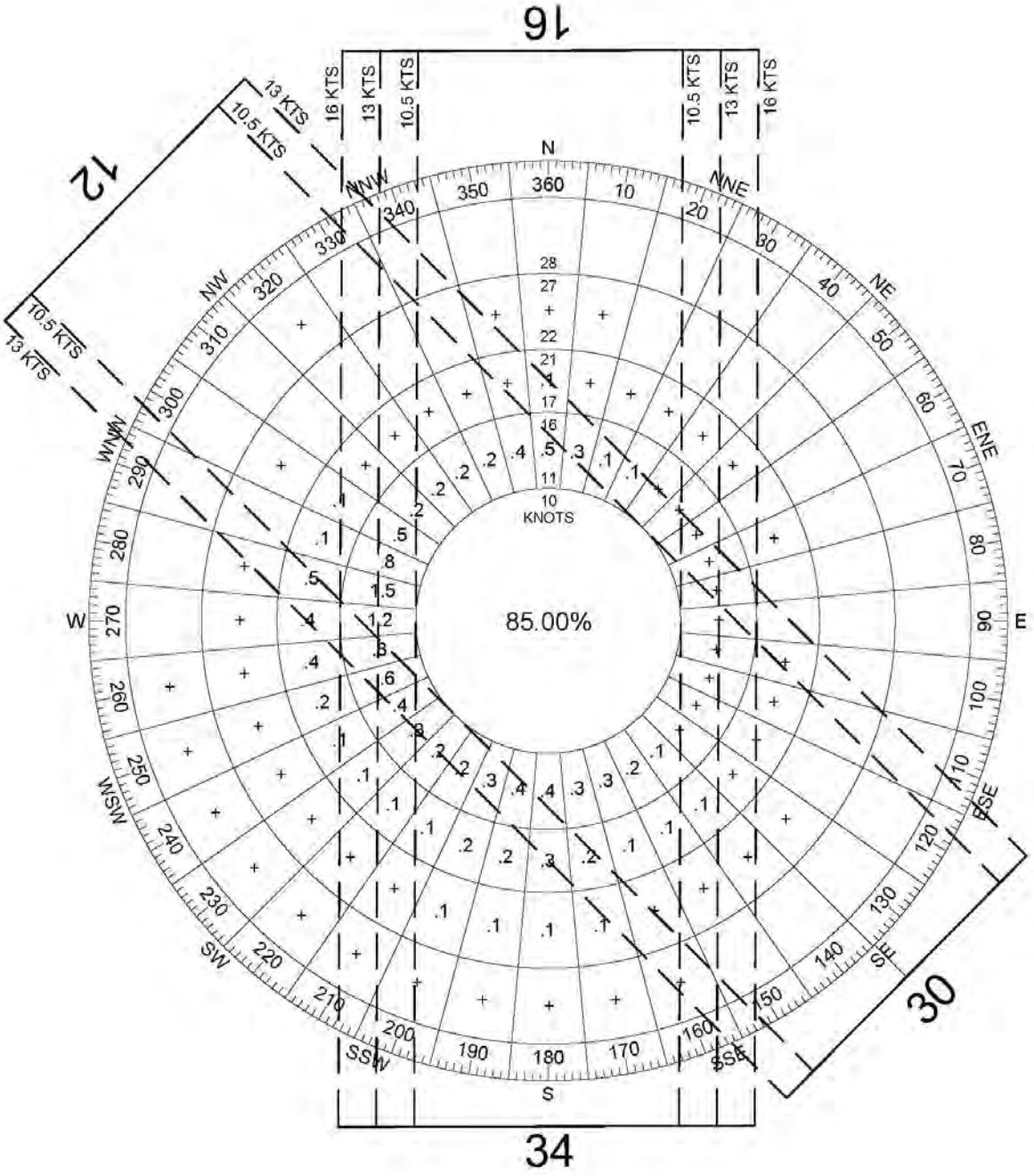
Source: FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*

FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*, recommends that a runway should be oriented so that it yields 95 percent wind coverage under stipulated crosswind coverage defined by the ARC. If a single runway alignment cannot meet the recommended 95 percent wind coverage then construction of an additional runway may be advisable. **Table 2-13** lists the crosswind coverage for Minden-Tahoe Airport. **Figure 2-27** depicts the crosswind coverage for Minden-Tahoe Airport.

Table 2-13 Wind Data for Minden-Tahoe Airport

Crosswind (knots)	Percent of Coverage		
	Combined	Runway 16-34	Runway 12-30
10.5	96.11%	91.64%	92.84%
13.0	98.18%	94.56%	95.91%
16.0	97.82%	97.82%	-

Source: Minden-Tahoe Airport AWOS, based on 38,370 observations from 2014 to 2016.



Source: Minden-Tahoe AWOS and Armstrong Consultants, Inc.

Figure 2-27 All-Weather Windrose

2.11 Environmental Inventory

The purpose of the environmental inventory is to identify key environmental resources that may be affected by potential airport development. The data compiled in this section will be used throughout the report when evaluating potential airport development alternatives and identifying any potential environmental impacts and environmental related permits that may be required for recommended development projects.

2.11.1 Air Quality

Counties that are designated as non-attainment have one or more of the six principal criteria pollutants as listed by the Clean Air Act. Counties that are below this criteria level are in attainment of the National Ambient Air Quality Standards (NAAQS). The Airport is located in Douglas County, which is considered to be within attainment for NAAQS as depicted within **Figure 2-28**. The air quality map identifies counties that are designated as Nonattainment for one or more National Ambient Air Quality Standards (NAAQS).

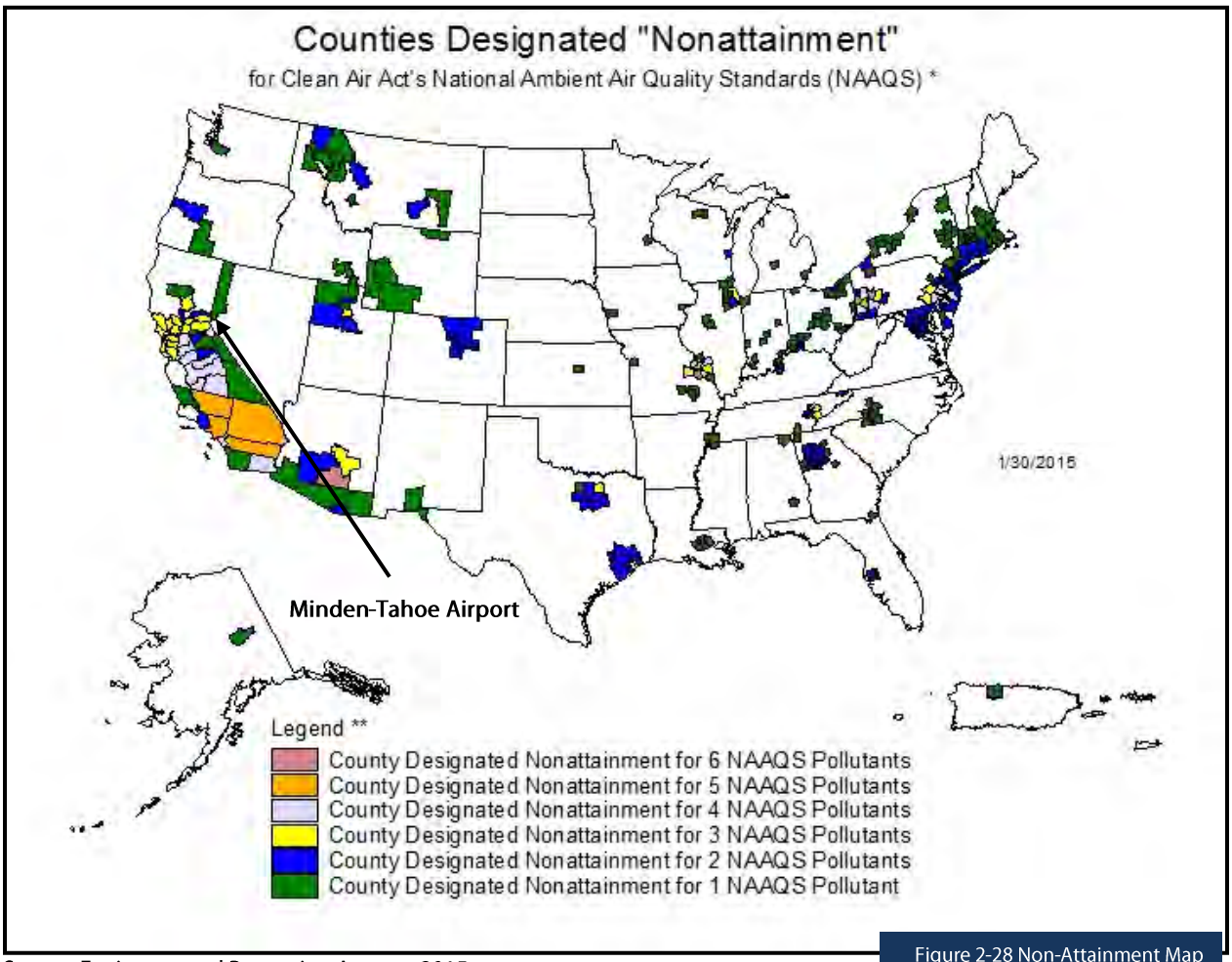


Figure 2-28 Non-Attainment Map

Source: Environmental Protection Agency, 2015

2.11.2 Department of Transportation Act – Section 4(f)

There are no publicly owned parks, recreation areas, wildlife and waterfowl refuges of National, State or Local significance or land from an historic site of National, State or Local significance located in the immediate vicinity of the airport.

2.11.3 Fish, Wildlife and Plants

The U.S. Fish and Wildlife Service was contacted to obtain an Official Threatened and Endangered Species List for the area encompassing Minden-Tahoe Airport. The following threatened, endangered or candidate species are listed for Douglas County and were evaluated for suitable habitat within vicinity of the Airport:

- **Fishes**
  - Lahontan cutthroat trout, *Oncorphynchus clarkia henshawi* – Threatened

- **Insects**
  - Carson wandering skipper, *Pseudoocopaeodes aunus obscurus* – Endangered

Neither of the two evaluated species have critical habitat on Minden-Tahoe Airport.

2.11.4 Historical, Architectural, Archaeological and Cultural Resources

The nearest historical site is the Genoa Historical District located five miles west of the Airport. There are no known historical, architectural or archaeological sites located at Minden-Tahoe Airport.

2.11.5 Wetlands

The U.S. Fish and Wildlife Service *National Wetlands Inventory* was reviewed to determine the location of wetlands within the vicinity of Minden-Tahoe Airport. **Figure 2-29** depicts the location of wetlands surrounding Minden-Tahoe Airport. The closest wetland areas are located approximately 300 feet south of the Airport. Future development projects will be evaluated to determine what, if any, impacts would occur.

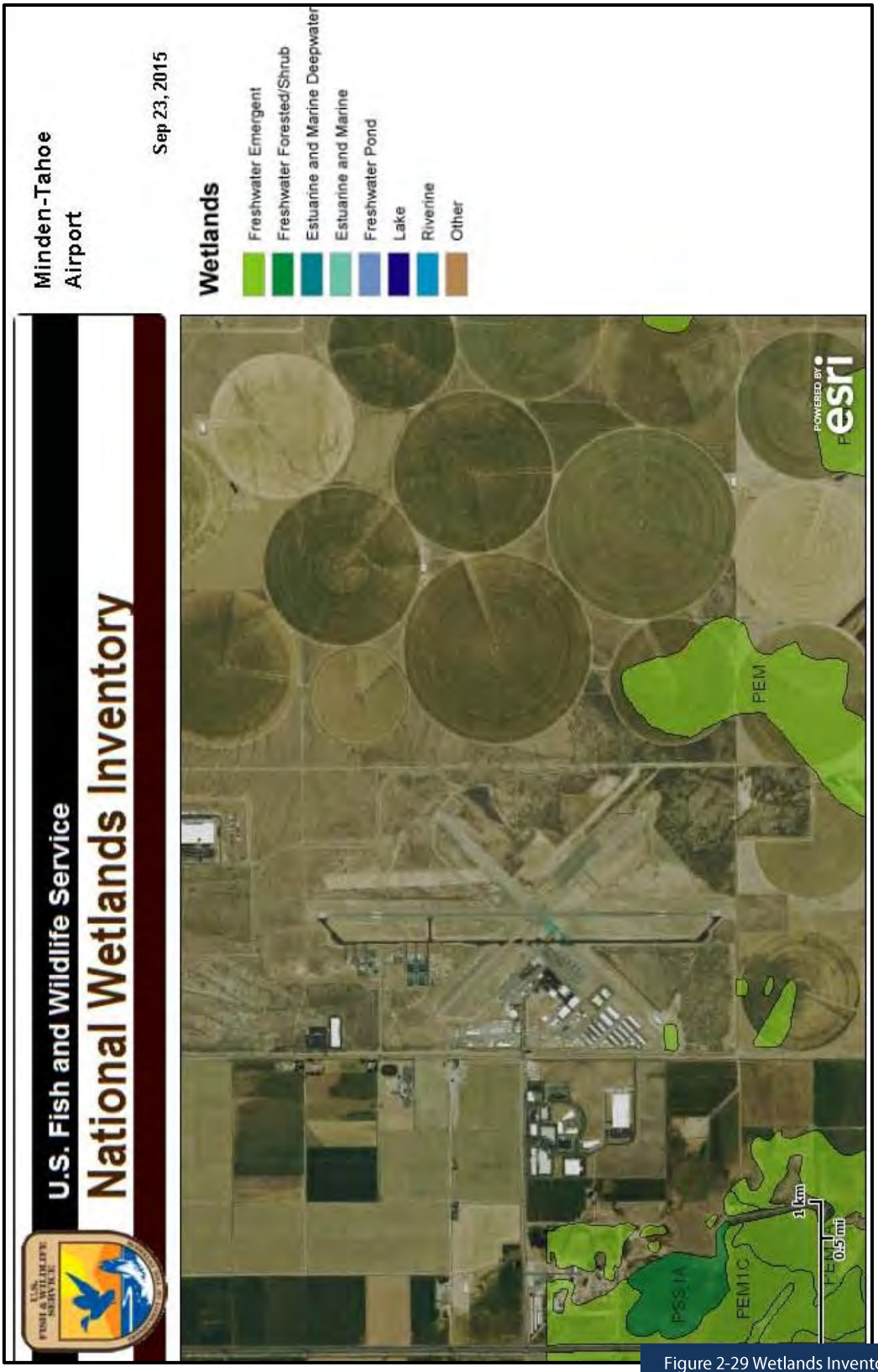


Figure 2-29 Wetlands Inventory Map

Source: United States Fish and Wildlife Service, 2015

2.12 Financial Overview

Airport Management reported the Airport is completely financially self-sustaining through land leases, tiedown fees, hangar rentals and fuel flowage fees. Pro forma projections are further evaluated in Chapter Eight, *Airport Development and Financial Plan*.

2.13 Factors Influencing Minden-Tahoe Airport

Below is a list of factors at Minden-Tahoe Airport to consider in the formulation of this Airport Master Plan:

- Minden-Tahoe Airport is one of the busiest airports serving the popular Lake Tahoe region.
- The Airport does not have permanent on-field air traffic control to ensure control of the busy airfield and adherence to noise abatement procedures.
- Potential users to the Airport are constrained by the lack of available hangar space.
- The Town of Minden experiences weather which has the potential to reduce visibility below circling minimums approximately 31 percent of the year.
- The Airport's high elevation, high density altitude and limited runway length may constrain current and potential airport users.

2.14 Summary of Airport Facilities

Table 2-14 provides a summary of the existing facilities available at Minden-Tahoe Airport.

Table 2-14 Existing Airport Facilities

Airport Data	Description
Identifier	KMEV
FAA Site Number	13091.*A
FAA NPIAS Number	32-0013
Owner	Douglas County
Airport Management Firm	ABS Aviation
Airport Elevation	4,723' MSL
Airport Facility	**Description**
Airport Reference Code	C-III-5000
Runway Design Code	RW 16-34: C-III-5000 RW 12-30: B-II-5000 RW 30G: B-I (small) - VIS
Runway Dimensions	RW 16-34: 7,399' x 100' RW 12-30: 5,298' x 75' RW 30G: 2,049' x 60'
Runway Surface Type	RW 16-34: Asphalt RW 12-30: Asphalt RW 30G: Dirt
Pavement Strength	RW 16-34: 99,000 lbs. SWG / 140,000 lbs. DWG RW 12-30: 27,000 lbs. SWG / 40,000 lbs. DWG RW 30G: Not Applicable
Runway Markings	RW 16-34: Non-Precision RW 12-30: Basic Runway 30G: None
Runway Lighting	RW 16-34: MIRL RW 12-30: None RW 30G: None
Instrument Approach	GPS Circling
Approach Minimums	Visual
Approach Lighting	None
Taxiways	One Parallel Taxiway (TW A) Three Partial Parallel Taxiways (TW B, TW C and TW S)
Aprons	Approximately 115,120 S.Y.
Tie Downs	132
Visual Aids	RW 16-34: VASIs, Threshold Lights RW 12-30: None RW 30G: None
Pilot Lounge	Yes – Hutt Aviation and Administration Building
Hangar Facilities	Approximately 80 Box Hangars and 78 T-Hangar Buildings
Fuel Storage	Hutt Aviation: 5 12,000 Gallon Tanks (Jet-A and AvGas) Sierra Skyport: 1 12,000 Gallon AvGas Tank
Fuel Service	Hutt Aviation: Full-service from 7:00 A.M. to 5:00 P.M. Sierra Skyport: 24-hour self-service
Weather Equipment	AWOS-III P/T
Automobile Parking	6,300 S.Y. Paved
Other Airport Facilities	Restaurant, Aircraft Maintenance, Avionics Repairs, Flight Instruction, Aircraft Charters, Aircraft Sales, Rental Cars, Hotel Shuttles, Taxi, Glider Towing, Skydiving, Glider Flights

Source: Armstrong Consultants, Inc., 2015

Chapter Three

Forecasts of Aviation Demand

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

3.1 Introduction

Forecasts of aviation activity provide the basis for evaluating the adequacy of existing airport facilities and its capability of handling existing and future traffic demand. Forecasts are the foundation for effective decision making in airport planning and establish the level of capital improvements needed and the projected timing of those necessary investments.

While forecast information is necessary for successful comprehensive airport planning, it is important to recognize that forecasts are only approximations of future activity, based upon historical data and viewed through present situations. Therefore, forecasts must be used with careful consideration, as they may lose their validity with the passage of time or are impacted by unforeseen changes in the surrounding market.

General aviation forecasts are typically based on historical data and other broadly accepted industry and governmental estimates of aviation activity, as well as the primary socioeconomic drivers of general aviation activity.

For this reason, an ongoing program of examination of local airport needs and national and regional trends is recommended and encouraged in order to promote the logical development of aviation facilities at Minden-Tahoe Airport.

At airports not served by air traffic control towers, approximations of existing aviation activity are necessary in order to form a basis for the development of reliable forecasts. Unlike towered airports, non-towered general aviation airports have historically not tracked or maintained comprehensive logs of aircraft operations. Therefore, approximations of existing aviation activity are based upon the most reliable data available, including reviews of based aircraft, fuel sales, historical data, local information and regional, state and national data forming the baseline to which forecasted aviation activity trends are applied.

Forecast methodologies and analysis in this study consider historical aviation trends at Minden-Tahoe Airport, as well as throughout the nation. The latest local historical data was collected from Airport management records.

Aviation activity projections are made based upon estimated growth rates, area demographics and socioeconomics, industry trends and other relevant indicators. Forecasts are prepared for the initial-term (0-5 years); the intermediate-term (6-10 years); and long-term (11-20 years) time frames. Using forecasts within this planning horizon will allow the airport's improvements to be implemented in order to efficiently meet the expected demand.

3.2 Aircraft Operation Categories

There are four types of aircraft operations considered in the planning process. These are termed "local, based, itinerant and transient." They are defined as follows:

Local operations: Departures or arrivals for the purpose of training, pilot currency or pleasure flying within the immediate area of the local airport. These operations typically consist of touch-and-go operations, practice instrument approaches, flights to and from local practice areas and pleasure flights that originate and terminate at the airport under study.

Itinerant operations: Departures that originate or terminate at another airport. These types of operations are closely tied to local demographic indicators, such as the use of aircraft by local businesses and use of the facility for recreational purposes. Itinerant operations may be conducted by based and transient aircraft.

Based aircraft operations: The total operations made by aircraft based (stored at the airport on a permanent, seasonal or long-term basis) at the study airport, with no attempt to classify the operations as to purpose. If based at more than one airport, the airport at which the aircraft is stored at the most days is the base airport (example: the airport at which the aircraft is located at more than 6 months out of the year if operated out of two different airports).

Transient operations: The total operations made by aircraft other than those based at the airport under study. These operations typically consist of business or pleasure flights originating at other airports, with termination or a stopover at the study airport.

The terms transient and itinerant are sometimes erroneously used interchangeably. This study will confine analysis to local and itinerant operations to correlate with FAA and State Aeronautics forecasting criteria.

3.3 National and Regional Trends in General Aviation

According to factors such as aircraft production, pilot activity and hours flown, general aviation reached a peak in the late 1970s. This peak was followed by a long downturn that persisted through most of the 1980s and the early 1990s and has been attributed to high manufacturing costs associated with product liability issues as well as other factors. The General Aviation Revitalization Act (GARA) of 1994 was enacted with the goal of revitalizing the industry by limiting product liability costs. The Act established an 18-year statute of repose on liability related to the manufacture of all general aviation aircraft and their components. According to a 2001 report to Congress by the General Accounting Office (GAO), trends in general aviation since GARA was enacted suggest that liability costs have been less burdensome to manufacturers, shipments of new aircraft have increased and technological advances have been made. Indicators of general aviation activity, such as the

numbers of hours flown and active pilots, have also increased in the years since GARA, but their growth has not been as substantial as the growth in manufacturing.

The FAA annually convenes expert panels in aviation and develops forecasts for future activity in all areas of aviation, including general aviation. The FAA's 2014-2035 forecast predicts that the total general aviation fleet will increase at an average annual rate of 0.4 percent during the 21-year forecast period, growing from 198,860 aircraft in 2014 to 214,260 aircraft in 2035. The fleet of jet turbine aircraft is expected to increase at a greater rate than the fleet of piston aircraft; as a result, the number of piston aircraft, while continuing to increase, it is expected to represent a smaller percentage of the total general aviation fleet. **Figure 3-1** and **Figure 3-2** illustrate this forecasted change to the general aviation fleet that is forecast to occur over the 21-year period.

In 2005 the category of "light sport" aircraft was created. At the end of 2013 a total of 2,056 aircraft were included in this category. By 2035, a total of 5,360 light sport aircraft are projected to be in the fleet.

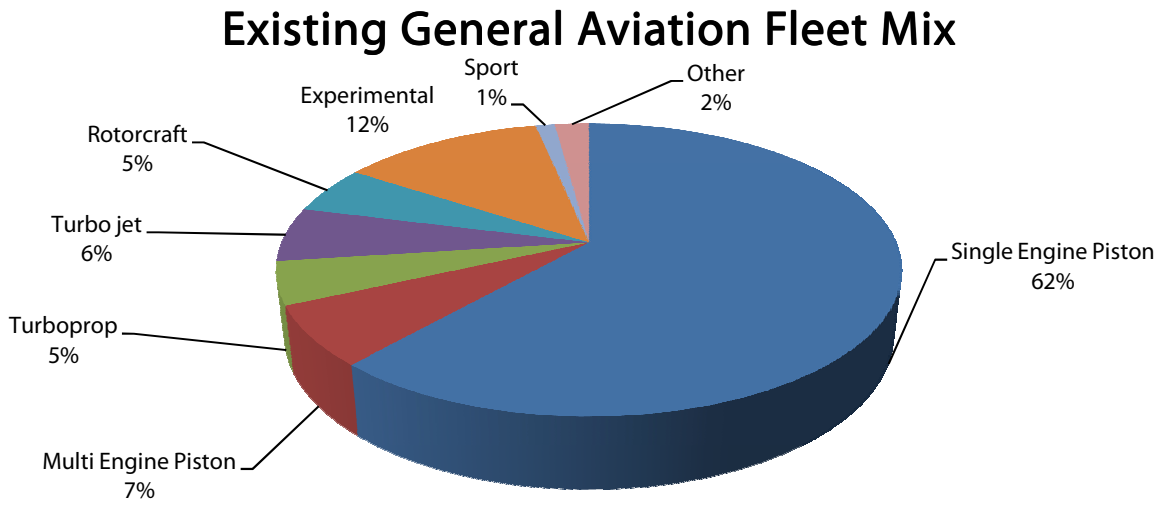


Figure 3-1 Existing National GA Fleet Mix

Source: Federal Aviation Administration, 2014

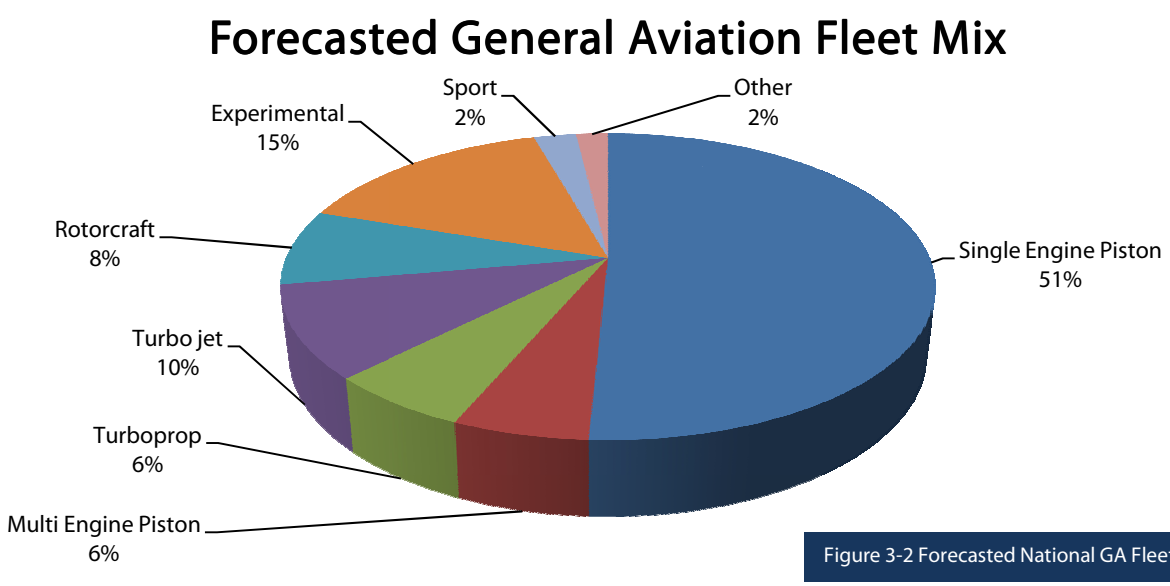


Figure 3-2 Forecasted National GA Fleet Mix

Source: Federal Aviation Administration, 2014

The General Aviation Manufacturer's Association (GAMA) produces activity forecasts based on general aviation hours flown. As shown in **Table 3-1**, the biggest predicted increase is for turbo jet and light sport aircraft at 4.2 percent and 5.1 percent growth respectively from 2014 through 2034. Both fixed wing piston aircraft categories are forecast to decline slightly through the forecast period.

Table 3-1 U.S. Aircraft Hours Flown

Year	Aircraft			Rotorcraft		Other	Experimental	Light Sport	Total Hours Flown (Thousands)
	Piston	Turbine	Turbo Jet	Piston	Turbine				
2014	12,521	2,784	3,571	765	2,804	182	1,237	193	24,057
2015	12,233	2,809	3,744	782	2,884	183	1,287	206	24,128
2016	11,992	2,828	3,927	799	2,987	185	1,343	221	24,282
2017	11,785	2,852	4,123	816	3,103	186	1,405	239	24,509
2018	11,618	2,872	4,317	834	3,220	187	1,454	254	24,756
2019	11,476	2,897	4,521	850	3,335	189	1,489	268	25,025
2020	11,360	2,953	4,952	882	3,575	190	1,526	282	25,720
2021	11,255	2,953	4,952	882	3,575	191	1,563	295	25,666
2022	11,183	2,992	5,172	898	3,695	192	1,600	309	26,041
2023	11,141	3,032	5,391	913	3,801	194	1,636	325	26,433
2024	11,099	3,080	5,609	927	3,906	195	1,709	360	26,885
2025	11,072	3,141	5,838	943	4,012	196	1,709	360	27,271
2026	11,057	3,211	6,069	957	4,120	198	1,743	377	27,732
2027	11,052	3,290	6,303	974	4,229	199	1,778	395	28,220
2028	11,049	3,381	6,542	990	4,343	200	1,812	413	28,730
2029	11,063	3,479	6,785	1,005	4,458	202	1,847	432	29,271
2030	11,076	3,582	7,029	1,021	4,577	203	1,882	449	29,819
2031	11,116	3,688	7,275	1,038	4,703	204	1,917	466	30,407
2032	11,174	3,800	7,512	1,055	4,831	206	1,952	482	31,012
2033	11,250	3,920	7,751	1,072	4,976	207	1,987	498	31,661
2034	11,361	4,041	8,005	1,090	5,123	208	2,023	513	32,364
AAG:	**-0.60%**	**1.80%**	**4.20%**	**1.80%**	**3.10%**	**0.70%**	**2.60%**	**5.10 %**	**1.73%**

Source: General Aviation Manufacturer's Association, 2014

The FAA projects the number of active general aviation pilots (excluding air transport pilots) to be 448,400 in 2035, an increase of 12,710 over the forecast period. Commercial pilots are projected to increase from 104,250 in 2015 to 113,250 in 2035, an average annual increase of 0.2 percent from 2015 to 2024 and 0.4 percent from 2025 to 2035. The number of student pilots is forecast to decrease at an average annual rate of 0.3 percent over the forecast period, declining from 119,650 in 2015 to 112,200 in 2035. The number of private pilots is projected to decrease at an average yearly rate of 0.3 percent over the forecast period from 173,750 in 2015 to a total of 163,600 in 2035. The FAA is also projecting that by the end of the forecast period a total of 14,950 sport pilots will be certified. It is also projected that the estimated number of sport pilot certificates in 2015 was 5,600, reflecting a growing interest in this "entry level" pilot certificate.

Next Generation Air Transportation System (NextGen) is a new era in flight that is transforming how aircraft navigate the sky and is a replacement to the World War II era technology that has until recently been the primary navigation technology. NextGen utilizes satellite technology which allows pilots to know the precise locations of other aircraft around them. This allows more planes in the sky while enhancing the safety of air travel. Satellite landing procedures also allow pilots arrive at airports more efficiently by providing for more direct flight routes.

The primary manner in which NextGen could influence operations at Minden-Tahoe is the possibility of the airport being provided with straight-in instrument approaches (as opposed to the existing circling approaches) to accommodate flights during periods of low visibility. This would be possible due to the decreased cost associated with the creation of a published instrument approach procedures and the use of remote satellite technology in place of onsite facilities.

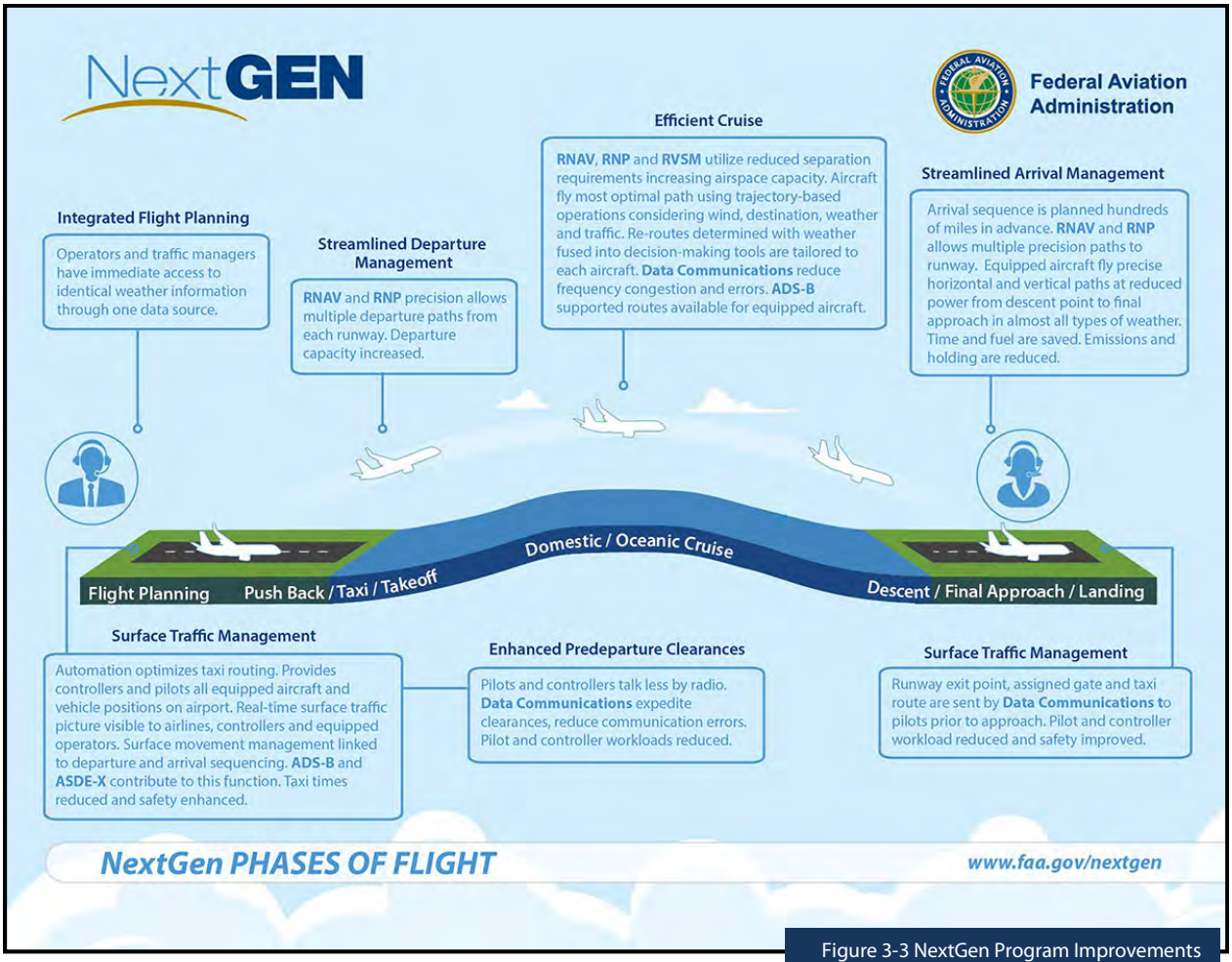


Figure 3-3 NextGen Program Improvements

Source: Federal Aviation Administration

3.4 Factors Affecting Aviation Demand at Minden-Tahoe Airport

In order to develop aviation forecasts to truly reflect the unique conditions at Minden-Tahoe Airport, the existing conditions impacting the Airport's demand must be evaluated. According to airport management, the Airport's hangar facilities are consistently near or at capacity, with waitlists often being implemented. The lack of availability for hangars and additional landside facilities is a constraint on airfield development. The Airport would likely see an immediate increase in based aircraft as a result of future hangar/landside development.

IFR conditions are present at the Airport frequently throughout the year, typically during the winter months, due to the Airport's location within a mountainous area. The lack of a straight-in instrument approach procedure has likely deterred transient aircraft from operating at Minden-Tahoe Airport during periods of poor visibility.

3.5 Available Activity Forecasts

The first step in preparing aviation forecasts is to examine historical and existing activity levels, and currently available forecasts from other sources. The FAA Form 5010-1, FAA TAF and airport management records were reviewed.

The TAF is the official FAA forecast of aviation activity for U.S. airports. The forecasts are prepared to meet the budget and planning needs of FAA and provide information for use by state and local authorities, the aviation industry, and the public. The 2016 TAF indicates 204 existing based aircraft for Minden-Tahoe Airport and 79,800 existing annual operations. The TAF indicates low growth in based aircraft and no growth in operations at Minden-Tahoe. A low or no-growth trend at general aviation airports is common with FAA TAFs. The existing activity levels reported in the FAA TAF form Minden-Tahoe Airport are not considered to be accurate and therefore are not utilized.

As discussed in Chapter Two, Inventory of Airport Assets, airport management records indicate 400 existing based aircraft and 90,000 operations, which exceed the FAA TAF data. It is recommended the FAA update and revises the FAA TAF to accurately reflect existing activity levels and number of based aircraft for Minden-Tahoe Airport. For the purpose of this forecast, airport management records were used as the primary source of information for the baseline year.

3.6 Existing Aviation Activity

Airport management records indicate that there were 400 based aircraft and approximately 90,000 total annual operations in 2016. Historical airport records indicate 285 based aircraft in 2011. Between 2011 and 2016 there has been an 8.07 percent annual growth in based aircraft. **Table 3-2** depicts the existing based aircraft fleet and operations mix at Minden-Tahoe Airport as reported by airport management. This local information will be used as the source of baseline existing aviation activity information. The Airport tracks existing activity based on fuel sales, information from airport users and activity levels observed by Airport staff.

Table 3-2 Existing Aviation Activity

Year	Based Aircraft Total	Operations				
		Fixed Wing	Glider	Jet	Helicopter	Total
2016	400	50,000	25,000	10,000	5,000	90,000

Source: Minden-Tahoe Airport, 2016

Note: 50 percent of fixed-wing operations are conducted by tow aircraft for gliders.

The FAA Form 5010-1, *Airport Master Record*, is an FAA document which contains aeronautical data describing the physical and operational characteristics of civil public-use airports. The most current Form 5010-1 indicates 364 based aircraft and 79,800 total annual operations in 2015. The existing activity levels reported in the Form 5010-1 for Minden-Tahoe Airport are not considered to be accurate due to an frequent influx of based aircraft since 2011. The National Based Aircraft Inventory indicates 375 based aircraft which was conducted in a count by airport management during the early spring of 2016.

As discussed in Chapter Two, *Inventory of Airport Assets*, Minden-Tahoe serves a mix of single-engine piston and multi-engine piston driven, turboprop, turbo jet, glider and helicopter aircraft. These users include business and personal transport, air ambulance, flight training, aircraft maintenance, military, recreational use, glider activity and aerial firefighting. Minden-Tahoe Airport provides easy access and a user friendly environment for general aviation activities.

Business and Personal Transportation

These users prefer the utility and flexibility offered by general aviation aircraft. This category includes business as well as tourism related activities. The types of aircraft utilized for personal and business transportation include a mix of single-engine, multi-engine, turboprop, and turbo jet aircraft.

Air Ambulance Services

Organizations such as Summit Air Ambulance provide essential emergency medical transportation for life threatening situations and assists in patient transfers by air from Carson Valley Medical Center to higher level care facilities. The air ambulance services provide quick and efficient transportation in emergency situations when time is of the essence.

Flight Training

These users conduct local and itinerant flights in order to meet flight proficiency requirements for obtaining FAA pilot certifications. These flights include touch-and-goes, day and night local and cross-country flights and practice approaches. Pilot certifications include Sport, Private, Instrument, Commercial, Instructor, Multi-Engine and Airline Transport ratings. Flight training at Minden-Tahoe Airport is provided by Hutt Aviation,

Reno-Tahoe Helicopter, Sierra Skyport and SoaringNV. Flight schools from the surrounding region also utilize the Airport for flight training activity.

Aircraft Maintenance
There are multiple facilities located on the airport that provide maintenance services to based and transient aircraft including Aces Aircraft Maintenance, Hutt Aviation, Rebuilt Aircraft and Walker Aviation. Services include but are not limited to: 100-hour inspections, annual inspections, powerplant rehabilitation and various repairs.

Military
The airport is currently utilized by military helicopters and fixed-wing aircraft for occasional fuel stops and local training operations.

Recreational and Tourism
These users include transient pilots flying into the region to visit recreational and tourist attractions. These users typically utilize single-engine piston aircraft; however, a small percentage may operate multi-engine piston or larger aircraft. Other types of aircraft in this category often include home-built, experimental aircraft, gliders and ultralights. Recreational aviation operators at Minden-Tahoe Airport include Skydive Lake Tahoe and SoaringNV. The recreational aviation operators at Minden-Tahoe Airport typically operate single-engine piston, turbine driven and glider aircraft.

Aerial Firefighting
The Airport has an aerial firefighting center operated by Minden Air, the U.S. Forest Service and Nevada Department of Forestry. The center serves as a base of operation for aerial firefighting aircraft such as the BAe-146 and AirTractor 802.

3.7 Forecasts of Aviation Activity

3.7.1 Based Aircraft Forecast

Forecasts of based aircraft for Minden-Tahoe Airport take into consideration growth rates for the airport, community, county, and state with a comparative analysis of based aircraft forecasts using four methodologies to determine a preferred forecast of based aircraft for Minden-Tahoe Airport.

The forecasts factor in the potential growth associated with the future implementation of a straight-in instrument approach as well as areas for future hangar development.

Per Capita Method
A per capita forecast projects the number of based aircraft in direct proportion to the projected population for Douglas County. According to the Nevada State Demographer's Office the population for Douglas County is expected to increase from 48,104 in 2016 to

50,130 in 2036. Using the per capita forecast method results in 417 based aircraft in 2035 and an annual growth rate of 0.21 percent. The results of the per capita forecast are shown in **Table 3-3**.

Table 3-3 Per Capita Method

Year	Douglas County Population	Based Aircraft
2016	48,104	400
2021	48,136	400
2026	48,829	406
2031	49,607	412
2036	50,130	417

Source: Armstrong Consultants, Inc., 2016

Market Share Method

A market share forecast was developed from the FAA TAF data for the State of Nevada. According to the TAF, there are 2,150 aircraft based in Nevada, of which 400 are based at Minden-Tahoe Airport. This results in the Airport having 18.6 percent market share of Nevada based aircraft. FAA forecasts the based aircraft to increase in the State to 2,447 by 2036. By applying this growth factor to the based aircraft at Minden-Tahoe Airport, results in 455 based aircraft at the Airport in 2036. The result of the market share forecast is shown in **Table 3-4**.

Table 3-4 Market Share Method

Year	Total Based Aircraft in Nevada	Based Aircraft
2016	2,102	400
2021	2,168	413
2026	2,235	425
2031	2,305	439
2036	2,376	455

Source: Armstrong Consultants, Inc., 2016

FAA Aerospace Forecast Method

This method assumes based aircraft at Minden-Tahoe Airport will grow at a rate equal to the forecasted 0.4 percent annual growth rate for the United States general aviation fleet. This method results in a total of 433 based aircraft at the Airport in 2036. The result of the historical growth scenario is shown in **Table 3-5**.

Table 3-5 FAA Forecast Method

Year	Based Aircraft
2016	400
2021	408
2026	416
2031	425
2036	433

Source: Armstrong Consultants, Inc., 2016

Cohort Method

This method is an average of the Market Share and FAA General Aviation forecasts. This method results in a total of 393 based aircraft at the Airport in 2036. The result of the scenario is shown in **Table 3-6**.

Table 3-6 Cohort Method

Year	Based Aircraft
2016	400
2021	411
2026	422
2031	433
2036	444

Source: Armstrong Consultants, Inc., 2016

Preferred Method

Based on the results of the four forecasting methods discussed, the Cohort method has been selected as the preferred forecast for based aircraft. The Cohort method factors growth in based aircraft for the State of Nevada with national trends in general aviation. **Figure 3-4** depicts a comparison of the forecasting methods.

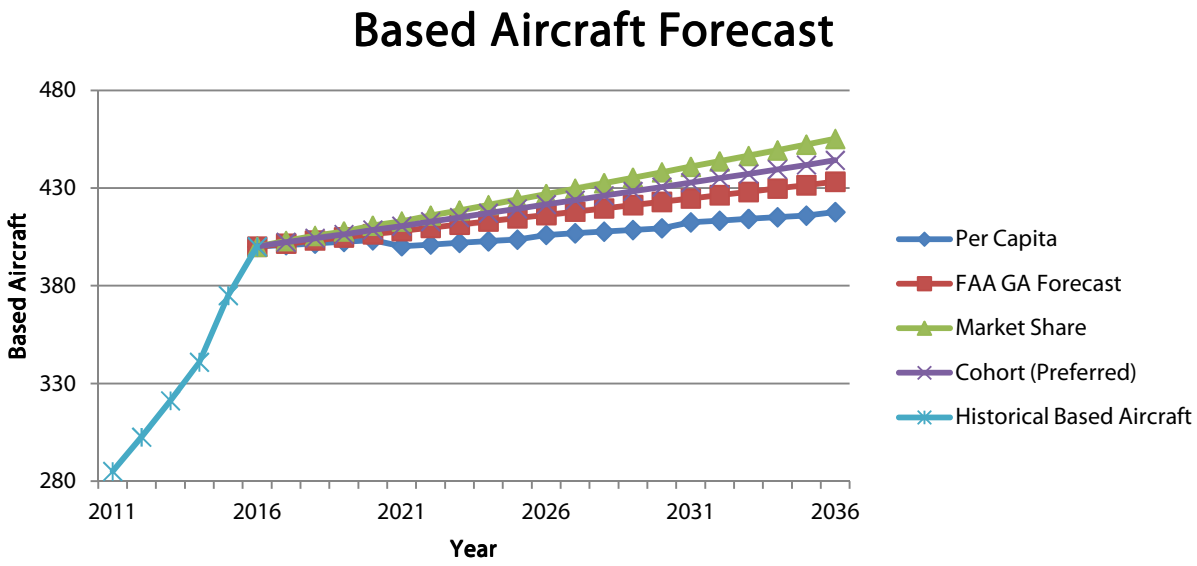


Figure 3-4 Based Aircraft Forecast

Source: Armstrong Consultants, Inc., 2016

3.7.2 Aircraft Operations Forecast

The following methods were used to develop a preferred method of forecasting aircraft operations at Minden-Tahoe Airport:

Method 1 uses the existing level of operations per based aircraft (OPBA). This method divided 90,000 operations by 400 based aircraft resulting in 225 OPBA. The 225 OPBA was then multiplied by the preferred forecasted number of based aircraft (444 aircraft) to determine total forecasted operations and resulted in 99,956 operations in 2036.

Method 2 uses the general guideline contained in FAA Order 5090.3C, *Field Formulation of the National Plan of Integrated Airport Systems* (NPIAS) that recommends the use of 350 OPBA for busier general aviation airports. Applying 350 OPBA to the preferred based aircraft forecast results in 155,488 annual operations by 2036.

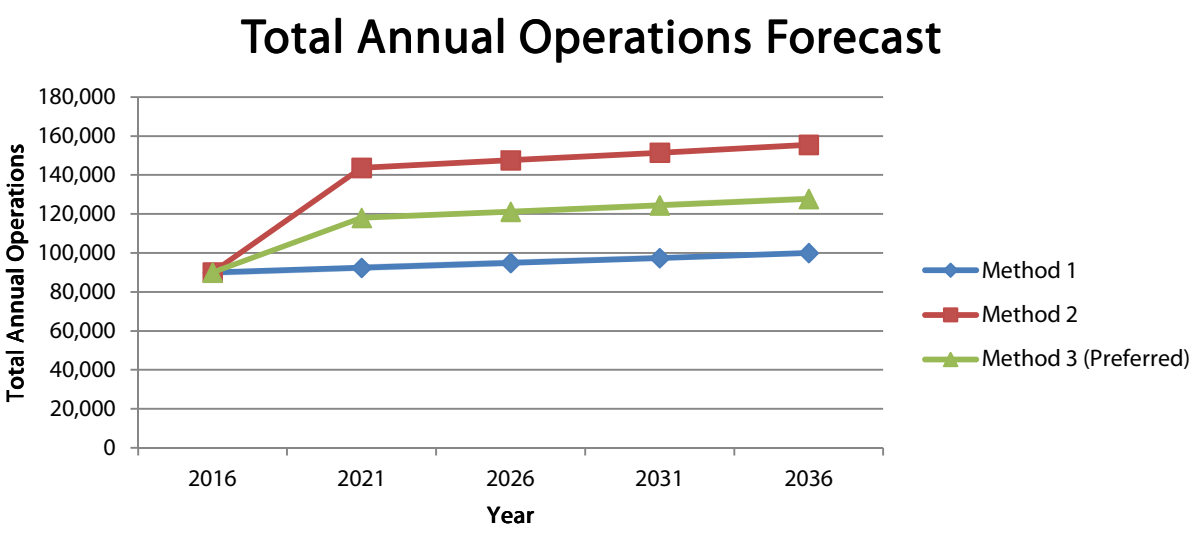
Method 3 uses an average of Methods 1 and 2. This method assumes the development of a future instrument approach procedure. As mentioned, the Airport's utility is substantially diminished during the winter months when IFR conditions are most prevalent. Furthermore, the winter season typically generates a greater amount of visitors to the region than the remainder of the year. Method 3 projects 127,722 annual operations by 2036.

These estimates provide a likely range of activity for future operations at Minden-Tahoe Airport. **Figure 3-5** and **Table 3-7** summarize the operations forecasts. Based on an evaluation of operations forecast methods, Method 3 was selected as the preferred method as it reflects a greater percentage of operations by based aircraft rather than transient operators while emphasizing the impacts of a future instrument approach procedure.

Table 3-7 Total Annual Operations Forecast

Year	Method 1	Method 2	Method 3
2016	90,000	90,000	90,000
2021	92,372	143,690	118,031
2026	94,868	147,572	121,220
2031	97,382	151,482	124,432
2036	99,956	155,488	127,722

Source: Armstrong Consultants, Inc., 2016



Source: Armstrong Consultants, Inc., 2016

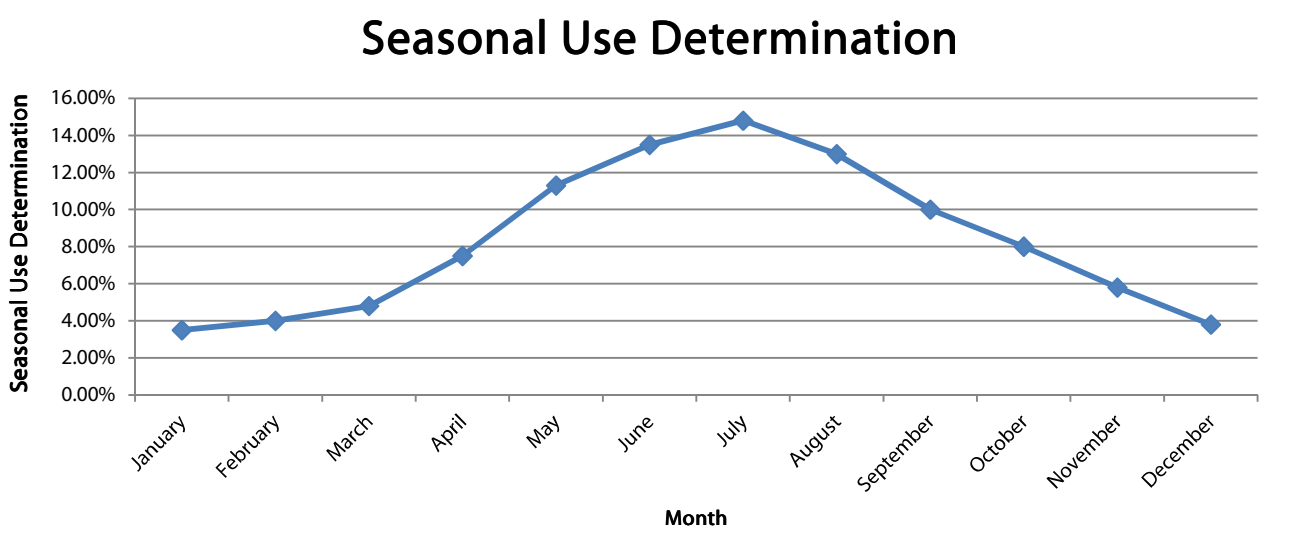
Figure 3-5 Total Annual Operations Forecast

3.8 Seasonal Use Determination

Some level of seasonal fluctuation in aircraft operations can be expected at nearly all airports. This fluctuation is most apparent in regions of the country with severe winter weather patterns or in resort communities were the local economy is driven by tourism. The fluctuation is less pronounced at major hub airports, with a high percentage of commercial and scheduled airline activity.

Seasonal use at Minden-Tahoe Airport was determined through the use of the FAA Statistical Handbook of Aviation which provides a generalization of trends in use for non-towered airports throughout a year. The percentages provided by the FAA Statistical Handbook of Aviation are consistent with reported trends of use at Minden-Tahoe Airport with a higher percentage of users during the summer months. The seasonal use determination is shown in **Figure 3-6**.

It should be noted that seasonal demand may substantially exceed actual use during the winter months. Douglas County experiences a significant increase in visitors to surrounding ski resorts; however, the combination of poor weather conditions and the lack of both a straight-in instrument approach procedure and permanent air traffic control tower likely prevent potential operators from using Minden-Tahoe Airport.



Source: FAA Statistical Handbook of Aviation

Figure 3-6 Seasonal Use Determination

3.9 Hourly Demand and Peaking Tendencies

In order to arrive at a reasonable estimate of demand at the airport facilities, it was necessary to develop a method to calculate the levels of activity during peak periods. The periods normally used to determine peaking characteristics are defined below:

Peak Month: The calendar month when peak enplanements or operations occur.

Design Day: The average day in the peak month derived by dividing the peak month enplanements or operations by the number of days in the month.

Busy Day: The Busy Day of a typical week in the peak month. In this case, the Busy Day is equal to the Design Day.

Design Hour: The peak hour within the Design Day. This descriptor is used in airfield demand/capacity analysis, as well as in determining terminal building, parking apron and access road requirements.

Busy Hour: The peak hour within the Busy Day. In this case, the Busy Hour is equal to the Design Hour.

Using the seasonal use information, a formula was derived which will calculate the average daily operations in a given quarter, based on the percentage of the total annual operations for that month, as determined by the graph. The formula is as follows:

$$M = A\ (T / 100)$$
$$D = M / (365 / 12)$$

Where	T	=	Quarterly percent of use (from graph)
	M	=	Average quarterly operations
	A	=	Total annual operations
	D	=	Average Daily Operations in a given quarter

Approximately 90% of total daily operations occur between the hours of 7:00 AM and 7:00 PM (12 hours) at a typical general aviation airport, meaning the maximum peak hourly occurrence may be 50% greater than the average of the hourly operations calculated for this time period.

The Estimated Peak Hourly Demand (P) in a given quarter was, consequently, determined by compressing 90% of the Average Daily Operations (D) in a given quarter into the 12-hour peak use period, reducing that number to an hourly average for the peak use period and increasing the result by 50% as follows:

	P	=	1.5 (0.90D / 12)
Where	D	=	Average Daily Operations in a given quarter.
	P	=	Peak Hourly Demand in a given month.

The calculations were made for each quarter of the planning period. The results of the calculations are shown in **Table 3-8**. The Design Day and Design Hour peak demand in the planning year occurs under VFR weather conditions in the July (highlighted in bold), with an average of 621 daily operations and approximately 69.9 operations per hour in 2036.

Table 3-8 Monthly/Daily/Hourly Demand

Planning Year: 2021 Operations: 118,031		Operations per			Planning Year: 2026 Operations: 121,220		Operations per		
Month	% Use	Month	Day	Hour	Month	% Use	Month	Day	Hour
January	3.50%	4,131	136	15.3	January	3.50%	4,243	139	15.7
February	4.00%	4,721	155	17.5	February	4.00%	4,849	159	17.9
March	4.80%	5,666	186	21.0	March	4.80%	5,819	191	21.5
April	7.50%	8,852	291	32.7	April	7.50%	9,091	299	33.6
May	11.30%	13,338	438	49.3	May	11.30%	13,698	450	50.7
June	13.50%	15,934	524	58.9	June	13.50%	16,365	538	60.5
July	**14.80%**	**17,469**	**574**	**64.6**	**July**	**14.80%**	**17,941**	**590**	**66.4**
August	13.00%	15,344	504	56.8	August	13.00%	15,759	518	58.3
September	10.00%	11,803	388	43.7	September	10.00%	12,122	399	44.8
October	8.00%	9,443	310	34.9	October	8.00%	9,698	319	35.9
November	5.80%	6,846	225	25.3	November	5.80%	7,031	231	26.0
December	3.80%	4,485	147	16.6	December	3.80%	4,606	151	17.0
Planning Year: 2031 Operations: 124,432		**Operations per**			**Planning Year: 2036 Operations: 127,722**		**Operations per**		
Month	% Use	Month	Day	Hour	Month	% Use	Month	Day	Hour
January	3.50%	4,355	143	16.1	January	3.50%	4,470	147	16.5
February	4.00%	4,977	164	18.4	February	4.00%	5,109	168	18.9
March	4.80%	5,973	196	22.1	March	4.80%	6,131	202	22.7
April	7.50%	9,332	307	34.5	April	7.50%	9,579	315	35.4
May	11.30%	14,061	462	52.0	May	11.30%	14,433	475	53.4
June	13.50%	16,798	552	62.1	June	13.50%	17,242	567	63.8
July	**14.80%**	**18,416**	**605**	**68.1**	**July**	**14.80%**	**18,903**	**621**	**69.9**
August	13.00%	16,176	532	59.8	August	13.00%	16,604	546	61.4
September	10.00%	12,443	409	46.0	September	10.00%	12,772	420	47.2
October	8.00%	9,955	327	36.8	October	8.00%	10,218	336	37.8
November	5.80%	7,217	237	26.7	November	5.80%	7,408	244	27.4
December	3.80%	4,728	155	17.5	December	3.80%	4,853	160	18.0

Source: Armstrong Consultants, Inc., 2016

3.10 Peak Hour General Aviation Pilot and Passenger Flow

The number of pilots and general aviation passengers relates to the peak hour operations forecast in **Table 3-8**. Based upon a historical economic impact studies; an average of 2.5 persons per aircraft operation is considered reasonable for general aviation forecasts. The average of 2.5 passengers per peak hour operation results in a peak hour flow of 241 general

aviation pilots and passengers by 2036. **Table 3-9** lists the forecasted peak hour general aviation pilot and passenger flow.

Table 3-9 Peak Hour General Aviation Pilot and Passenger Flow

Year	Peak Hour Aircraft Operations	Peak Hour GA Pilot/Passenger Flow
2021	64.6	222
2026	66.4	228
2031	68.1	234
2036	69.9	241

Source: Armstrong Consultants, Inc., 2016

3.11 Forecast Summary

Table 3-10 is a summary of the preferred forecast for Minden-Tahoe Airport through the 20 year planning period, while utilizing the most current based aircraft data for the baseline year.

The following critical factors were taken into consideration when selecting the preferred forecasts:

- Minden-Tahoe Airport has attained a large market share of based aircraft in the State of Nevada.
- The Airport would likely experience growth with additional landside and hangar facilities.
- Access to the Airport during the winter season, which generates substantial visitors to the region, is limited due to the lack of a straight-in instrument approach procedure and frequent IFR conditions.
- The national trend for general aviation is forecasted to have relatively low growth.

Table 3-10 Forecast Summary

Year	Based Aircraft	Operations				
	Total	Fixed Wing	Glider	Jet	Helicopter	Total
2016	400	50,000	25,000	10,000	5,000	90,000
2021	411	65,573	32,786	13,115	6,557	118,031
2026	422	67,344	33,672	13,469	6,733	121,220
2031	433	69,129	34,564	13,826	6,913	124,432
2036	444	70,957	35,478	14,191	7,096	127,722

Source: Armstrong Consultants, Inc., 2016

Chapter Four

Facility Requirements

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

4.1 Introduction

The evaluation of airport facility requirements uses the results of the inventory and forecasts contained in Chapter Two and Three, as well as established planning criteria, to determine the existing and future facility needs for Minden-Tahoe Airport through the twenty year planning period. Airside facilities include runways, taxiways, aircraft parking aprons, navigational aids and lighting systems. Landside facilities include hangars, fixed base operator (FBO) facilities, surface access and automobile parking, utilities, and other related items. All airfield items are evaluated based on established standards developed by the Federal Aviation Administration (FAA).

The time frame for addressing development needs usually involves initial-term (up to five years), intermediate-term (six to ten years), and long-term (eleven to twenty years) planning periods. Long-term planning primarily focuses on the ultimate role of the airport. Medium-term planning focuses on a more detailed assessment of needs, while the short-term analysis focuses on immediate action items. Actual activity at the airport will vary over time and may be higher or lower than what the demand forecast predicts. Using the three planning milestones (short, medium and long-term) the County can make an informed decision regarding the timing of development based on activity levels and actual demand. This approach will result in a financially responsible and demand-based development plan for the airport.

4.2 Runway Design Code

The Runway Design Code (RDC) is a system established by the FAA to relate airport design criteria to the operational and physical characteristics of the aircraft that are currently operating and/or forecast to operate at the airport. The RDC has three primary components relating to airport design. The first component, depicted by letters A through E, is categorized by the design aircraft approach speed which determines the runway approach category (operational characteristic). The second component, depicted by Roman numerals I through VI, is categorized by either the design aircraft wingspan or tail height, utilizing the characteristic that places the aircraft in the highest design group (physical characteristic). The third component relates to the visibility minimums expressed by Runway Visual Range (RVR) values listed in feet (1,200, 1,600, 2,400, 4,000, and 5,000). If the airport does not have an instrument approach it is listed as visual (VIS). In general, the approach category of the design aircraft drives the required design parameters for runway and runway facilities while the aircraft wingspan or tail height drive the required taxiway and taxilane separation criteria. **Table 4-1** provides a definition of both aircraft approach categories and aircraft design groups. Examples of each of these RDC are depicted in **Figure 4-1**.

A-I*	Primarily single-engine piston aircraft, some light multi-engine aircraft	 Cessna 172	 Diamond DA40
B-I*	Primarily light multi-engine piston aircraft, some very light jets	 Cessna 402C	 Cessna Citation Mustang
B-II*	Light turboprops, small commuter airliners, and mid-sized corporate jets	 Beechcraft 1900	 Pilatus PC-12
C/D-I	Primarily small and fast corporate jets	 Learjet 45	 Learjet 60
C/D-II	Large corporate jets and small regional jets (≥ 50 seats)	 Bombardier Challenger	 Gulfstream IV
C/D-III	Very large corporate jets	 Gulfstream G500	 Airbus Corporate Jet
C/D-IV	Medium to large commercial airliners (approx. 200-350 seats)	 Airbus A330	 Boeing 767
D-V or greater	Very large commercial airliners (approx. 350+ seats)	 Airbus A380	 Boeing 747

*If aircraft MTOW is less than 12,500 lbs., it is considered "small."

Figure 4-1 RDC Examples by Aircraft

Source: Armstrong Consultants, Inc., 2016

Table 4-1 Runway Design Code

Approach Category	Approach Speed	
Category A	less than 91 knots	
Category B	91 to 120 knots	
Category C	121 to 140 knots	
Category D	141 to 165 knots	
Category E	166 knots or more	
Design Group	**Wingspan**	**Tail Height**
Group I	< than 49 feet	< than 20 feet
Group II	49 to 78 feet	20 to 29 feet
Group III	79 to 117 feet	30 to 44 feet
Group IV	118 to 170 feet	45 to 59 feet
Group V	171 to 213 feet	60 to 65 feet
Group VI	214 to 261 feet	66 to 79 feet
Runway Visual Range (in feet)	**Flight Visibility Category (Statue Mile)**	
VIS	Visual	
5,000	1-mile or greater	
4,000	Lower than 1 mile but not lower than 3/4 mile (APV ≥ 3/4 but < 1 mile)	
2,400	Lower than 3/4 mile but not lower than 1/2 mile (CAT - I PA)	
1,600	Lower than 1/2 mile but not lower than 1/4 mile (CAT - II PA)	
1,200	Lower than 1/4 mile (CAT - III PA)	

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

To ensure that all airport facilities are designed to accommodate the expected air traffic, and to meet FAA criteria, the specific existing and future RDC for each runway must be determined. In order to designate a specific RDC for a runway, aircraft in that RDC should perform a minimum of 500 annual operations. The aircraft currently using Minden-Tahoe Airport on a regular basis have a RDC of A-I, B-I, B-II, C-II and C-III. The majority of the turboprop and jet aircraft operating at Minden-Tahoe Airport fall into the B-II, C-II and C-III RDC. Examples of aircraft with an RDC of A-I and B-I are listed in **Table 4-2**. Examples of aircraft with an RDC of A-II and B-II are listed in **Table 4-3**. Examples of aircraft with an RDC of C-I and C-II are listed in **Table 4-4**. Examples of aircraft with an RDC of C-III are listed in **Table 4-5**.

Table 4-2 Examples of Aircraft with RDC A-I or B-I

Aircraft	Approach Speed (knots)	Wingspan (feet)	Tail Height (feet)	Max T.O. Weight (pounds)
Beech Baron 58P	101	37.8	9.1	6,200
Beech Bonanza V35B	70	33.5	6.6	3,400
Beech King Air B100	111	45.9	15.3	11,799
Cessna 172	60	36.0	9.8	2,200
Cessna 182	64	36.0	9.2	2,950
Cessna 340	92	38.1	12.2	5,990
Cessna 414	94	44.1	11.5	6,750
Cessna Citation I	108	47.1	14.3	11,850
Gates Learjet 28/29	120	42.2	12.3	15,000
Mitsubishi MU-2	119	39.1	13.8	10,800
Piper Archer II	86	35.0	7.4	2,500
Piper Cheyenne	110	47.6	17.0	12,050
Rockwell Sabre 40	120	44.4	16.0	18,650
Swearingen Merlin	105	46.3	16.7	12,500
Raytheon Beechjet	105	43.5	13.9	16,100
Eclipse 500 Jet	90	37.9	13.5	5,920

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

Table 4-3 Examples of Aircraft with RDC A-II or B-II

Aircraft	Approach Speed (knots)	Wingspan (feet)	Tail Height (feet)	Max T.O. Weight (pounds)
Air Tractor 802F	105	58.0	11.2	16,000
Beech King Air C90-1	100	50.3	14.2	9,650
Beech Super King Air B200	103	54.5	14.1	12,500
Cessna 441	100	49.3	13.1	9,925
Cessna Citation II	108	51.6	15.0	13,300
Cessna Citation III	114	50.6	16.8	17,000
Dassault Falcon 50	113	61.9	22.9	37,480
Dassault Falcon 200	114	53.5	17.4	30,650
Dassault Falcon 900	100	63.4	24.8	45,500
DHC-6 Twin Otter	75	65.0	19.5	12,500
Grumman Gulfstream I	113	78.5	23.0	35,100
Pilatus PC-12	85	52.3	14.0	9,920

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

Table 4-4 Examples of Aircraft with RDC C-I or C-II

Aircraft	Approach Speed (knots)	Wingspan (feet)	Tail Height (feet)	Max T.O. Weight (pounds)
Beechjet 400	121	43.5	18.1	16,100
Bombardier Challenger 605	125	61.8	20.7	41,250
Cessna Citation 650	126	53.6	16.8	23,000
Cessna Citation X	131	63.6	18.9	36,100
Falcon 900 EX	126	63.5	24.2	48,300
Gulfstream-II	141	68.8	24.5	65,300
Gulfstream-III	136	77.8	24.4	68,700
Gulfstream-III	136	77.8	24.4	71,780
Hawker 125-1000	130	61.9	17.1	36,000
Learjet 24	128	35.6	12.6	13,000
Learjet 55	128	43.6	14.7	21,500
Rockwell 980	121	52.1	14.9	10,325

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

Table 4-5 Examples of Aircraft with RDC C-III

Aircraft	Approach Speed (knots)	Wingspan (feet)	Tail Height (feet)	Max T.O. Weight (pounds)
Airbus Corporate Jet	121	111.9	42.3	149,914
Boeing Business Jet	132	117.4	41.6	171,000
Bombardier Global Express	137	94.0	25.6	92,500
British Aerospace BAe-146	125	86.4	28.2	93,035
Gulfstream G500	140	93.5	25.8	85,100

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

Existing and forecasted activity indicate the fundamental development items for the initial, intermediate, and long- term will remain at an ARC of C-III for aircraft weighing under 150,000 pounds. It is anticipated that occasional operations by D-III aircraft will continue to occur during the planning period; however, forecasted operations by Category D aircraft are not expected to reach 500 annual operations during the planning period.

4.2.1 Design Aircraft

As discussed in Chapter Three, *Forecasts of Aviation Activity*, a variety of aircraft, ranging from a RDC of A-I through D-III, are expected to utilize the airport in the initial, intermediate and long-term time frames. A design aircraft best represents the most demanding aircraft using the airport that has at least 500 annual operations. The design aircraft is used to determine both existing and future facility needs at the airport.

The current design aircraft for Runway 16-34 is the Gulfstream G500. The Gulfstream G500 is a common corporate jet aircraft frequently utilized by charter operators and corporate or private users. The Gulfstream G500 has a RDC of C-III. The future design aircraft for Runway 16-34 is expected to transition to larger corporate aircraft based on industry and local trends, therefore the Airbus A318 Corporate Jet has been selected as the future design aircraft.

The current design aircraft for Runway 12-30 is the Beechcraft King Air 200. The King Air 200 is a very common twin turboprop aircraft utilized by many corporate and private users, it is also popular with government agencies, air-taxi, charter and air ambulance companies. The King Air 200 has a RDC of B-II. This aircraft is expected to remain as the future design aircraft. **Figure 4-2** depicts the Beechcraft King Air 200.

The current design aircraft for Runway 30G is the Piper PA-25 Pawnee. The Piper PA-25 Pawnee is a common single engine aircraft utilized for glider tow operations. The Piper PA-25 Pawnee has a RDC of B-I (small). This aircraft is expected to remain as the future design aircraft.

Figure 4-2 Beechcraft King Air 200

Source: Textron Aviation, 2015

4.3 Annual Service Volume

Airfield capacity is determined by using an airport's Annual Service Volume (ASV). An airport's ASV has been defined by the FAA as "a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would be encountered over a year's time." Therefore, ASV is a function of the hourly capacity of the airfield and the annual, daily, and hourly demands placed upon it. According to FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, the ASV for the dual runway configuration for Minden-Tahoe Airport is approximately 230,000 annual operations. Runway 30G was not included in the ASV since it is only utilized for landing of tow and glider aircraft and is not paved.

Based on existing and forecasted activity levels, operations are not expected to exceed 52 percent of capacity over the 20-year planning period. Therefore, no additional runways are needed (from a capacity perspective) to accommodate the existing or forecasted activity. **Table 4-6** summarizes the ASV relationship developed in this section.

Table 4-6 Annual Service Volume

Year	Total Annual Operations	Annual Service Volume	Annual Service Ratio
2016	90,000	230,000	39%
2021	118,031	230,000	51%
2026	121,220	230,000	53%
2031	124,432	230,000	54%
2036	127,722	230,000	56%

Source: FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*

4.4 Airside Facility Requirements

Airside facilities consist of those facilities that are related to aircraft arrival, departure, and ground movement, along with all associated navigational aids, airfield lighting, pavement markings, and signage.

4.4.1 Runway System

There are many factors that influence the required runway length for an airport. FAA Advisory Circular 150/5325-4B, *Runway Length Requirements for Airport Design,* provides guidance for determining runway length requirements. The information required to determine the recommended runway lengths includes, airfield elevation, mean maximum temperature of the hottest month and the effective gradient for the runway. The following information for Minden-Tahoe was used for the analysis:

Field Elevation: 4,723 feet MSL

Mean Maximum Temperature of Hottest Month: 90° F

Difference in Runway End Elevation: 22 Feet

The process to determine recommended runway lengths for a selected list of critical design airplanes begins with determining the weights of the critical aircraft that are expected to use the Airport on a regular basis. For aircraft weighing 60,000 pounds or less, the runway length is determined by family groupings of aircraft having similar performance characteristics. The first family grouping is identified as small airplanes, which is defined by the FAA as airplanes weighing 12,500 pounds or less at Maximum Takeoff Weight (MTOW). MTOW is the maximum weight limit at which an aircraft can attempt to safely takeoff.

The second family grouping is identified as large airplanes, which is defined by the FAA as airplanes exceeding 12,500 pounds but weighing less than 60,000 pounds. The third is large aircraft weighing 60,000 pounds or more. For large aircraft, the required runway length is determined by aircraft-specific length requirements. **Table 4-7** provides the aircraft weight categories defined by the FAA.

Table 4-7 Airplane Weight Categorization for Runway Length Requirements

Airplane Weight Category MTOW			Design Approach
≤ 12,500 Pounds	Approach Speed < 30 knots		Family groupings of small airplanes
	Approach Speed ≥ 30 knots, but < 50 knots		Family groupings of small airplanes
	Approach Speed ≥ 50 knots	With < 10 Passengers	Family groupings of small airplanes
		With ≥ 10 Passengers	Family grouping of small airplanes
Over 12,500 pounds, but < 60,000 pounds			Family groupings of large airplanes
≥ 60,000 pounds or more			Individual large airplane

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

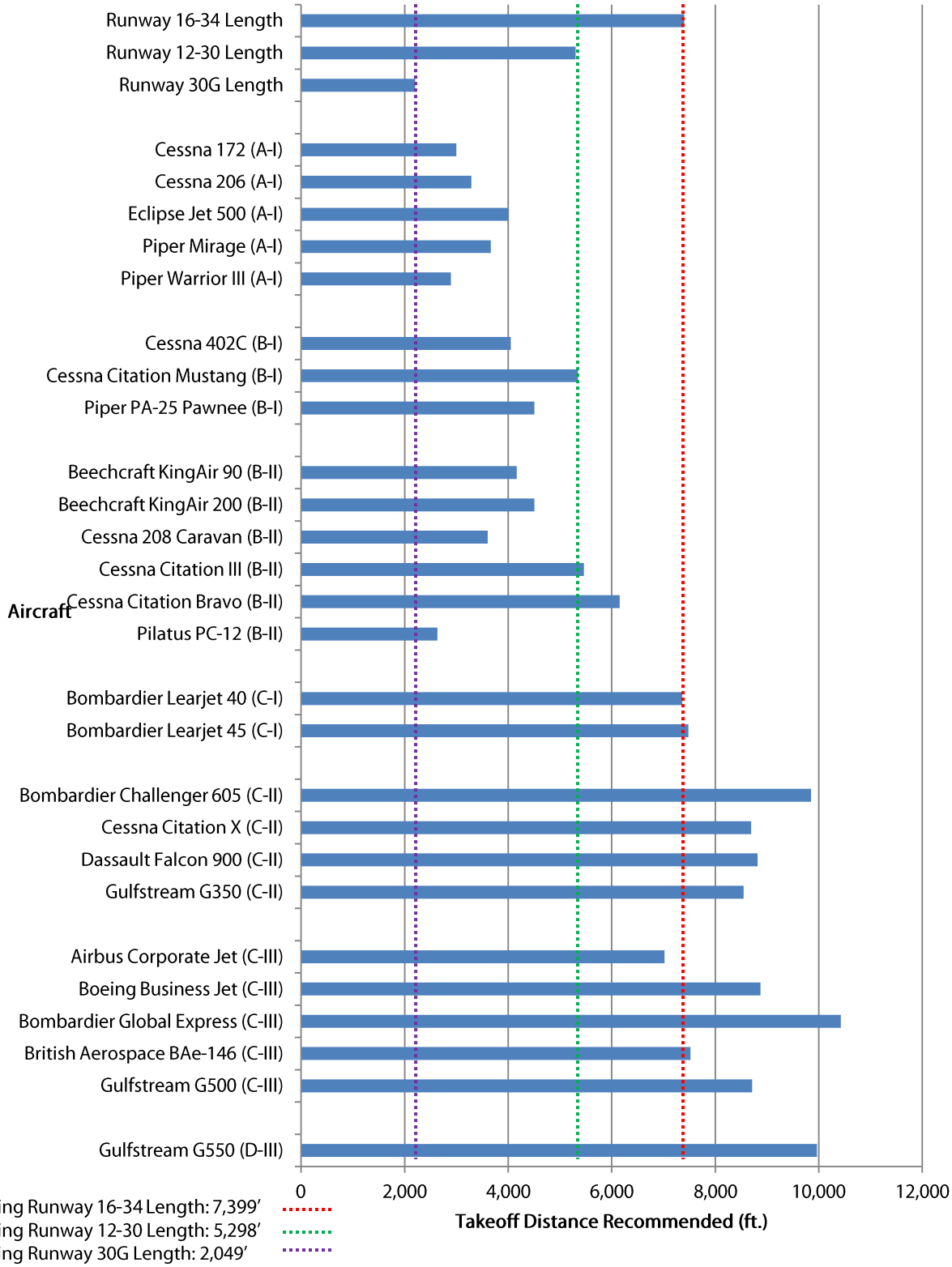
Runway Length

When determining recommended runway length for an airport it is necessary to consider the types of aircraft (aircraft design group and critical aircraft) that will be using the airport and their respective takeoff distance requirements. The Advisory Circular provides several runway length recommendations for both small and large aircraft according to varying percentages of aircraft fleet and associated takeoff weights. A summary of the recommended runway lengths is listed in **Table 4-8**. **Figure 4-3** provides examples of takeoff distance requirements for some of the aircraft currently using and projected to utilize the airport in different design codes.

Table 4-8 Recommended Runway Lengths

Description	Runway Length
Existing Runway 16-34 Length	7,399′
Existing Runway 12-30 Length	5,298′
Existing Runway 30G Length	2,049′
Small Aircraft (<12,500 lbs.,< 10 passenger)	
75 percent of these small airplanes	4,450′
95 percent of these small airplanes	5,890′
100 percent of these small airplanes	6,120′
Large Aircraft (<60,000 lbs.)	
75 percent of these planes at 60 percent useful load	6,750′
75 percent of these planes at 90 percent useful load	8,820′
100 percent of these planes at 60 percent useful load	10,130′
100 percent of these planes at 90 percent useful load	11,220′

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



Source: Aircraft Manufacturer Data
1\ Note: Aircraft performance data based on maximum certificated takeoff weight and mean maximum temperature of the hottest month of 90° F and an airport elevation of 4,723 feet MSL

Figure 4-3 Runway Length Analysis

Runway 16-34 Analysis

As Runway 16-34 is the primary runway at Minden-Tahoe Airport, it should be able to accommodate a substantial portion of the large aircraft fleet with a maximum takeoff weight greater than 60,000 pounds. Currently, Runway 16-34 can accommodate 66 percent of large planes at 90 percent useful load. It is recommended to consider extending Runway 16-34 in two phases:

- Future (Phase I): Extend Runway 16-34 to a length of 8,820 feet.
- Ultimate (Phase II): Extend Runway 16-34 to a length of 10,130 feet.

Phase I would accommodate 75 percent of large aircraft at 90 percent useful load. Phase II would accommodate 100 percent of large aircraft at 60 percent useful load. The feasibility and configuration for the recommended Runway 16-34 extension will be further evaluated in Chapter Five, *Development Alternatives*.

Runway 16-34 has a width of 100 feet. According to FAA AC 150/5300-13A, Change 1, *Airport Design*, although a RDC C-III runway has a 150 foot width requirement, if the pavement strength is less than 150,000 pounds, a 100 foot width is permissible. According to 2013 NDOT PCN Data, the existing pavement strength for Runway 16-34 is 140,000 pounds Dual Wheel Gear (DWG). The 100 foot width is able to accommodate the larger corporate jet traffic and air tanker operators at Minden-Tahoe Airport. Therefore, the existing Runway 16-34 width is considered to be adequate for the planning period. It is recommended to increase the Runway 16-34 pavement strength to 149,950 pounds DWG to accommodate the future design aircraft.

Runway 12-30 Analysis

Runway 12-30, the crosswind runway, has a length of 5,298 feet, which is able to accommodate 86 percent of small aircraft with a maximum takeoff weight less than 12,500 pounds. This is considered to be sufficient for a crosswind runway and therefore the Runway 12-30 length is considered adequate for the planning period. According to 2013 NDOT PCN Data, the current pavement strength of 40,000 pounds DWG accommodates virtually all small aircraft and is therefore considered to be adequate for the planning period. The existing Runway 12-30 width meets the 75 foot design standard for RDC B-II and is therefore considered adequate for the planning period.

Runway 30G Analysis

Runway 30G is a dirt runway utilized by tow aircraft and glider landings only. The existing 2,049 foot length is considered to be adequate for this runway use. The existing Runway 30G width meets the 60 foot design standard for RDC B-I (small) and is therefore considered adequate for the planning period.

Airport Pavement Strength

Minden-Tahoe Airport pavement weight bearing capacities were evaluated by NDOT in 2013 through their statewide Pavement Management System Update. The results of this study are included in **Appendix A**. Runway strengths are normally based upon the weight of the design aircraft. The pavement design strength is based on average levels of activity and is expressed in terms of aircraft landing gear type and configurations. Pavement design strength is not the maximum allowable weight; limited operations by heavier aircraft other than the critical aircraft may be permissible. It is important to note that frequent operations by heavier aircraft will shorten the lifespan of the pavement. Should activity by heavier aircraft increase within the planning period, the pavement should be evaluated for a strengthening overlay.

4.4.2 Crosswind Coverage

The FAA recommends that a runway's orientation provide at least 95 percent crosswind coverage. Based on wind data collected from the Airport AWOS between October 2014 and July 2016 and as depicted in **Table 4-9**, the primary runway provides less than 95 percent coverage for 10.5 and 13.0 knot crosswinds. Therefore, Runway 12-30 qualifies as a crosswind runway. The combined crosswind coverage meets standards for 10.5, 16.0 and 13.0 knot crosswinds; therefore, the existing runway orientations are considered to be adequate for the planning period.

Table 4-9 Wind Data for Minden-Tahoe Airport

Crosswind (knots)	Percent of Coverage		
	Combined	Runway 16-34	Runway 12-30
10.5	96.11%	91.64%	92.84%
13.0	98.18%	94.56%	95.91%
16.0	97.82%	97.82%	-

Source: Minden-Tahoe Airport AWOS, based on 38,370 observations from 2014 to 2016.

4.4.3 Helicopter Parking Area

Helicopter operations at Minden-Tahoe Airport include a mix of activities in support of aerial firefighting, air ambulance, flight instruction, business, and private transportation; however there are currently no designated helicopter parking areas for non-aerial firefighting users. The existing helipads at Minden-Tahoe Airport are considered to be adequate for the planning period. To enhance safety and utility of the airport it is recommended four designated concrete helicopter parking pads be constructed.

The designated concrete helicopter parking pads would reduce potential damage from helicopter rotor downwash when parking near or hovering adjacent to fixed wing aircraft, as well as preventing damage to asphalt from a helicopters high dynamic load on landing skids.

4.4.4 Taxiway System

Length and Width

The primary function of a taxiway system is to provide efficient access between runways and terminal area. The taxiways should be located so that aircraft exiting the runway will have minimal interference with aircraft operating on the runway. Taxiways expedite aircraft departures from the runway and increase operational safety and efficiency. Recent updates to the FAA's Airport Design Advisory Circular have provided new guidance for taxiway configuration and fillet geometries.

The Taxiway Design Group (TDG), which determines pavement width, is based on the outer to outer main gear width (MGW) and cockpit to main gear (CMG) distance of the design aircraft expected to operate on the taxiway. The Airplane Design Group (ADG) is based on the wingspan and tail height and determines the safety area, object free area and separations. The design aircraft, the Airbus Corporate Jet, Beechcraft King Air 200 and Piper PA-46 Pawnee are listed as TDG 3, TDG 2 and TDG 1 aircraft, respectively. Taxiways and taxilanes may be constructed with TDG 1, TDG 2 or TDG 3 depending on the size of the aircraft to be accommodated within the specific area.

The design standards for TDG 3/ADG III are listed in **Table 4-10**. The design standards for TDG 2/ADG II are listed in **Table 4-11**. The design standards for TDG 1/ADG I are listed in **Table 4-12**. An inventory of the taxiway system and the TDG each taxiway meets is listed in **Table 4-13**. However, taxiway configuration and fillet geometries are further discussed below.

Table 4-10 Taxiway Design Group 3 / Airplane Design Group III Standards

Design Criteria	Dimension
Taxiway Width	50′
Taxiway Safety Area	118′
Taxiway Object Free Area	186′
Taxilane Object Free Area	162′
Runway Centerline to Parallel Taxiway Centerline Separation	400′

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

Table 4-11 Taxiway Design Group 2 / Airplane Design Group II Standards

Design Criteria	Dimension
Taxiway Width	35′
Taxiway Safety Area	79′
Taxiway Object Free Area	131′
Taxilane Object Free Area	115′
Runway Centerline to Parallel Taxiway Centerline Separation	240′

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

Table 4-12 Taxiway Design Group 1 / Airplane Design Group I Standards

Design Criteria	Dimension
Taxiway Width	25′
Taxiway Safety Area	49′
Taxiway Object Free Area	89′
Taxilane Object Free Area	79′
Runway Centerline to Parallel Taxiway Centerline Separation	150′

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

Table 4-13 Minden-Tahoe Airport Taxiway System

Taxiway	Taxiway Width	Taxiway Design Group / Airplane Design Group Met
A	50′	3 / III
A1	50′	3 / III
A2	50′	3 / III
B	35′	2 / II
S	50′	3 / I

Source: Armstrong Consultants, Inc., 2015

Taxiway System Analysis

Runway 16-34 is served by a full length parallel taxiway, Taxiway A. According to FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*, the required runway centerline to taxiway centerline separation for RDC C-III is 400 feet for runways with instrument approach visibility minimums lower than ¾-mile. The existing runway centerline to taxiway centerline separation is 500 feet for Runway 16-34. The existing length, width and runway to taxiway separation of Taxiway A are considered to be adequate for the planning period.

Runway 12-30 is served by two partial parallel taxiways, Taxiway B and S. According to FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design*, the required runway centerline to taxiway centerline separation for RDC B-II is 240 feet for runways with instrument approach visibility minimums not lower than ¾-mile and 300 feet for B-II lower than ¾-mile approach visibility minimums. The existing runway centerline to taxiway centerline separation is 275 feet for Taxiway S and 500 feet for Taxiway B. Taxiway S currently meets design standards for TDG 3, but should be increased to accommodate ADG II wingtip clearances based on the type of aircraft using Runway 12-30. Taxiway B meets all design standards for TDG 2 / ADG II.

It is recommended to construct a full-length parallel taxiway serving Runway 12-30 which meets TDG 2 / ADG II standards. Chapter Five, *Development Alternatives*, will evaluate the feasibility of constructing a full-length parallel taxiway for Runway 12-30.

Taxiway Geometries Analysis

Upon evaluation of the existing taxiway system at Minden-Tahoe Airport the following is recommended:

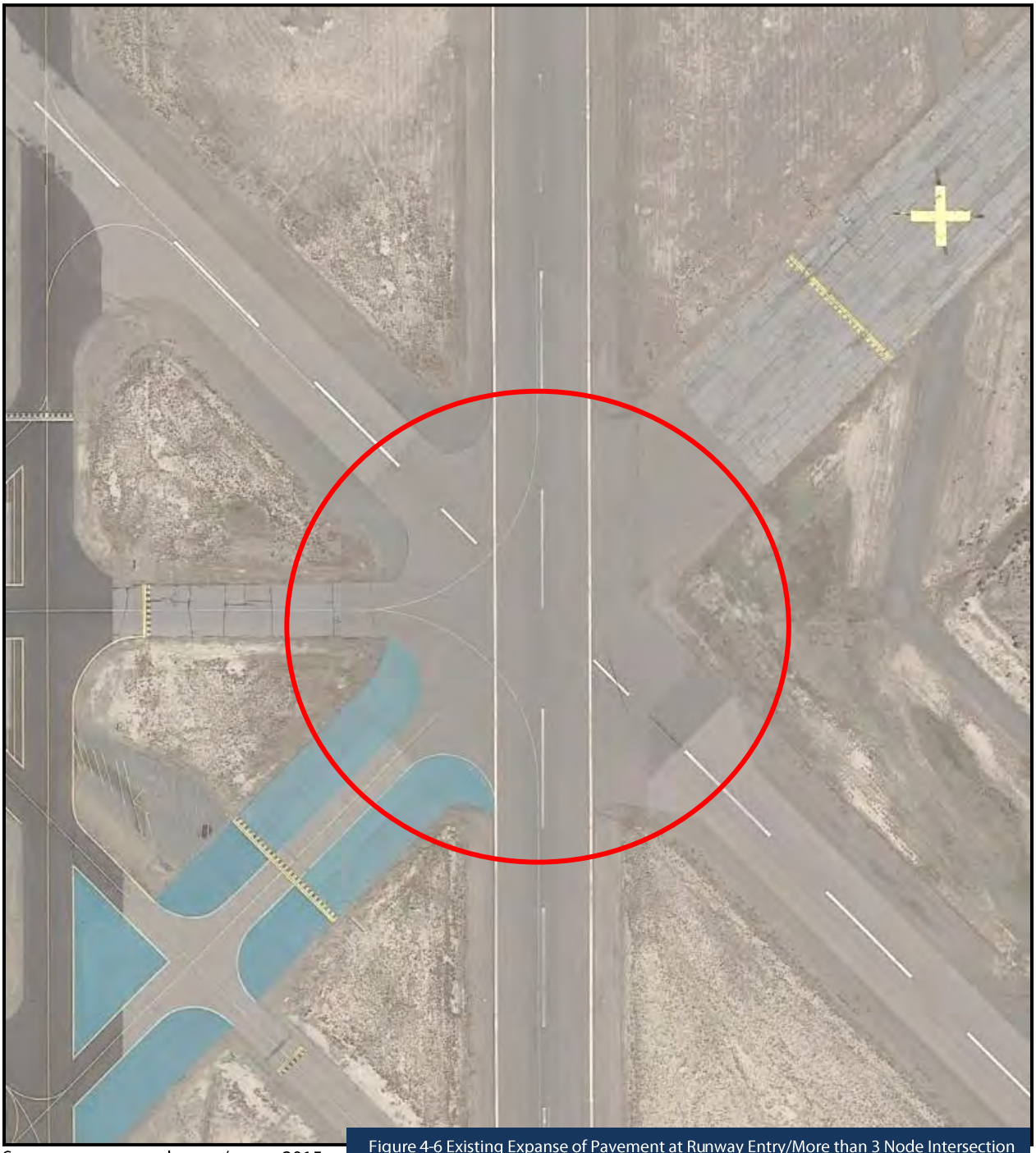
- Eliminate direct access from the aircraft parking apron to Runway 16-34 (See **Figure 4-4**)
- Meet new taxiway fillet design geometry for new taxiways and when existing taxiways are reconstructed
- Optimize pilot's recognition of entry to the runway (i.e. increase situational awareness) through design of taxiway layout including:
    - Eliminating existing non-right angle of taxiway/runway intersections (See **Figure 4-5**)
    - Removing intersections with greater than 3 nodes (See **Figure 4-6**)
    - Removing existing wide expanse of pavement at runway entry (See **Figure 4-6**)
    - Removing existing high energy intersections in the middle third of the runway (See **Figure 4-7**)
    - Layout taxiways to account for operational requirements
    - Avoid using runways as taxiways

Sources: www.google.com/maps, 2015

Figure 4-4 Existing Direct Apron to Runway Access

Figure 4-5 Existing Non-Right Angle Runway/Taxiway Intersections

Sources: www.google.com/maps, 2015



Sources: www.google.com/maps, 2015

Figure 4-6 Existing Expanse of Pavement at Runway Entry/More than 3 Node Intersection

Figure 4-7 Existing High Energy Intersections in Middle Third of Runways

Sources: www.google.com/maps, 2015

4.4.5 Aircraft Parking Apron

Aircraft aprons are typically located in the non-movement area of an airport near or adjacent to the terminal area. The function of an apron is to accommodate aircraft during loading and unloading of passengers and/or cargo, fueling, maintenance, and initial to long-term parking. The layout and size of an apron depends on aircraft and ground vehicle circulation needs and specific aircraft clearance requirements. Minden-Tahoe Airport has two aircraft parking aprons. The main aircraft parking apron, located west of Runway 16-34 and Runway 12-30, consists of 99,020 square yards of asphalt and concrete with 132 tiedowns. The glider staging apron, located adjacent to the end of Runway 30, consists of 16,500 square yards of asphalt and no tiedowns.

Tie-down Requirements: Aircraft tie-downs should be provided for small and medium sized aircraft that utilize the airport. These aircraft risk being damaged from the presence of sudden wind gusts if not properly secured. Currently, during peak operations, the Minden-Tahoe Airport experiences limited availability of tie-downs for both based and transient aircraft. It is recommended to expand the aircraft parking apron and install additional tie-downs to accommodate existing and forecasted demand.

Figure 4-8 depicts the existing configuration and object free areas for the west aircraft parking apron. **Figure 4-9** depicts the existing configuration and object free areas for the general aviation hangar areas. The current tie-down layouts are based on ADG I and II Taxilane Object Free Areas (OFA). Typically large aircraft, including business jets, are not tied down and can usually be parked overtop of multiple tie-downs. A mix of ADG I, II and III design standards for tiedowns are recommended for the planning period.

Figure 4-8 Main Apron Taxilane Object Free Areas

Source: Armstrong Consultants, Inc., 2015

Source: Armstrong Consultants, Inc., 2015

Figure 4-9 West Hangar Area Separations

Fixed-Wing Apron Size Requirements: It is recommended to construct additional apron area to accommodate a General Aviation Services Building with a deicing pad and future hangar development. It is also recommended to construct a designated hard stand for heavier aircraft based on the increase in demand at the airport.

Helicopter Apron Requirements: As previously discussed, it is recommended to construct dedicated helicopter parking pads to accommodate existing and future growth in helicopter operations. A dedicated helicopter parking area would increase safety of airport operations by separating fixed wing and rotorcraft aircraft. Four helicopter parking pads designed to accommodate the Bell 407 are recommended for the forecast period.

Glider Staging and Storage Area Apron Size Requirements: It is recommended to construct additional apron area to accommodate glider staging operations with associated tow aircraft. It is recommended to locate this staging area adjacent to the existing glider

staging area east of the end of Runway 30. The staging area is planned to be expanded in the summer of 2016.

It is also recommended to construct a separate glider storage apron near the glider staging area to provide a location where gliders can be stored without constraining staging operations.

Air Tanker Apron Requirements: It is recommended to allocate a designated area to accommodate additional apron space for expanded air tanker operations. The apron should include designated areas for aircraft to resupply their fire retardant.

The layout and configuration of accommodating future apron areas will be further evaluated in Chapter Five, *Development Alternatives*.

4.4.6 Navigational Aids

A Navigational Aid (NAVAID) is any ground based electronic device used to provide course or altitude information to pilots. NAVAIDs include Very High Omnidirectional Range (VORs), Very High Frequency Omnidirectional Range with Tactical Information (VOR-TACs), Non-directional Beacons (NDBs) and Tactical Air Navigational Aids (TACANs), as examples. No navigational aids are located within the immediate vicinity of the airport. The Squaw Valley VOR is the closest NAVAID and is located 26.4 miles west from Minden-Tahoe Airport. No new NAVAIDs are recommended for the airport.

4.4.7 Instrument Approach Procedure

For aircraft operating under Instrument Flight Rules (IFR), an instrument approach procedure is a series of predetermined maneuvers for use under actual or simulated instrument meteorological conditions (IMC) from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

Non-precision Global Positioning System (GPS) approaches do not require ground-based facilities on or near the airport for navigation. The GPS receiver uses satellites for navigation. Therefore, it involves little or no cost for the airport sponsor. GPS was developed by the United States Department of Defense for military use and is now available for civilian use. GPS approaches are rapidly being commissioned at airports across the United States, having approach minimums of as low as 350-foot ceilings and 1-mile visibility are typical for this type of approach. An instrument approach procedure increases the utility of the airport by providing for the capability to operate in inclement weather conditions. This is especially important for air ambulance, physician transport and business flights. It is also utilized for conducting training and maintaining instrument currency.

As previously discussed, Minden-Tahoe Airport's utility is substantially diminished due to the lack of a straight-in instrument approach procedure. During the winter months, the

surrounding mountainous terrain and potential for heavy snowfall create frequent IMC conditions. Therefore, it is recommended a straight-in instrument approach procedure be developed for the Airport.

Based on input from the TAC, a straight-in Localizer Performance with Vertical Guidance (LPV) instrument approach procedure to Runway 34 with visibility minimums of ½-mile and a straight-in LPV instrument approach procedure to Runway 16 with visibility minimums of ½-mile would be preferred. The development of an approach procedure with ½-mile visibility minimums is considered a precision instrument approach and would require the installation of an approach lighting system. The proposed approach lighting will be further discussed in **Section 4.4.8**.

4.4.8 Airfield Signage, Marking, Lighting and Visual Aids

Airport lighting, signage and visual aids enhances safety during periods of inclement weather and nighttime operations by providing visual guidance to pilots in the air and on the ground. The airfield lighting and visual aids at Minden-Tahoe Airport consists of:

- Two-box Visual Approach Slope Indicators (VASIs) on Runways 16 and 34.
- Medium Intensity Runway Lights (MIRLs) on Runway 16-34 that are pilot controlled on the Common Traffic Advisory Frequency (CTAF) frequency 123.05 MHz
- Threshold lights on Runways 16 and 34.
- Medium Intensity Taxiway Lights (MITLs) on Taxiway A1
- Taxiway A, A2, B and S are outlined with retro-reflective markers
- Lighted runway and taxiway signage with non-standard location indicators
- Lighted wind cone/segmented circle
- Rotating airport beacon

The airfield lighting infrastructure is in poor condition with the lighting fixtures in fair condition. The lighting, signs and visual aids are in fair condition. The airport should overhaul their electrical infrastructure to ensure the reliability of the airfield lighting. It is recommended to install a Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR) on the both ends of Runway 16-34 and High Intensity Runway Lights (HIRLS) alongside Runway 16-34 for the precision instrument approach procedure. It is recommended to install Runway End Identifier Lights (REILs) on both ends of Runways 16-34 and 12-30. The REILs for Runway 16-34 would be used to accommodate a future non-precision instrument approach procedure and would be replaced by the MALSR installations if a precision instrument approach procedure is implemented. It is recommended to install Precision Approach Path Indicators (PAPIs), MIRLs and threshold lights on Runway 12-30. It is also recommended to install Medium Intensity Taxiway Lights (MITLs) on all taxiways currently outlined with retro-reflective markers. It is

also recommended to further recess the edge lights along the intersection of Runway 12-30 and 16-34 to minimize damage during snow removal operations. Light-Emitting Diode (LED) lights should be considered for any new lighting systems on the Airport. LED's are energy efficient and have a longer useful life. The lighted signs should also be replaced and incorporate standard location indicators.

4.4.9 Air Traffic Control Tower

Due to the unique variety of aircraft operations, location to noise sensitive properties and volume of traffic at Minden-Tahoe Airport, an air traffic control tower should be considered. An air traffic control tower would be able to enhance aviation safety through control of the busy airspace and enforce noise abatement procedures. According to Title 14 Code of Federal Regulation Part 170, *Establishment and Discontinuance Criteria for Air Traffic Control Services and Navigation Facilities*, to be considered for an air traffic control tower, the Airport must:

1. The airport, whether publicly or privately owned, must be open to and available for use by the public as defined in the Airport and Airway Improvement Act of 1982;
2. The airport must be part of the National Plan of Integrated Airport Systems;
3. The airport owners/authorities must have entered into appropriate assurances and covenants to guarantee that the airport will continue in operation for a long enough period to permit the amortization of the control tower investment;
4. The FAA must be furnished appropriate land without cost for construction of the control tower; and;
5. The airport must meet the benefit-cost ratio criteria specified herein utilizing three consecutive FAA annual counts and projections of future traffic during the expected life of the tower facility. (An FAA annual count is a fiscal year or a calendar year activity summary. Where actual traffic counts are unavailable or not recorded, adequately documented FAA estimates of the scheduled and nonscheduled activity may be used.)

The result of the benefit-cost ratio for benefit of the air traffic control tower over the tower life cycle cost must be greater or equal to 1.0.

Minden-Tahoe Airport is able to meet Criteria #1 through #4. It is recommended the Airport initiate a benefit-cost analysis through the FAA. Suitable land areas for a future air traffic control tower will be evaluated in Chapter Five, *Development Alternatives*, and shown on the Airport Layout Plan.

4.5 Landside Facility Requirements

Landside facilities are another important aspect of the airport. Landside facilities serve as the processing interface between the surrounding community and the airport operating environment. Likewise, it offers the air traveler the first impression of the airport and the

local area. Landside facilities house the support infrastructure for airside operations and can also generate additional revenues for the airport sponsor.

4.5.1 General Aviation Services Buildings

General aviation services buildings typically offer various amenities to passengers, local and transient pilots and airport management. Often called pilot lounges at general aviation airports, service buildings typically provide airport users with public restrooms, public telephones, a pilot's lounge and information regarding airport services.

The Airport currently provides a public waiting area available in the 1,600 square foot Airport Administration Building. It is recommended to construct a public-use general aviation services building. The airport's service building should be able to satisfy the forecasted peak hour general aviation pilot and passenger demand.

The accepted methodology used to project service building facility needs for general aviation airports is based on the number of airport users anticipated to use the facility during the design hour. The design hour is typically defined as the peak hour of an average day of the peak month. The design hour measures the number of passengers departing or arriving on aircraft in an elapsed hour of a typical busy (design) day. Estimating design hour passengers is typically a three-step process:

- Determine the peak month
- Determine the design day to be used
- Estimate the amount of daily activity that occurs in the design hour

The number of peak hour passengers and pilots was derived by assuming 2.5 passengers and pilots per design hour. The building functional size is based on providing 100 square feet per peak design hour. This process is applied to both the existing (base year) conditions as well as forecasted activity in future years. **Table 4-14** lists the building requirements.

Table 4-14 General Aviation Services Building Requirements

Year	Design Hour Operations	Peak Hour Pilots and Passengers	Functional Size
2016	49.3	170	17,000 S.F. 1,600 S.F. (Actual)
2021	64.6	222	22,200 S.F.
2026	66.4	228	22,800 S.F.
2031	68.1	234	23,400 S.F.
2036	69.9	241	24,100 S.F.

Source: Armstrong Consultants, Inc., 2016

Potential locations for the General Aviation Services Building will be further evaluated in Chapter Five, *Development Alternatives*.

4.5.2 Hangar Facilities

Hangars are typically classified as either T-hangars, small multi-unit storage complexes that typically accommodates small aircraft in each unit or conventional hangars that are comprised of small to very large units, able to accommodate a wide variety of aircraft types and quantities. The number of aircraft that each conventional hangar holds varies according to the size of hangars available from manufacturers, the specifications imposed by the airport owner and operators needs. Existing hangars at Minden-Tahoe Airport include 80 conventional box hangars and 78 T-hangars. **Figure 2-20** shows some of the hangars at the airport.

Prefabricated conventional and T-hangar units are available from a variety of manufacturers throughout the nation. Storage space for based aircraft was determined using guidelines suggested in manufacturer's literature. The following are typical.

Conventional hangar standards:

- 1,200 square feet for single-engine aircraft
- 1,400 square feet for multi-engine aircraft
- 1,800 square feet for turboprop or turbojet aircraft

T-hangar standards:

- 1,400 square feet for single- and multi-engine aircraft

The hangar criterion was applied to the based aircraft forecasts to determine the actual hangar area requirements for each hangar type.

Based Aircraft Hangar Requirements: Future facility requirements for based aircraft typically determine the number of tiedown locations, number of shaded spaces, number of T-hangars and number of conventional type hangars required at the airport. Development areas will be identified on the ALP for a mix of hangars to accommodate future growth and to protect areas for development beyond the 20-year planning period.

It is recommended to open up additional areas to lease for future hangar development in order to accommodate the existing hangar wait list, as well as other future hangar development. These individuals have indicated they would prefer to store their aircraft in a hangar rather than outside on the aircraft parking apron. The configuration of additional hangars will be evaluated in Chapter Five, *Development Alternatives*.

Transient Aircraft Hangar Requirements: Transient single-engine aircraft operators generally do not require aircraft storage facilities unless there is inclement weather expected

(such as high winds, hail or snow) or if the operator is planning an extended stay. Minden-Tahoe Airport does have instances of high winds and therefore transient hangars are needed for existing and future transient aircraft. Some higher performance single-engine and multi-engine aircraft operators may desire overnight aircraft storage or a heated hangar in the winter. It is recommended to protect an area for transient aircraft hangars adjacent to the proposed General Aviation Services Building.

4.5.3 Aviation Fuel Facilities

Fuel storage consists of one 12,000 gallon capacity above ground storage tank containing 100-Low Lead fuel (100LL) operated by Sierra Skyport and five 12,000 gallon capacity above ground storage tank containing Jet-A and 100LL fuel operated by Hutt Aviation. Fueling services provided by Sierra Skyport are available at Minden-Tahoe Airport 24-hours a day through use of a credit card reader. Fueling services provided by Hutt Aviation are available from 7:00 A.M. to 5:00 P.M. The existing fuel storage facilities are considered adequate for the planning period.

4.5.4 Airport Access and Automobile Parking

Minden-Tahoe Airport is accessed by Airport Road (also known as County Road 759) located west of the Airport. Directional signs are posted throughout the Town of Minden. It is recommended that an airport's automobile parking be able to satisfy the forecasted peak hour general aviation pilot and passenger demand.

Utilizing methods most commonly used by the FAA for calculating parking space requirements, **Table 4-15** shows the automobile parking space recommendations during the 20-year planning period. It is recommended that the parking be expanded to accommodate needs for 444 based aircraft in the long-term time frame. This includes providing parking adjacent to future hangar development areas.

Table 4-15 Automobile Parking Lot Requirements

Year	Based Aircraft	Recommended Size (S.Y.)
2016	400	14,200 (6,300 Actual)
2021	411	14,591
2026	422	14,981
2031	433	15,372
2036	444	15,372

Note: Each parking space includes 35.5 square yards. Parking space requirements determined by total based aircraft.
Source: Armstrong Consultants, Inc., 2016

4.5.5 Perimeter and Terminal Area Fencing

There are gaps in the coverage of fence in portions of the Airport perimeter. A six foot chain link fence with three strand barb wire partially encompasses the terminal area. Four-strand barbed wire fence encompasses the remainder of the Airport boundary with some

area unfenced. The Airport has electric vehicle access gates and manual gates that provide access to the airfield. It is recommended to install chain link fencing encompassing the entire Airport perimeter. The eight-foot chain link fencing will prevent inadvertent and unauthorized entry by wildlife and individuals. A perimeter fencing project is currently scheduled for 2016. Additional terminal fencing with vehicle and pedestrian access gates should be installed with the future expansion of the landside development area.

4.5.6 Security

There are several programs designed to increase general aviation airport security including the Aircraft Owners and Pilots Association (AOPA) Airport Watch program which created an around the clock telephone hotline answered by federal authorities. Minden-Tahoe Airport is an AOPA Airport Watch program participant. The existing security measures at the Minden-Tahoe Airport are considered to be adequate for the planning period.

4.5.7 Aircraft Rescue and Fire Fighting Equipment and Storage Building

Airport Rescue and Fire Fighting (ARFF) equipment is not required at airports that do not serve scheduled commercial passenger service with 10 or more passenger seats. Local municipal or volunteer fire departments typically provide fire protection to general aviation airports in their district. Mutual aid agreements may also be provided and developed with nearby fire departments to assist in emergency situations. In any case, procedures should be in place to ensure emergency response in case of an accident or emergency at the airport. Although statistically very safe, the most likely emergency situations at general aviation airports are an aircraft accident, fuel or aircraft fire or hazardous material (fuel) spill. The level of protection recommended in FAA Advisory Circular 150/5210-6D, *Aircraft Fire and Rescue Facilities and Extinguisher Agents*, for general aviation airports is 200 gallons of aqueous film forming foam (AFFF) supplemented with 270 pounds of dry chemical. Proximity suits should be utilized for fire fighter protection. Aviation rated fire extinguishers should be immediately available in the vicinity of the aircraft apron and fueling facilities. Adequate facilities should be provided to store any ARFF vehicle(s) or equipment that is acquired.

Fire extinguishers are available at Minden-Tahoe Airport, while the East Fork Fire Protection District responds to emergencies at the airport. The East Fork Fire Protection District owns and operates one engine, one water tender, two brush trucks, one rescue vehicle and one utility vehicle at the nearest station to the Airport (Station 14). Estimated response time from Station 14 to the airport is approximately 10 minutes. The East Fork Fire Protection District and Minden-Tahoe Airport have ongoing training to familiarize the fire department with Airport, aircraft and firefighting equipment. It is recommended that the East Fork Fire Protection District comply with the recommendations contained in FAA Advisory Circular 150/5210-6D, *Aircraft Fire and Rescue Facilities and Extinguishing Agents*.

4.5.8 Snow Removal and Maintenance Equipment and Storage Building

The existing airfield maintenance and snow removal equipment is considered to be in good condition. The Airport also operates a 3,000 square foot maintenance storage building which is in good condition. The existing snow removal equipment is considered to be inadequate to meet the operational needs of the Airport.

It is recommended to acquire a large sized snow removal truck which can accommodate attachments for a sweeper, snow blower and plow. The sweeper is anticipated to be acquired in the short-term. The existing equipment should be replaced as it reaches the end of its useful life. It is recommended to construct a dedicated snow removal equipment storage building at the Airport.

4.5.9 Non-Aeronautical Revenue Generation

Types of non-aeronautical revenue generation could include, but are not limited to; retail, concessions, hotels, industrial development, car rentals, corporate business parks, solar power, and limited agricultural use which would not conflict with airport land use compatibility. It is prudent to protect areas for non-aeronautical revenue generation to assist the airport in maintaining economic sustainability. Non-aeronautical revenue generating activities do not need direct access to the airfield. Any release of land for non-aeronautical purposes must be coordinated through the Federal Aviation Administration's Phoenix Airport District Office.

Currently, Minden-Tahoe Airport has limited non-aeronautical revenue generating agreements in place. Additional areas appropriate for non-aeronautical uses will be identified on the Airport Layout Plan.

4.6 Infrastructure Requirements

4.6.1 Utilities

Utilities at the Airport include electrical power, sewer, potable water, internet and phone. These utilities are all located in the western portion of the Airport property. As discussed in Chapter Two, *Inventory of Airport Assets*, a project is currently in progress to plan, design and install utility infrastructure within the eastern airport development area. To the extent practicable, fiber optic lines should be utilized for telecommunication services to future business/corporate hangars. The utilities should be expanded, as necessary, to accommodate additional landside development.

4.6.2 Weather Reporting Facilities

Weather information is available to pilots from the Automated Weather Observation System (AWOS) Level-III P/T located on the airport. The AWOS-III reports altimeter setting, wind

direction, wind speed, temperature, dew point, cloud ceiling, visibility data. The weather information provided by the AWOS-III P/T is currently available by radio (up to 25 nautical miles) via VHF frequency 119.325 MHz or phone at (775) 782-6264.

The AWOS-III P/T is considered adequate for the forecast period.

4.7 Land Use Compatibility and Control

4.7.1 Airport Property

Existing airport property encompasses approximately 996 acres of land. Fee simple is absolute ownership of land, free of any conditions or claims of title. An avigation easement is the control of the surfaces above the land without outright ownership of the property. The RPZ is a trapezoidal area extending to 1,900 feet beyond the ends of Runway 16-34 and 1,200 feet beyond the ends of Runway 12-30 and Runway 30G and is typically included within the airport property boundary. Residential properties, wildlife attractants and other uses that result in congregations of people are restricted from the RPZ. The existing Runway Protection Zones (RPZs) are owned either fee simple or controlled through avigation easement by Douglas County. The acquisition of land may be needed to accommodate the potential Runway 16-34 extension. This will be further evaluated in Chapter Five, *Development Alternatives*.

4.7.2 Airport Zoning and Compatible Land Use

Airport zoning ordinances should include height restrictions and land use compatibility regulations. Development around airports can pose certain hazards to air navigation if appropriate steps are not taken to ensure that buildings and other structures do not penetrate the Part 77 Airspace Surfaces (described in the following section). The FAA therefore recommends that all Airport Sponsors implement height restriction zoning in the vicinity of the airport to protect these Part 77 Surfaces. Currently, Douglas County has off-airport land use zoning in effect for the Airport Influence Area, as shown in **Figure 2-25**.

In addition to ensuring that obstructions to Part 77 Surfaces are avoided or appropriately marked and lighted, it is recommended that the Airport Sponsor make reasonable efforts to prevent incompatible land uses such as residential encroachment from the immediate area of the airport. Also, the FAA states in FAA Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants On or Near Airports*, such as landfills and/or transfer stations are incompatible land uses with airports. These types of facilities should be located at least 5,000 feet from any point on a runway that serves piston type aircraft and 10,000 feet from any point on a runway that serves turbine powered aircraft. Furthermore, any facility which may attract wildlife (especially birds) such as sewage treatment ponds and wastewater treatment plants should also be located this same distance from any point on the runway.

Land use compatibility considerations include safety, height hazards and noise exposure. Although extremely rare, most aircraft accidents occur within 5,000 feet of a runway. Therefore, the ability of the pilot to bring the aircraft down in a manner that minimizes the severity of an accident is dependent upon the type of land uses within the vicinity of the airport. Douglas County adopted an Airport Influence Area and voluntary noise abatement procedures. Land uses surrounding Minden-Tahoe Airport are generally considered to be compatible with the Airport.

4.7.3 Airport Management Structure

Minden-Tahoe Airport is managed and staffed by ABS Aviation, Incorporated on behalf of Douglas County. The County administration works with ABS Aviation to determine needs and prioritize future capital improvement projects. The management structure is working well and is considered adequate for the safe and efficient operation of the Airport.

4.8 Airspace Surfaces

Title 14 Code of Federal Regulations (CFR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace,* (Part 77) establishes several imaginary surfaces that are used as a guide to provide a safe, unobstructed operating environment for aviation activities. A graphical depiction of Part 77 surfaces are shown in **Figure 2-15**. The Primary, Approach, Transitional, Horizontal and Conical Surfaces identified in Part 77 are applied to each runway. For the purpose of this section, a visual/utility runway is a runway that is intended to be used by propeller driven aircraft of 12,500 pound maximum gross weight or less. A non-precision instrument/utility runway is a runway that is intended to be used by aircraft of 12,500 pounds maximum gross weight or less with a straight-in instrument approach procedure and instrument designation indicated on an FAA approved airport layout plan, a military service approved military airport layout plan or by any planning document submitted to the FAA by competent authority. A non-precision instrument/larger-than-utility runway is a runway intended for the operation of aircraft weighing more than 12,500 pounds that also has a straight-in instrument approach procedure. Runways with only "circling" instrument approaches are considered "visual" for Part 77 purposes.

Minden-Tahoe Airport does not currently have a straight-in instrument approach procedures for any runway and, therefore is considered to be "larger than utility visual" for Runway 16-34. Runways 12-30 and 30G are considered a "visual utility" runway. The existing and future Part 77 Airspace Surfaces are listed in for their respective runways in **Section 4.9**. The Part 77 Airspace Surfaces for these classifications are described in **Section 2.7.9**. While it is desirable to eliminate penetrations of Part 77 airspace surfaces, in some cases, penetrations (also known as obstructions) may be mitigated with appropriate marking and/or lighting. The airspace surrounding the Airport will be further evaluated and shown graphically as a part of the Airport Layout Plan drawing set.

4.9 Summary of Design Standards and Facility Requirements

Tables 4-16, Table 4-17 and **Table 4-18** summarize the FAA design standards, as described in Chapter Two, *Inventory of Airport Assets*, for the recommended development during the initial, intermediate and long-term time frames to Runways 16-34, 12-30 and 30G, respectively. **Table 4-19** summarizes the facility requirements for Minden-Tahoe Airport. The recommendations are based on the types and volume of aircraft expected to utilize the airport in the short and long-term time frames. These recommended facilities will enable the airport to continue to serve its users in a safe and efficient manner.

Table 4-16 Summary of Dimensional Criteria for Runway 16-34

Design Criteria	Existing	Future	Ultimate
Runway Design Code	C-III-5000	C-III-5000	C-III-2400
Approach Type RW 16	GPS - Circling	RNAV Non-precision*	LPV Precision*
Approach Type RW 34	GPS - Circling	RNAV Non-precision*	LPV Precision*
Approach Visibility Minimums RW 16	Visual	1 -mile*	½ -mile*
Approach Visibility Minimums RW 34	Visual	1 -mile*	½ -mile*
Runway centerline to parallel taxiway centerline	400′ (500′ actual)	Same	Same
Runway centerline to edge of aircraft parking apron	500′	Same	Same
Runway width	100′**	Same	Same
Runway shoulder width	25′	Same	Same
Runway Safety Area width	500′(497′ Actual)	500′	Same
Runway Safety Area length beyond runway end	RW 16: 1,000' (998′ Actual) RW 34: 1,000′	1,000′	Same
Runway Object Free Area width	RW 16: 800′ (550′ Actual) RW 34: 800′ (732′ Actual)	800′	Same
Runway Object Free Area length beyond runway end	RW 16: 1,000′ (214′ Actual) RW 34: 1,000′ (300′ Actual)	1,000′	Same
Runway Obstacle Free Zone width	400′	Same	Same
Runway Obstacle Free Zone length beyond runway end	200′	Same	Same
Runway Protection Zone RW 16	500′ x 1,010′ x 1,700′	Same	1,000′ x 1,750′ x 2,500′
Runway Protection Zone RW 34	500′ x 1,010′ x 1,700′	Same	1,000′ x 1,750′ x 2,500′
Taxiway Design Group	3	3	3
Taxiway width	50′	Same	Same
Taxiway Safety Area width	118′	Same	Same
Taxiway Object Free Area width	186′	Same	Same
Taxilane Object Free Area width	162′	Same	Same
Runway centerline to aircraft hold lines	250′	Same	Same
Airspace Surfaces (Part 77)	**Existing**	**Future**	**Ultimate**
Runway 16	Visual - Utility	NPI -Utility*	PI – Utility*
Runway 34	Visual - Utility	NPI -Utility*	PI – Utility*
Primary Surface width	250′	500′	1,000′
Primary Surface length beyond runway ends	200′	Same	Same
Approach Surface dimensions RW 16	250′ x 1,250′ x 5,000′	500′ x 3,500′ x 10,000′	1,000′ x 16,000′ x 10,000′ / 40,000′
Approach Surface dimensions RW 34	250′ x 1,250′ x 5,000′	500′ x 3,500′ x 10,000′	1,000′ x 16,000′ x 10,000′ / 40,000′
Approach Surface slope RW 16	20:1	34:1	50:1 / 40:1
Approach Surface slope RW 34	20:1	34:1	50:1 / 40:1
Transitional Surface slope	7:1	Same	Same
Horizontal Surface radius from runway	5,000′	10,000′	Same
Conical Surface width	4,000′	Same	Same

Source: FAA AC 150/5300-13A, Change 1, *Airport Design* and Title 14 CFR Part 77
*Pending FAA review and IAP development, NPI = Non-precision Instrument, PI = Precision Instrument
**Note: C-III runway standard width is 150 feet unless the pavement strength is less than 150,000 pounds, then a 100 foot width is acceptable.

Table 4-17 Summary of Dimensional Criteria for Runway 12-30

Design Criteria	Existing	Future
Runway Design Code	B-II-5000	B-II-5000
Approach Type RW 12	GPS - Circling	GPS - Circling
Approach Type RW 30	GPS - Circling	GPS - Circling
Approach Visibility Minimums RW 12	Visual	Visual
Approach Visibility Minimums RW 30	Visual	Visual
Runway centerline to parallel taxiway centerline	240′ (270′ and 500′ actual)	240′
Runway centerline to edge of aircraft parking apron	250′	Same
Runway width	75′	Same
Runway shoulder width	10′	Same
Runway Safety Area width	150′	Same
Runway Safety Area length beyond runway end	300′	Same
Runway Object Free Area width	500′ (458′ Actual)	500′
Runway Object Free Area length beyond runway end	RW 12: 300′ (0′ Actual) RW 30: 300′	RW 12: 300′ RW 30: Same
Runway Obstacle Free Zone width	400′	Same
Runway Obstacle Free Zone length beyond runway end	200′	Same
Runway Protection Zone RW 12	500′ x 700′ x 1,000′	Same
Runway Protection Zone RW 30	500′ x 700′ x 1,000′	Same
Taxiway Design Group	1 / 2	2
Taxiway width	25′ / 35′	35′
Taxiway Safety Area width	49 / 79′	79′
Taxiway Object Free Area width	89′ / 131′	131′
Taxilane Object Free Area width	79′ / 115′	115′
Runway centerline to aircraft hold lines	125′ / 200′	200′
Airspace Surfaces (Part 77)	**Existing**	**Future**
Runway 12	Visual > Utility	Visual > Utility
Runway 30	Visual > Utility	Visual > Utility
Primary Surface width	250′	Same
Primary Surface length beyond runway ends	200′	Same
Approach Surface dimensions RW 12	250′ x 1,250′ x 5,000′	Same
Approach Surface dimensions RW 30	250′ x 1,250′ x 5,000′	Same
Approach Surface slope RW 12	20:1	Same
Approach Surface slope RW 30	20:1	Same
Transitional Surface slope	7:1	Same
Horizontal Surface radius from runway	5,000′	Same
Conical Surface width	4,000′	Same

Source: FAA AC 150/5300-13A, Change 1, *Airport Design* and Title 14 CFR Part 77

Table 4-18 Summary of Dimensional Criteria for Runway 30G

Design Criteria	Existing	Future
Runway Design Code	B-I (Small) -VIS	B-I (Small) -VIS
Approach Type RW 30G	Visual	Visual
Approach Visibility Minimums RW 30G	Visual	Visual
Runway centerline to parallel taxiway centerline	N/A	Same
Runway centerline to edge of aircraft parking apron	N/A	Same
Runway width	60′	Same
Runway shoulder width	10′	Same
Runway Safety Area width	120′	Same
Runway Safety Area length beyond runway end	240′	Same
Runway Object Free Area width	250′	Same
Runway Object Free Area length beyond runway end	240′	Same
Runway Obstacle Free Zone width	250′	Same
Runway Obstacle Free Zone length beyond runway end	200′	Same
Runway Protection Zone RW 30G	250′ x 450′ x 1,000′	Same
Taxiway Design Group	2	2
Taxiway width	35′	Same
Taxiway Safety Area width	79′	Same
Taxiway Object Free Area width	131′	Same
Taxilane Object Free Area width	115′	Same
Runway centerline to aircraft hold lines	200′	Same
Airspace Surfaces (Part 77)	**Existing**	**Future**
Runway 30G	Visual - Utility	Visual - Utility
Primary Surface width	250′	Same
Primary Surface length beyond runway ends	200′	Same
Approach Surface dimensions RW 30G	250′ x 1,250′ x 5,000′	Same
Approach Surface slope RW 30G	20:1	Same
Transitional Surface slope	7:1	Same
Horizontal Surface radius from runway	5,000′	Same
Conical Surface width	4,000′	Same

Source: FAA AC 150/5300-13A, Change 1, *Airport Design* and Title 14 CFR Part 77

Table 4-19 Summary of Facility Requirements

Runway 16-34	Existing	Future	Ultimate
Runway Design Code	C-III-5000	C-III-5000	C-III-2400
Length	7,399′	8,820′**	10,130′**
Width	100′	Same	Same
Strength (pounds)	140,000 lbs. DWG*	149,950 lbs. DWG**	Same
Runway 16 Markings	Non-precision	Same	Precision
Runway 34 Markings	Non-precision	Same	Precision
Runway 12-30			
Runway Design Code	B-II-5000	B-II-5000	B-II-5000
Length	5,298′	Same	Same
Width	75′	Same	Same
Strength (pounds)	40,000 lbs. DWG*	Same	Same
Runway 12 Markings	Basic	Same	Same
Runway 30 Markings	Basic	Same	Same
Runway 30G			
Runway Design Code	B-I (Small)-VIS	B-I (Small)-VIS	B-I (Small)-VIS
Length	2,200′	Same	Same
Width	60′	Same	Same
Taxiway System			
Taxiway Design Group	2 / 3	Same	Same
Taxiway	Full Length and Partial Parallel	Full-Length Parallel x 2	Same
Width	35′ / 50′	Same	Same
Strength (pounds)	140,000 lbs. DWG	Same	Same
Airfield Lighting			
Runway Edge	Runway 16-34: Yes Runway 12-30: No Runway 30G: No	Runway 16-34: HIRL Runway 12-30: Yes Runway 30G: Same	Same Same Same
Threshold Lights	Runway 16-34: Yes Runway 12-30: No Runway 30G: No	Runway 16-34: Same Runway 12-30: Yes Runway 30G: Same	Same Same Same
REILs	Runway 16-34: No Runway 12-30: No Runway 30G: No	Runway 16-34: Yes Runway 12-30: Yes Runway 30G: No	Runway 16-34: No Same Same
Approach Slope Indicator	Runway 16-34: Yes Runway 12-30: No Runway 30G: No	Runway 16-34: Same Runway 12-30: PAPI Runway 30G: Same	Same Same Same
Approach Lighting System	No	No	Runway 16-34: Yes
Taxiway Edge Lights	MITL/Retroflectors	MITL	Same
Visual Aids			
Segmented Circle	Yes	Same	Same
Wind Cone/Wind Tee	Yes	Same	Same
Rotating Beacon	Yes	Same	Same
Fencing			
Terminal Area	Partial 6′ Chain Link	Full 8′ Chain Link	Same
Perimeter	Partial Four-Strand Barb Wire	Full 8′ Chain Link	Same
Hangar Facilities			
T-Hangars	78	As Demand Warrants	
"Conventional" (Box Hangar)	80	As Demand Warrants	
Fuel Storage Facilities			
100 LL / Jet-A	6 12,000 Gallon Tanks	Same	Same
Other Services			
G.A. Services Building	No	15,400 S.F.	16,200 S.F.
Weather Station	AWOS-III	Same	Same
Unicom	Yes	Same	Same
Automobile Parking	6,300 S.Y.	13,242 S.Y.	13,952 S.Y.
Air Traffic Control Tower	No	Yes	Same

Source: Armstrong Consultants, Inc., 2016 / *According to NDOT PCN Data, 2013/**As warranted by demand

Chapter Five

Development Alternatives

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

5.1 Introduction

This chapter contains the description and evaluation of recommended development for Minden-Tahoe Airport. The basis for the airside and landside alternatives was derived from the recommendations contained in Chapter Four, *Facility Requirements*. A combination of effective airside and landside planning is essential to the successful development of the airport. Airside facilities are those used during takeoff, landing, taxiing, and parking of aircraft. Landside facilities generally consist of a system of buildings, fuel systems, roadways, and vehicle parking areas.

According to FAA Advisory Circular 150/5070-6B, *Airport Master Plans*, each identified alternative's technical feasibility, economic and fiscal soundness, and aeronautical utility should be examined. Ultimately, development alternatives will only be considered that meet the Airport's planning needs and those that the FAA, NDOT or the County will be realistically able to implement. Not all development shown may be eligible or available for FAA or NDOT grant funding.

5.2 Development Concepts

The overall objective of the alternatives analysis is to:

1) Define a path for future development that is capable of accommodating the forecast demand and facility needs of the airport.

2) Evaluate the best way to implement the facility requirements as presented in Chapter Four, *Facility Requirements*.

As part of the master plan process, a range of airside and landside alternatives are typically created and evaluated based on design standards, environmental concerns, and financial feasibility for implementing the facility requirements. In other instances, where less development is anticipated, the selection of a preferred development plan can result from a straight forward evaluation of the various options resulting from discussions with the sponsor and input from airport users.

The following best planning tenets, as recommended in FAA Advisory Circular 150/5070-6B, *Airport Master Plans*, apply to the evaluation of the development alternatives:

- Conforms to best practices for safety and security
- Conforms to FAA and other appropriate design standards
- Provides for the land use on and off airport
- Allows for forecast growth throughout the planning period

- Provides for growth beyond the planning period
- Provides balance between developmental elements
- Provides flexibility to adjust to unforeseen changes
- Conforms to the County's strategic vision
- Conforms to relevant local, regional, and state transportation plans
- Is technically and financially feasible
- Is socially and politically feasible
- Satisfies user's needs

5.3 Airside Development

Airside development is typically the most critical and physically dominant feature of airport development and therefore a focal point of an airport's planning process. This section discusses the airside development alternatives and addresses the needs of the existing and future aviation demand identified in Chapter Four, *Facility Requirements*. All airside development alternatives are depicted graphically at the end of this Chapter.

5.3.1 Runway System

Chapter Four, *Facility Requirements*, recommended the extension of Runway 16-34 to a future length of 8,820 feet and an ultimate length of 10,130 feet. Although the runway extension is recommended, it is not required for the Airport to do so. The extension of Runway 16-34 would occur if and when there is documented demand from an aircraft operator which requires greater runway length. This alternatives analysis evaluates potential impacts associated with the recommended Runway 16-34 extension. No changes were recommended to Runway 12-30 or Runway 30G. The objectives of the Runway 16-34 extension include:

- Protect for an ultimate runway length of 10,130 feet to accommodate 100 percent of the large aircraft fleet at 60 percent useful load
- Accommodate an extension of Taxiway A to the future end of Runway 16-34
- Protect for a full-length parallel taxiway along the eastside of Runway 16-34
- Provide sufficient Runway Safety Area (RSA), Object Free Area (ROFA) and Obstacle Free Zone (ROFZ)
- Ensure Runway 16-34 Runway Protection Zones (RPZ) are free of incompatible land uses
- Ensure the Runway Visibility Zone (RVZ) remains free of obstructions
- Maintain runway line of sight requirements
- Install High Intensity Runway Lights (HIRLs) and protect for Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR)

installation (requires land 1,600 feet long by 400 feet wide plus an additional 1,000 feet in length by 25 feet in width for runway alignment indicator lights.)
- Minimize potential environmental or community impacts

An alternatives analysis was conducted to determine the optimum method of accommodating the Runway 16-34 extension. All alternatives, except Alternative 4, would meet the objectives of extending Runway 16-34. Estimated runway extension costs do not include improvements to the taxiway system which will be further discussed in **Section 5.3.2**.

Alternative 1: Extend Runway 16-34 to the South

Alternative 1 would accommodate the future and ultimate runway lengths by extending Runway 16-34 by 2,731 feet to the south in two phases. Phase I would provide an 8,820 foot runway length. Phase II would provide a 10,130 foot runway length. The development area is currently zoned for Agricultural activities and primarily falls outside of the existing airport property boundary.

The major advantages to this alternative are:
- Does not require the realignment of any roads or relocation of existing structures
- RPZs are free of incompatible land uses
- Area can accommodate the installation of a MALSR on the approach ends of Runway 16 and 34 with minimal impacts
- Area of potential effect appears to be compatible with future airport development

The major disadvantages to this alternative are:
- Requires the purchase of ± 162 acres of land
- Requires earthwork to maintain grades with existing runway
- Potential to impact farmlands of statewide importance and floodplains
- Moves aircraft over-flight closer to the Town of Minden

Alternative 1, Phase I Estimated Cost: $6,250,000
Alternative 1, Phase II Estimated Cost: $6,750,000
Total Alternative 1 Estimated Cost: $13,000,000

Alternative 2: Extend Runway 16-34 to the North

Alternative 2 would accommodate the future and ultimate runway lengths by extending Runway 16-34 by 2,731 feet to the north in two phases. Phase I would provide an 8,820 foot runway length. Phase II would provide a 10,130 foot runway length. The development area is currently zoned for Airport and Light Industrial activities.

The major advantages to this alternative are:

- Area can accommodate the installation of a MALSR on the approach ends of Runway 16 and 34 with minimal impacts
- The footprint of the runway extension would occur primarily on existing airport property

The major disadvantages to this alternative are:

- Requires the partial closure of Bliss Road and improvements to the east access road to accommodate runway extension
- Adverse traffic impacts to Starbuck Way and other proposed development as a result of Bliss Road realignment
- Requires the purchase and relocation of eight commercial/industrial buildings to accommodate the RPZ
- Requires the purchase of ± 51 acres of land to the north in order to accommodate the runway extension
- Requires the purchase of ± 67 acres of land to the south in order to accommodate the MALSR installation
- Requires earthwork to maintain grades with existing runway
- Potential to impact farmlands of statewide importance and floodplains
- Portions of the proposed area of potential effect are not considered compatible land uses for airport development
- Moves aircraft over-flight closer to the Johnson Lane Census-Designated Place located northeast of the Airport

Alternative 2, Phase I Estimated Cost: $10,300,000
Alternative 2, Phase II Estimated Cost: $14,400,000
Total Alternative 2 Estimated Cost: $24,700,000

Alternative 3: Extend Runway 16-34 to the South and North

Alternative 3 would accommodate the future and ultimate runway lengths by extending Runway 16-34 by 1,421 feet to the south in Phase I and by 1,310 feet to the north in Phase II. The development areas are currently zoned for Agricultural, Airport and Light Industrial activities.

The major advantages to this alternative are:

- Area can accommodate the installation of a MALSR on the approach ends of Runway 16 and 34 with minimal impacts
- Portions of the area of potential effect are considered to be compatible land uses for airport development
- RPZs are free of incompatible land uses in Phase I

The major disadvantages to this alternative are:

- Requires the partial closure of Bliss Road and improvements to the east access road to accommodate Phase II runway extension and RPZ
- Adverse traffic impacts to Starbuck Way and other proposed development as a result of Bliss Road realignment
- Requires the purchase of ± 18 acres of land to the north in order to accommodate the runway extension
- Requires the purchase of ± 113 acres of land to south in order to accommodate the runway extension and MALSR installation
- Requires earthwork to maintain grades with existing runway
- Potential to impact farmlands of statewide importance and floodplains
- Portions of the proposed area of potential effect are not considered compatible for airport development
- Moves aircraft over-flight closer to residential development areas north of the Airport and the Town of Minden to the south

Alternative 3, Phase I Estimated Cost: $6,250,000
Alternative 3, Phase II Estimated Cost: $9,550,000
Total Alternative 3 Estimated Cost: $15,800,000

Alternative 4: No Action

Alternative 4 is the no action alternative. Under this alternative, Runway 16-34 would remain at the existing length of 7,400 feet. There is no estimated development cost for Alternative 4.

The major advantages to this alternative are:

- Requires no federal, state or local investment
- No potential for environmental impacts
- No construction related impacts

The major disadvantages to this alternative are:

- Negative economic impacts from constrained development
- Potential to constrain future airport operations

Reduced Runway Extension Length Option

Alternatives 1 through 3 considered the options to extend Runway 16-34 to a full runway length of 10,130 feet to accommodate 100 percent of the large aircraft at 60 percent useful load. It is possible that Runway 16-34 could be extended to a length less than 10,130 feet. This option would cost less than the full length extension options but would not provide the

equivalent utility of a 10,130 foot length. No specific constraint has been identified to further consider this option moving forward.

Discussion at the March 2016 TAC Meeting did not indicate any reason in which a reduced runway extension length option would be necessary.

5.3.2 Taxiway System

Runway 16-34 Parallel Taxiways

Chapter Four, *Facility Requirements*, recommends the construction of a full-length parallel taxiway along the eastside of Runway 16-34. Furthermore, it is recommended to extend Taxiway A to the future ends of Runway 16-34. The parallel taxiways would provide for aircraft circulation and enhance airport safety. It is recommended to set the future east parallel taxiway (Taxiway Z) to a runway to taxiway centerline separation of 400 feet to meet RDC C-III-2400 design standards. Taxiway Z should be constructed to meet TDG 3 / ADG III design standards. The estimated cost of the Taxiway A extension and Taxiway Z construction is dependent on the Runway 16-34 extension alternative selected.

Alterative 1 Parallel Taxiway Estimated Cost: $22,050,000

Alterative 2 Parallel Taxiway Estimated Cost: $21,250,000

Alterative 3 Parallel Taxiway Estimated Cost: $23,700,000

Alterative 4 Parallel Taxiway Estimated Cost: $12,550,000

Correction of Non-Standard Taxiway Geometries

Chapter Four, *Facility Requirements*, recommends the correction of several existing non-standard taxiway layout geometries at Minden-Tahoe Airport. The following actions are recommended to correct or mitigate existing non-standard conditions:

- Realignment of Taxiway A2 to eliminate greater than 3-node intersection and intersection in high energy area
- Removal of Taxiway C between Runway 16-34 and Taxiway A to eliminate greater than 3-node intersection, direct aircraft parking apron to runway access, non-right angle exit/entry to Runway 16-34 and intersection in high energy area
- Realignment of Taxiway B between Runway 16-34 and Taxiway A to eliminate non-right angle exit/entry to Runway 16-34 and intersection in high energy area[1]
- Realign both ends of Taxiway A and end of Taxiway B to enter runways at right angles

[1] Figure depicts realignment based on existing runway configuration and final layout is subject to change based on Runway Alternative selected.

- Installation of high-visibility runway position hold lights at the intersection of Taxiway A and Runway 12-30[2]

Non-Standard Condition Correction Estimated Cost: $7,475,000[3]

5.3.3 Aircraft Parking Apron

Chapter Four, *Facility Requirements*, recommends the expansion of aircraft parking aprons to accommodate the following airport users:

- Fixed-Wing Aircraft
- Helicopters
- Gliders
- Air tankers

Due to the operational differences and needs between the primary airport users, it is recommended to segregate these users into individual parking apron areas based on type to provide the most efficient and safe airfield layout.

Fixed-Wing Aircraft Parking Apron: An area for additional fixed-wing aircraft parking apron should be protected along the eastside of Runway 16-34. As previously mentioned, the new aircraft parking apron would be 57,850 square yards in size. This apron would coincide with the placement of a future General Aviation Terminal Building. Concrete hard stands should also be developed to accommodate the weight bearing of large corporate jets. The fixed-wing aircraft parking apron should also protect for future aircraft fuel facilities and storage for aircraft refueling vehicles.

A centralized deicing area for aircraft is also recommended. The collection of deicing fluid should be considered during the design of the proposed apron. The deice pad could also be utilized as an aircraft wash rack. Options for collection include a wastewater drainage system or a deicing fluid vacuum vehicle.

Eastside Fixed-Wing Aircraft Parking Apron Estimated Cost: $17,000,000[4]

Helicopter Parking Apron: It is recommended that helicopter parking pads, be located immediately north of the proposed west aircraft parking apron expansion. An 11,100 square yard helicopter parking area with four designated helicopter parking pads is recommended. The parking pads for the helicopter should be constructed with concrete to avoid damage to asphalt pavement. The area would be available for expansion if demand warrants.

[2] This is intended as mitigation tool and does not correct the non-standard condition. The only correction would involve eliminating the full-length parallel taxiway for Runway 16-34 which is not considered to be feasible.
[3] Does not include the construction of Taxiway H
[4] Includes taxilanes originating at the Eastside Fixed-Wing Apron and removal of original Runway 3-21 materials

Helicopter Parking Apron Estimated Cost: $1,200,000

Glider Staging and Storage Apron: It is recommended to expand the existing glider staging area located between Runway 12-30 and Runway 30G by 445 linear feet to the southeast. The asphalt apron would be expanded by 16,500 square yards.

It is also recommended a glider storage area be located northeast of Runway 30G. This location would provide efficient circulation and movement on and off of Runway 30G to the staging area and reduce the amount of glider traffic crossing Runway 16-34 and Runway 12-30. The asphalt apron would be 18,300 square yards in size and accommodate the larger wingspans associated with gliders.

Glider Staging Apron Estimated Cost: $1,000,000

Glider Storage Apron Estimated Cost: $1,150,000

Air Tanker Base: It is recommended to protect an area for a future air tanker base adjacent to the eastside of the Runway 16 threshold. Base facilities could include an operations building, loading stations for large tanker aircraft, a fixed-wing apron and a helicopter parking apron. The actual layout and configuration will be determined by the operating agency. The development cost of the air tanker apron would depend on the detailed configuration and the needs of the tanker base operator.

5.4 Landside Development

Landside development is typically driven by existing and future airside configuration. This section discusses the landside development alternatives and addresses the needs of the existing and future aviation demand identified in Chapter Four, *Facility Requirements*. The proposed landside development is depicted graphically at the end of this Chapter.

5.4.1 Hangar Development Areas

It is recommended to protect for hangar development areas in multiple phases to the east of the proposed fixed-wing aircraft parking apron along the east side of Runway 16-34. Areas should be developed to accommodate future hangar development which includes the construction of paved taxilanes and graded. Taxilanes and hangars should be constructed privately or by the Airport as demand warrants.

5.4.2 General Aviation Services Building

It is recommended to construct a 16,200 square foot general aviation services building to accommodate the forecasted peak hour pilot and passenger demand. The facility should be located east of the proposed fixed-wing aircraft parking apron. It is also recommended to design and construct a facility which is representative of the Minden-Tahoe region to

provide an exceptional user experience. This may be achieved through a variety of methods including the use of local building materials or utilization of local architectural styles. The terminal building should also be designed for environmental sustainability through the use of natural light, high-efficiency light fixtures and improved insulation. **Figure 5-1** depicts a sample layout of a general aviation services building.

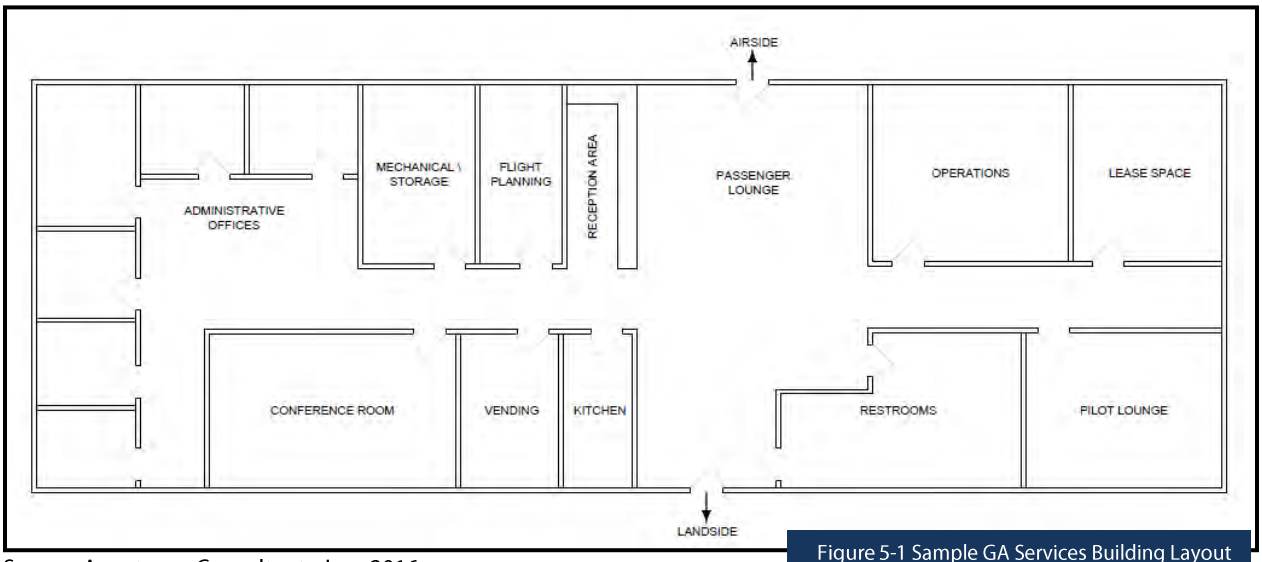


Figure 5-1 Sample GA Services Building Layout

Source: Armstrong Consultants, Inc., 2016

5.4.3 Airport Access and Automobile Parking

Airport Access

The existing airport access roads are sufficient to accommodate traffic flows to facilities located along the western portion of Minden-Tahoe Airport. Access to the proposed development along the eastern portion of the Airport is dependent on the Runway Alternative selected. Listed below are the actions necessary to accommodate automotive traffic based on each Runway Alternative:

- Runway Alternatives 1 & 4: No action needed; Bliss Road can efficiently provide connection to the proposed eastside development.
- Runway Alternatives 2 & 3: A two-lane road would need to be constructed from the north at the intersection of Vicky Lane and Johnson Lane to provide connection to the proposed eastside development.

Alternatives 2 & 3 Estimated Cost: $1,100,000

Automobile Parking

Chapter Four, *Facility Requirements*, identified an existing deficiency in automobile parking availability. To meet existing demand, the parking lot would need to be increased by 6,303

square yards. It is recommended to construct an additional parking lot in the open space northwest of the existing parking lot. Additional parking should be constructed adjacent to development in the eastern portion of the Airport as facilities are built.

5.4.4 Snow Removal Equipment Storage Building

It is recommended to construct a snow removal equipment storage building to accommodate the specific models of snow removal equipment that is anticipated to operate at Minden-Tahoe Airport. The facility should be located northwest of the existing automobile parking lot to provide close proximity to the Airport Administration Building. **Figure 5-2** depicts an example of a snow removal equipment storage building for a large general aviation airport.

Figure 5-2 Example SRE Storage Building

Source: Armstrong Consultants, Inc., 2012

5.4.5 Aviation Center

An aviation center is currently planned for development at the Minden-Tahoe Airport. The aviation center will be a facility to coordinate recreational aviation-related activities. It is recommended to locate this facility along the eastside of the Airport adjacent to the

proposed glider staging and storage area. **Figure 5-3** depicts the conceptual design of the facility.

Figure 5-3 Proposed Aviation Center

Source: Minden-Tahoe Airport, 2016

5.4.6 Revenue Generation Land

It is recommended to protect for both aeronautical and non-aeronautical revenue generating parcels in the following locations:

- South of the west aircraft parking apron and west of Runway 16-34 (88 acres)
- South of Runway 12-30 and east of Runway 16-34 (83 acres)

As stated in Chapter Four, *Facility Requirements*, it is prudent to coordinate any non-aeronautical land use with the Federal Aviation Administration's Phoenix Airport District Office.

5.4.7 Air Traffic Control Tower

It is recommended to protect an area east of the Runway 16-34 midpoint for the development of an air traffic control tower. Features such as structure height, necessary utilities and line of sight capabilities will need to be further evaluated in an air traffic control tower siting study to be conducted after the completion of the benefit-cost analysis.

5.5 Summary of Development Alternatives

The development alternatives presented in this Chapter were derived to accommodate the forecasted aviation demand and the corresponding facility requirements for Minden-Tahoe Airport for the twenty year planning period. The following recommendations were made to accommodate existing and forecasted demand:

Airside Development

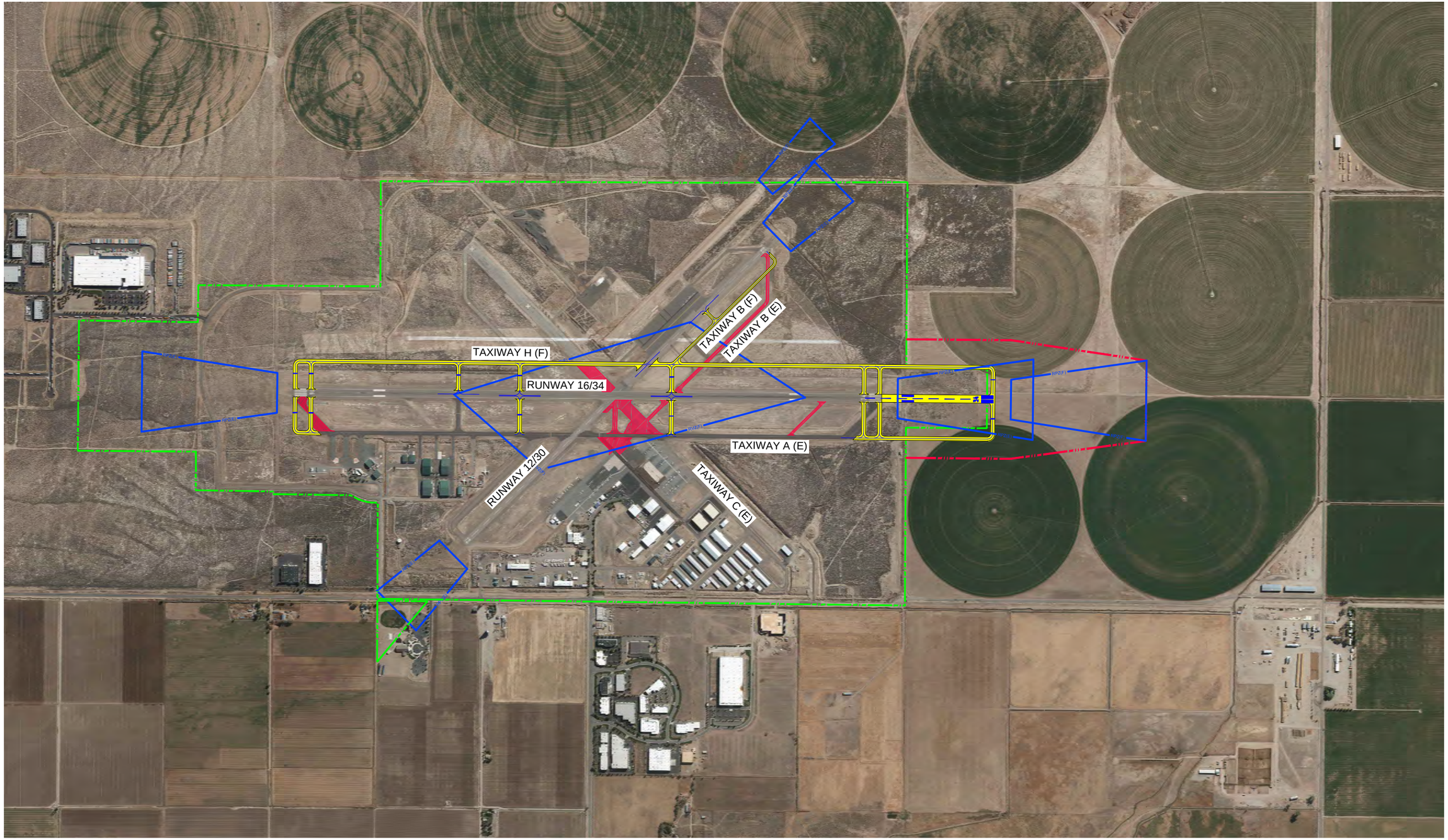
- Extend Runway 16-34 by 2,731 feet to the south
- Construct full-length parallel taxiway, Taxiway Z, to the east of Runway 16-34
- Correct non-standard taxiway geometries, as recommended
- Construct fixed-wing aircraft parking apron east of Runway 16-34 and expand west apron
- Construct air tanker base east of Runway 16 threshold
- Construct glider storage apron northeast of Runway 30G and expand glider staging area south between Runway 12-30 and Runway 30G
- Construct four helicopter parking pads

Landside Development

- Construct hangar facilities in multiple phases
- Construct general aviation services building adjacent to proposed fixed-wing aircraft apron
- Construct additional automobile parking northwest of the existing parking lot in the short-term
- Construct automobile parking along the eastern portion of the Airport to accommodate future development
- Construct snow removal equipment storage building near existing automobile parking lot
- Protect for revenue generating parcels in the southern portion of the Airport property
- Protect for aviation center near proposed glider staging and storage aprons
- Protect for potential air traffic control tower east of Runway 16-34 midpoint

A meeting was held in March 2016 in Minden to present and discuss the recommended development. The TAC affirmed the recommended development presented in this Chapter. The TAC also recommended showing the widening of Runway 16-34 from 100 feet to 150 feet. This would only occur if there were documented demand from a user requiring a 150 foot width with over 500 annual operations. It was also recommended to protect for a precision instrument approach to the Runway 16 end in addition to the Runway 34 end.

A recommended development drawing is shown at the end of this Chapter.



LEGEND

- FUTURE AIRFIELD PAVEMENT
- TO BE REMOVED
- EXISTING AIRPORT PROPERTY LINE
- FUTURE AIRPORT PROPERTY LINE

600 0 600 1200

SCALE IN FEET

ARMSTRONG
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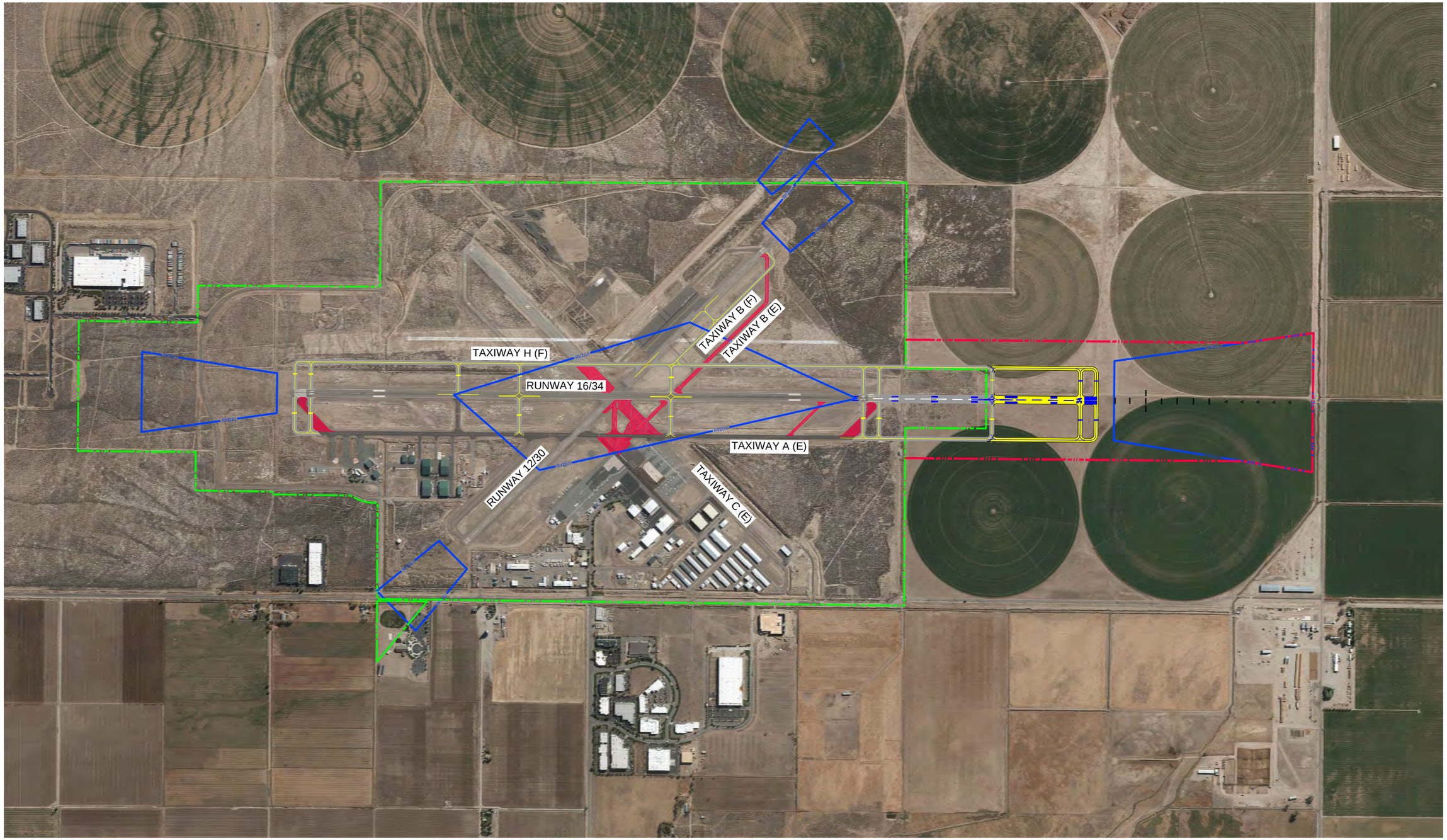
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

RUNWAY 16/34 EXTENSION - ALTERNATIVE 1-PHASE I

SCALE:	PER BAR SCALE	DATE:	02/2016
DRAWN:	LKB	FILE:	6310606-I
CHK'D:	JMR	JOB NO.:	156310



LEGEND

- FUTURE AIRFIELD PAVEMENT
- TO BE REMOVED
- EXISTING AIRPORT PROPERTY LINE
- FUTURE AIRPORT PROPERTY LINE

600 0 600 1200

SCALE IN FEET

ARMSTRONG
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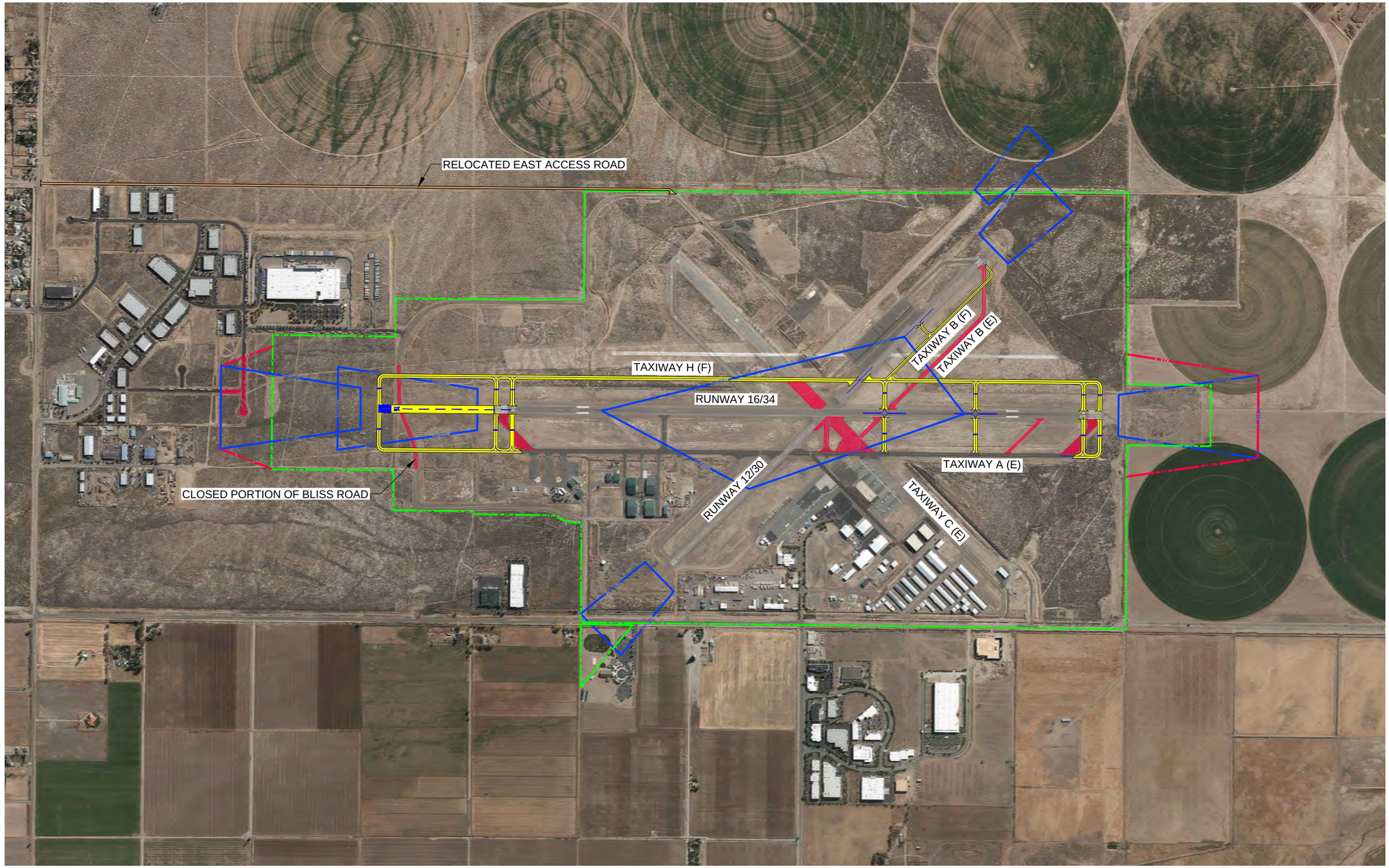
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

RUNWAY 16/34 EXTENSION-ALTERNATIVE 1-PHASE II

SCALE:	PER BAR SCALE	DATE:	02/2016
DRAWN:	LKB	FILE:	6310606-II
CHK'D:	JMR	JOB NO.:	156310



LEGEND

- FUTURE AIRFIELD PAVEMENT
- TO BE REMOVED
- EXISTING AIRPORT PROPERTY LINE
- FUTURE AIRPORT PROPERTY LINE

600 0 600 1200

SCALE IN FEET

ARMSTRONG
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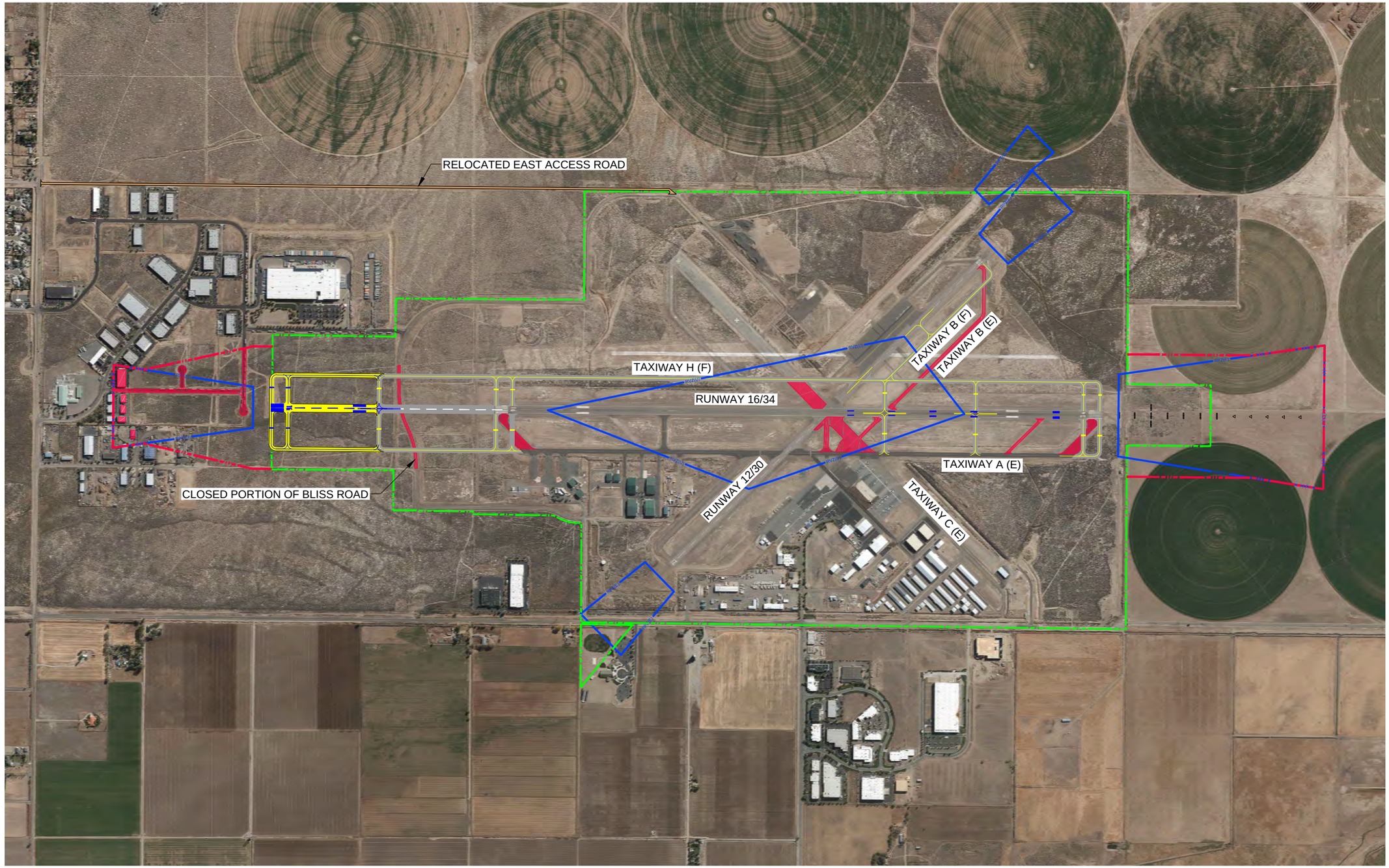
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

RUNWAY 16/34 EXTENSION-ALTERNATIVE 2-PHASE I

SCALE:	PER BAR SCALE	DATE:	02/2016
DRAWN:	LKB	FILE:	6310607-I
CHK'D:	JMR	JOB NO.:	156310



LEGEND

- FUTURE AIRFIELD PAVEMENT
- TO BE REMOVED
- EXISTING AIRPORT PROPERTY LINE
- FUTURE AIRPORT PROPERTY LINE

600 0 600 1200

SCALE IN FEET

ARMSTRONG
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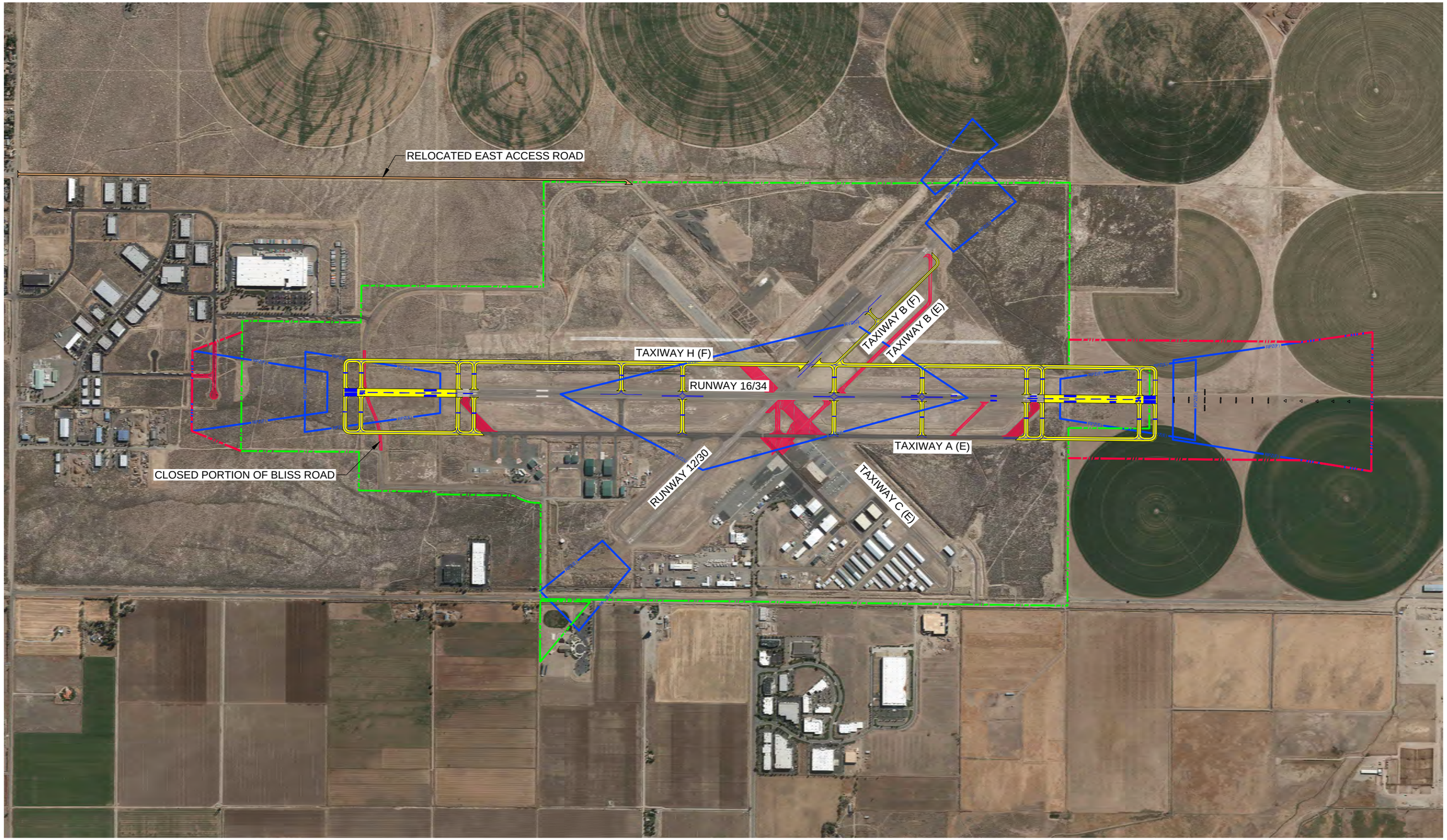
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

RUNWAY 16/34 EXTENSION-ALTERNATIVE 2-PHASE II

SCALE:	PER BAR SCALE	DATE:	02/2016
DRAWN:	LKB	FILE:	6310607-II
CHK'D:	JMR	JOB NO.:	156310



LEGEND

- FUTURE AIRFIELD PAVEMENT
- TO BE REMOVED
- EXISTING AIRPORT PROPERTY LINE
- FUTURE AIRPORT PROPERTY LINE

600 0 600 1200

SCALE IN FEET

ARMSTRONG
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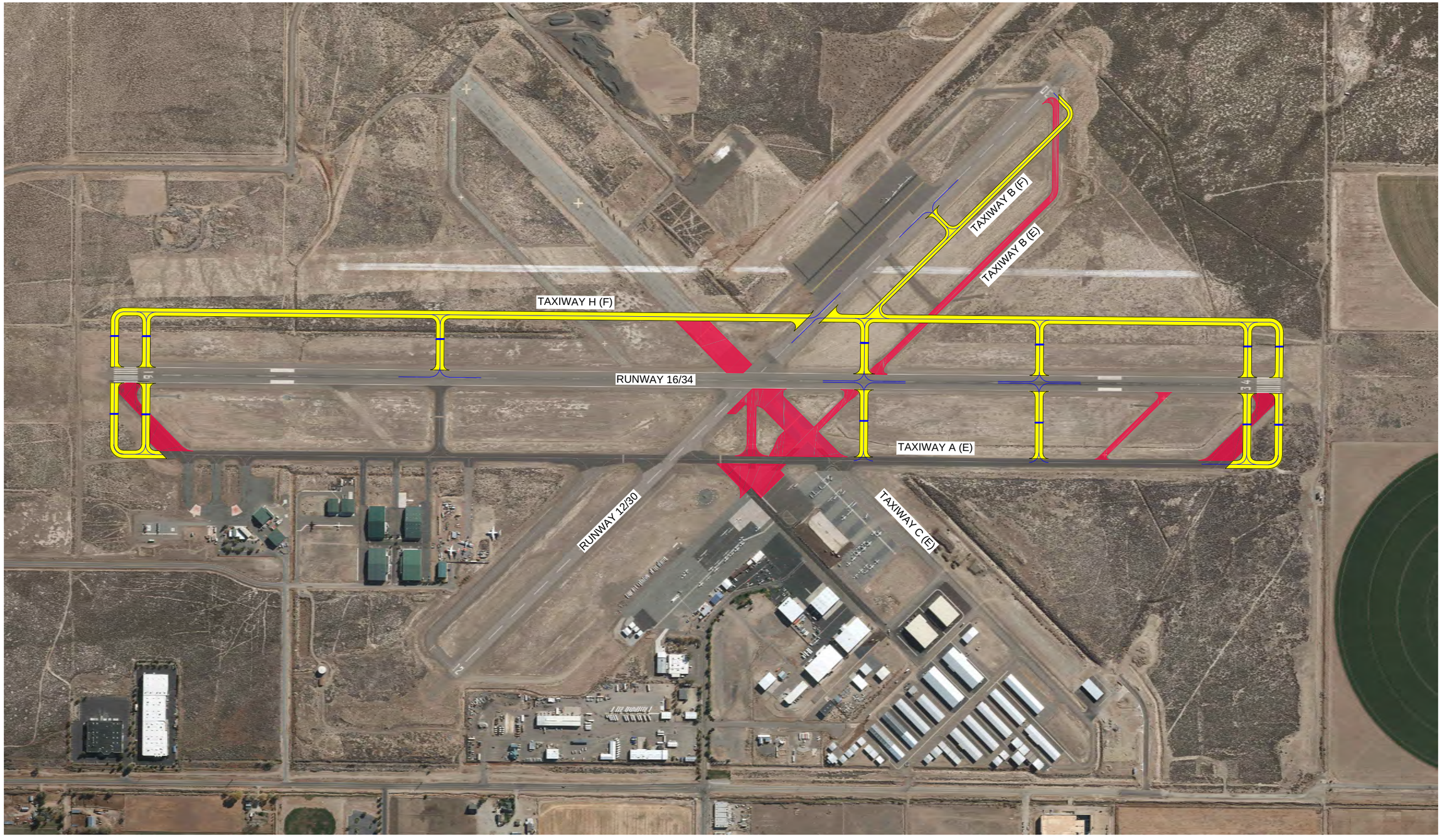
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

RUNWAY 16/34 EXTENSION - ALTERNATIVE 3

SCALE:	PER BAR SCALE	DATE:	02/2016
DRAWN:	LKB	FILE:	6310608
CHK'D:	JMR	JOB NO.:	156310



LEGEND

- FUTURE AIRFIELD PAVEMENT
- TO BE REMOVED
- FUTURE MARKING

300 0 300 600

SCALE IN FEET

ARMSTRONG
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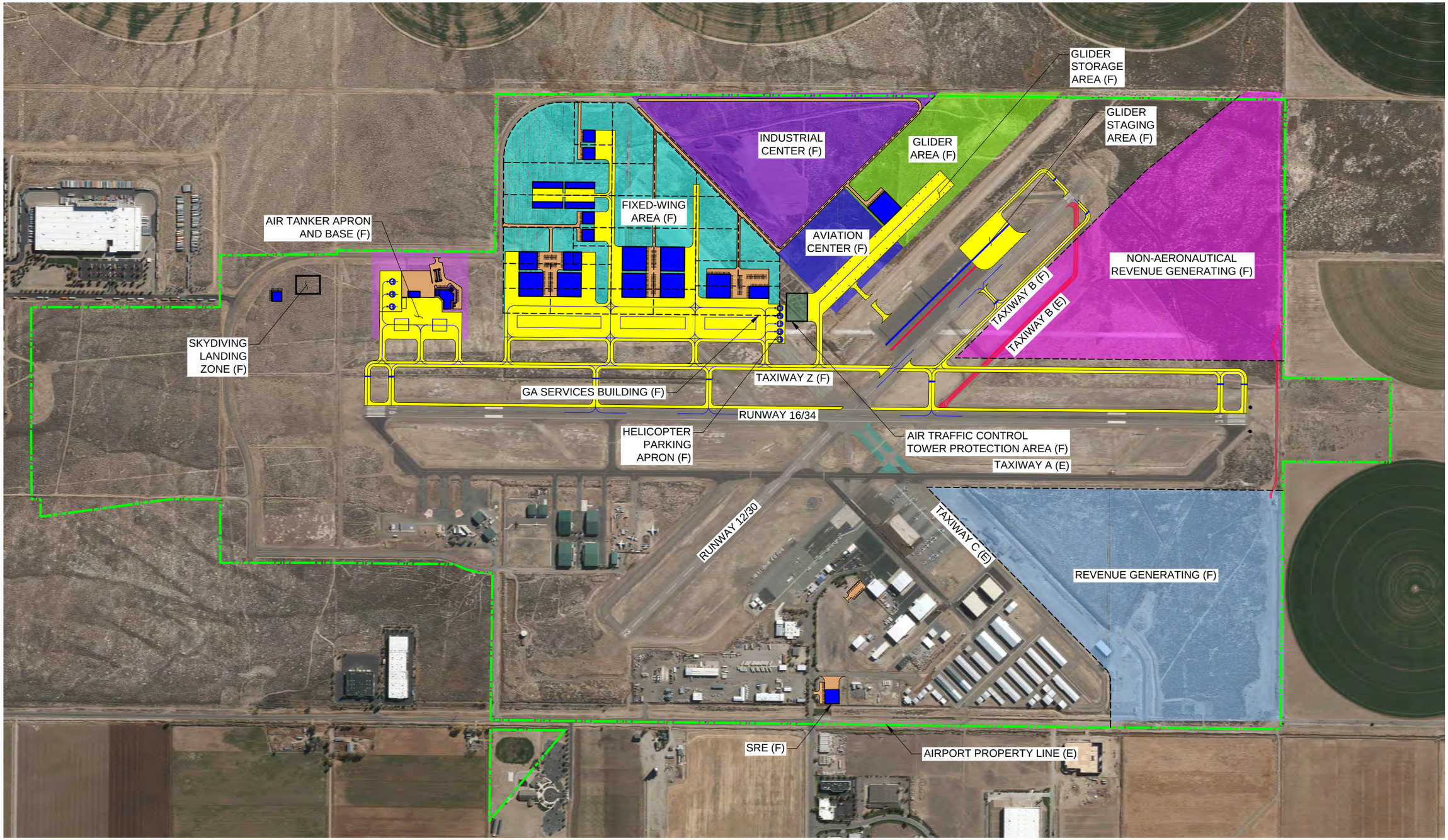
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

RECOMMENDED TAXIWAY SYSTEM DEVELOPMENT

SCALE:	PER BAR SCALE	DATE:	02/2016
DRAWN:	LKB	FILE:	6310602
CHK'D:	JMR	JOB NO.:	156310



LEGEND

- FUTURE AIRFIELD PAVEMENT
- FUTURE ROAD
- FUTURE STRUCTURE
- TO BE REMOVED
- EXISTING AIRPORT PROPERTY LINE
- FUTURE PARCEL

400 0 400 800

SCALE IN FEET

ARMSTRONG
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MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

RECOMMENDED APRON & LANDSIDE DEVELOPMENT

SCALE:	PER BAR SCALE	DATE:	11/2016
DRAWN:	LKB	FILE:	6310605
CHK'D:	JMR	JOB NO.:	156310

Chapter Six

Airport Layout Plan

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

MINDEN-TAHOE AIRPORT

DOUGLAS COUNTY, NEVADA

AIRPORT LAYOUT PLAN

SPONSOR APPROVAL

DOUGLAS COUNTY DATE

PREPARED BY:

ARMSTRONG CONSULTANTS, INC.

A.I.P. NO. 3-32-0013-028-2015

A.C.I. PROJECT NO. 156310

DATE: NOVEMBER 2016

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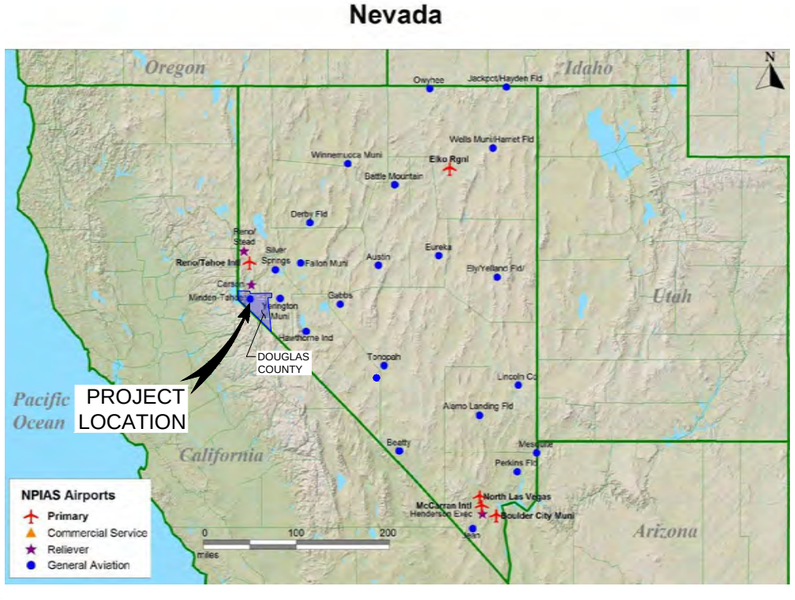
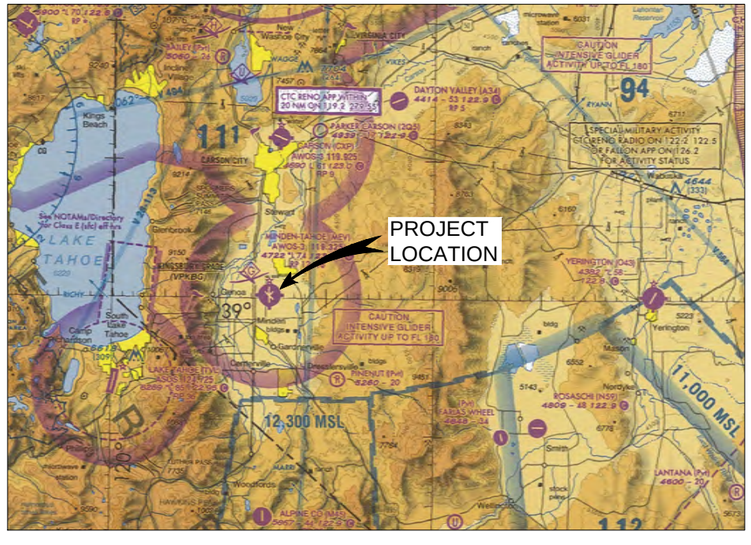
(E = EXISTING, F = FUTURE, U = ULTIMATE)



LOCATION MAP



VICINITY MAP

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
0	156310	11/2016	ORIGINAL ISSUE	6310501	LKB	JMR	JZP

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6310501

SPONSOR APPROVAL

DOUGLAS COUNTY DATE

FAA APPROVAL

MAGNETIC NORTH SOURCE:
NOAA GEOPHYSICAL DATA CENTER
MAGNETIC DECLINATION 13°29' EAST
RATE OF CHANGE 0°6' WEST PER YEAR
OBTAINED: 02/09/16

SCALE IN FEET: 500 0 500 1000

CRITICAL POINTS

NO.	OBJECT	GROUND ELEV.	OBJECT HEIGHT	TOP ELEV.	SURFACE	SURFACE ELEV.	SURFACE PENETRATION
1	ROAD	4700'	15'	4715'	TSS (E) / TSS (F)/(U)	4745' / 4729'	ROFA, RSA (E)
2	ROAD	4698'	15'	4713'	APRC (E) / APRC (F)/(U)	4750' / 4724'	ROFA, RSA (E)
3	FENCE	4718'	9'	4724'	APRC (E) / TSS (E)	4767' / 4767'	NONE
4	ROAD	4697'	15'	4712'	APRC (E)/(F) / TSS (E)/(F)	4730' / 4725'	NONE
5	FENCE	4728'	9'	4737'	APRC (E)/(F) / TSS (E)/(F)	4760' / 4754'	NONE
6	FENCE	4725'	9'	4734'	APRC (E)/(F) / TSS (E)/(F)	4735' / 4735'	NONE

TOP ELEVATION ESTIMATED, NOT FROM A SURVEY.

LEGEND

EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION	EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)			THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)			REIL
		GRAVEL / TURF / DIRT		N/A	VASI
APL	APL	AIRPORT PROPERTY LINE (APL)	N/A		PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)		N/A	AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)		N/A	WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)		N/A	AWOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)		N/A	LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)		N/A	SECTION CORNER
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)	4125	N/A	CONTOURS
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)			ROADS / VEHICLE PARKING
RVZ(E)	RVZ(F)(U)	RUNWAY VISIBILITY ZONE (RVZ)			MARKINGS
		AIRPORT REFERENCE POINT (ARP)	X	XX	FENCING
	N/A	PACS/SACS MONUMENT	N/A		HELICOPTER PARKING
N/A		PRECISION OBSTACLE FREE ZONE	N/A		MALSR
			N/A		TO BE REMOVED

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MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd	Apprvd
0	156310	11/2016	ORIGINAL ISSUE	6310502	LKB	JMR	JZP

AIRPORT LAYOUT PLAN

Sheet: 2 of: 29

AIRPORT FACILITIES LIST

NO.	FACILITY DESCRIPTION	HEIGHT	TOP ELEV. (MSL-EST.)	NO.	FACILITY DESCRIPTION	HEIGHT	TOP ELEV. (MSL-EST.)
1	AIRPORT ADMINISTRATION	15'	4720'	44	HANGARS	16'	4722'
2	FBO	26'	4731'	45	HANGARS	26'	4733'
3	FBO	34'	4739'	46	HANGARS	26'	4733'
4	RESTAURANT	14'	4719'	47	HANGARS	20'	4727'
5	CIVIL AIR PATROL	13'	4718'	48	HANGARS	16'	4721'
6	SoaringNV	27'	4732'	49	HANGARS	20'	4726'
7	AIRPORT MAINTENANCE BUILDING	27'	4732'	50	HANGARS	14'	4720'
8	SIERRA SKYPORT	18'	4723'	51	HANGARS	20'	4727'
9	MINDEN AIR CORP	26'	4726'	52	HANGARS	16'	4723'
10	SIERRA FRONT INTERAGENCY DISPATCH FACILITY	18'	4718'	53	HANGARS	16'	4725'
11	FLYERS ENERGY	18'	4723'	54	HANGARS	16'	4725'
12	COMMERCIAL HANGAR	35'	4735'	55	HANGAR	26'	4735'
13	COMMERCIAL HANGAR	34'	4734'	56	HANGAR	20'	4726'
14	COMMERCIAL HANGAR	34'	4734'	57	HANGAR	16'	4722'
15	COMMERCIAL HANGAR	34'	4734'	58	HANGAR	20'	4726'
16	HANGAR	26'	4726'	59	HANGAR	20'	4727'
17	HANGAR	26'	4726'	60	HANGAR	20'	4727'
18	BUILDINGS	13'	4716'	61	HANGAR	18'	4724'
19	HANGAR	28'	4732'	62	HANGAR	18'	4724'
20	HANGAR	17'	4721'	63	HANGAR	16'	4725'
21	HANGAR	22'	4727'	64	HANGAR	20'	4729'
22	HANGAR	24'	4729'	65	AIRCRAFT TIE DOWNS	-	-
23	HANGAR	34'	4739'	66	AIRPORT FUEL STORAGE FACILITY	12'	4714'
24	HANGAR	30'	4735'	67	SELF SERVICE FUEL SYSTEM	12'	4716'
25	HANGAR	21'	4726'	68	ELECTRICAL VAULT	12'	4717'
26	HANGAR	14'	4719'	69	BEACON	54'	4759'
27	HANGAR	20'	4725'	70	AWOS	31'	4746'
28	HANGAR	20'	4725'	71	LIGHTED WIND CONE & SEGMENTED CIRCLE	22'	4727'
29	HANGAR	32'	4738'	72	SUPPLEMENTAL WIND CONE	16'	4717'
30	HANGAR	32'	4739'	73	SUPPLEMENTAL WIND CONE	7'	4721'
31	HANGAR	16'	4721'	74	SUPPLEMENTAL WIND CONE	8'	4725'
32	HANGAR	21'	4722'	75	VASI's	-	-
33	HANGAR	16'	4718'	76	SRE BUILDING	35'	4740'
34	HANGAR	15'	4720'	77	AIR TANKER APRON AND BASE	35'	4750'
35	HANGAR	15'	4720'	78	CORPORATE HANGARS	35'	4747'
36	HANGAR	15'	4720'	79	GA SERVICES BUILDING	35'	4746'
37	HANGAR	15'	4720'	80	GLIDER OPERATIONS BUILDING/HANGAR	35'	4755'
38	HANGAR	15'	4720'	81	HANGARS	35'	4755'
39	HANGARS	14'	4717'	82	T-HANGARS	15'	4738'
40	HANGARS	16'	4721'	83	HELICOPTER PARKING	-	-
41	HANGARS	20'	4725'	84	PAPI's	-	-
42	HANGARS	16'	4722'	85	REIL's	-	-
43	HANGARS	16'	4722'	86	MALSR	-	-
◯	EXISTING			87	VEHICLE PARKING	-	-
□	FUTURE						

NON-STANDARD CONDITIONS TO BE CORRECTED (F)

NO.	DESCRIPTION	PROPOSED ACTION	APPROXIMATE DATE TO CORRECT CONDITION
1	RUNWAY 16 END - BLISS ROAD IN ROFA, FENCE IN ROFA & RSA	RELOCATE PORTION OF BLISS ROAD AND FENCE	2020
2	RUNWAY 12 END - FENCE IN ROFA	RELOCATE FENCE	2017
3	NON 90° RUNWAY ENTRANCE / EXIT	REALIGN ENTRANCE TAXIWAYS TO 90°	2032
4	GREATER THAN THREE NODE ENTRY TO RUNWAYS	CLOSE AND REMOVE PAVEMENT OF SOME TAXIWAYS	2026
5	RUNWAY 34 END - FENCE IN ROFA	ACQUIRE LAND AND RELOCATE FENCE	2017

DECLARED DISTANCES

ITEM	EXISTING		FUTURE		ULTIMATE		EXISTING / FUTURE		EXISTING / FUTURE	FAA APPROVAL DATE
	RW 16	RW 34	RW 16	RW 34	RW 16	RW 34	RW 12	RW 30	RW 30G	
TAKEOFF RUN AVAILABLE (TORA) (FT)	7,399	7,399	8,822	8,822	10,131	10,131	5,298	5,298	2,049	N/A
TAKEOFF DISTANCE AVAILABLE (TODA) (FT)	7,399	7,399	8,822	8,822	10,131	10,131	5,298	5,298	2,049	N/A
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA) (FT)	7,399	7,399	8,822	8,822	10,131	10,131	5,298	5,298	2,049	N/A
LANDING DISTANCE AVAILABLE (LDA) (FT)	7,399	7,399	8,822	8,822	10,131	10,131	5,298	5,298	2,049	N/A

MODIFICATION TO STANDARDS APPROVAL

NO.	DESCRIPTION	STANDARD TO BE MODIFIED	EXISTING	PROPOSED	PROPOSED ACTION	AIRSPACE CASE NO.	APPROVAL DATE
NONE REQUIRED							

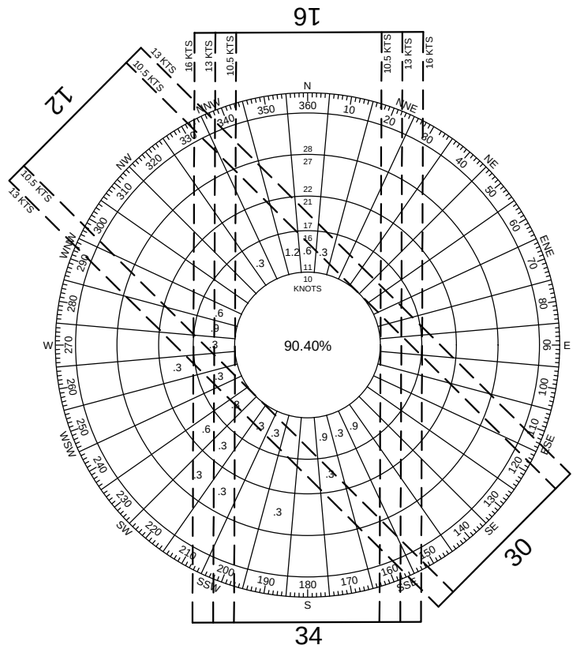
△ TAXIWAY TABLE

NO.	NAME	WIDTH	ADG	TDG	PROPOSED ACTION
1	A (E)(F)(U)	50'	III	3	EXTEND (F)(U)
2	A1 (E)	50'	III	3	RELOCATE (F)
3	A2 (E) A3 (F)(U)	50'	III	3	TO REMAIN
4	A3 (E)	50'	III	3	REMOVE (F)
5	A4 (E)	35'	II	2	RELOCATE (F)
6	B (E)	35'	II	2	REMOVE FROM TW D TO RW 16/34 / RELOCATE FROM RW 16/34 TO RW 30 END (F)
7	C (E)(F)	35'	II	2	REMOVE FROM TW A TO RW 16/34 (F)
8	D (E/F)	40'	II, III	2, 3	REMOVE FROM TW B TO TW A
9	E (E/F)	35'	II	2	TO REMAIN
10	F (E/F)	25'	I	1	TO REMAIN
11	G (E/F)	25'	I	1	TO REMAIN
12	A (F)	50'	III	3	EXTEND (F)
13	A (U)	50'	III	3	EXTEND (U)
14	A1 (F)(U)	50'	III	3	NEW (F)
15	A2 (F)(U)	50'	III	3	NEW (F)
16	A4 (F)(U)	50'	III	3	NEW (F)
17	A5 (F)(U)	50'	III	3	NEW (F)
18	A6 (F)(U)	50'	III	3	NEW (F)
19	A7 (F)(U)	50'	III	3	NEW (F)
20	A8 (F)(U)	50'	III	3	NEW (F)
21	A9 (U)	50'	III	3	NEW (U)
22	A10 (U)	50'	III	3	NEW (U)
23	B (F)	35'	II	2	NEW (F)
24	B1 (F)	35'	II	2	NEW (F)
25	B2 (F)	35'	II	2	NEW (F)
26	Z (F)	50'	III	3	NEW (F)
27	Z (U)	50'	III	3	NEW (U)
28	Z1 (F)	50'	III	3	NEW (F)
29	Z2 (F)	50'	III	3	NEW (F)
30	Z3 (F)	50'	III	3	NEW (F)
31	Z4 (F)	50'	III	3	NEW (F)
32	Z5 (F)	50'	III	3	NEW (F)
33	Z6 (F)	50'	III	3	NEW (F)
34	Z7 (F)	50'	III	3	NEW (F)
35	Z8 (F)	50'	III	3	NEW (F)
36	Z9 (U)	50'	III	3	NEW (U)
37	Z10 (U)	50'	III	3	NEW (U)
38	S (E)	50'	II	3	TO REMAIN
39	J (F)	35'	II	2	NEW (F)

AIRPORT DATA

ITEM		EXISTING (E)	FUTURE (F)	FUTURE (F)
AIRPORT REFERENCE CODE (ARC)		C-III-VIS	C-III-5000	C-III-2400
MEAN MAX. TEMP OF HOTTEST MONTH (°F) (JULY)		90	90	90
AIRPORT ELEVATION (MSL, FT) (NAVD 88) *		4,723.6	4,723.6	4,723.6
AIRPORT NAVIGATIONAL AIDS - ALL AIRPORT OWNED		BEACON, GPS - CIRCLING	BEACON, GPS - LPV	BEACON, GPS - LPV
AIRPORT REFERENCE POINT (ARP) COORDINATES (NAD 83)	LATITUDE	N 39° 00' 02"	N 38° 59' 58"	N 38° 59' 54"
	LONGITUDE	W 119° 45' 04"	W 119° 45' 04"	W 119° 45' 04"
MISCELLANEOUS FACILITIES		TAXIWAY LIGHTING, WIND CONES, AWOS	TAXIWAY LIGHTING, WIND CONES, AWOS	TAXIWAY LIGHTING, WIND CONES, AWOS
ARC AND CRITICAL AIRCRAFT - RUNWAY 16/34	ARC	C-III	C-III	C-III
	AIRCRAFT	GULFSTREAM G500	AIRBUS CORP. JET	AIRBUS CORP. JET
	WINGSPAN (FT)	93.5	111.9	111.9
	UNDERCARRIAGE WIDTH (FT)	16.0	29.4	29.4
	APPROACH SPEED (KTS)	140	121	121
ARC AND CRITICAL AIRCRAFT - RUNWAY 12/30	ARC	B-II	B-II	B-II
	AIRCRAFT	KING AIR 200	KING AIR 200	KING AIR 200
	WINGSPAN (FT)	54.5	54.5	54.5
	UNDERCARRIAGE WIDTH (FT)	17.2	17.2	17.2
	APPROACH SPEED (KTS)	180	180	180
ARC AND CRITICAL AIRCRAFT - RUNWAY 30G	ARC	B-I (SMALL)	B-I (SMALL)	B-I (SMALL)
	AIRCRAFT	PAWNEE	PAWNEE	PAWNEE
	WINGSPAN (FT)	36.2	36.2	36.2
	UNDERCARRIAGE WIDTH (FT)	7.0	7.0	7.0
	APPROACH SPEED (KTS)	68.9	68.9	68.9
AIRPORT MAGNETIC VARIATION	VARIATION	13° 29' E	TBD	TBD
	DATE	2/9/2016	TBD	TBD
	SOURCE	NOAA	TBD	TBD
NPIAS SERVICE LEVEL		GA-REGIONAL	GA-REGIONAL	GA-REGIONAL

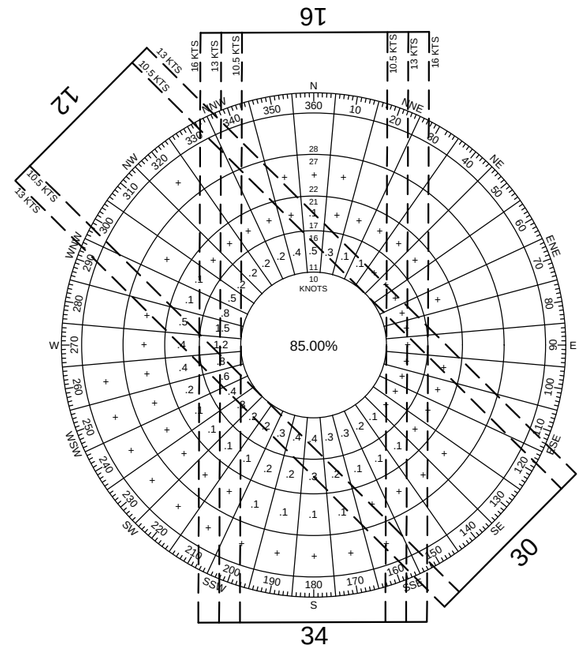
* ELEVATIONS FROM WOOLPERT SURVEY DATA DATED 06/2016.



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPH	16 KNOTS 20 MPH
16/34	96.25%	97.34%	98.11%
12/30	96.23%	97.60%	-
COMB.	97.84%	98.64%	98.11%

IFR WIND ROSE

WIND DATA SOURCE: MINDEN-TAHOE AIRPORT AWOS
(COLLECTION BETWEEN 2014 TO 2015)
NUMBER OF OBSERVATIONS: 344
NOTE: NO DATA PRIOR TO 2014 DUE TO AWOS SERVICE UNAVAILABILITY



RUNWAY	10.5 KNOTS 13 MPH	13 KNOTS 16 MPH	16 KNOTS 20 MPH
16/34	91.64%	94.56%	97.82%
12/30	92.84%	95.91%	-
COMB.	96.11%	98.18%	97.82%

ALL WEATHER WIND ROSE

WIND DATA SOURCE: MINDEN-TAHOE AIRPORT AWOS
(COLLECTION BETWEEN 2014 TO 2016)
NUMBER OF OBSERVATIONS: 38,370

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MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
0	156310	11/2016	ORIGINAL ISSUE	6310502	LKB	JMR	JZP

AIRPORT DATA SHEET

RUNWAY DATA

ITEM		RW 16/34 - EXISTING (E)		RW 16/34 - FUTURE (F)		RW 16/34 - ULTIMATE (U)		RW 12/30 - EXISTING (E)		RW 12/30 - FUTURE (F)		RW 30G - EXISTING / FUTURE (E)(F)	
RUNWAY IDENTIFICATION		16	34	16	34	16	34	12	30	12	30	30G	END OF RW 30 G LANDING AREA
RUNWAY DESIGN CODE (RDC)		C-III-VIS		C-III-5,000 / 5,000		C-III-2,400 / 2,400		B-II-VIS		B-II-VIS		B-I (SMALL)-VIS	
SURFACE MATERIAL, PAVEMENT STRENGTH & MATERIAL TYPE	SURFACE MATERIAL	ASPHALT		ASPHALT		ASPHALT		ASPHALT		ASPHALT		DIRT	
	STRENGTH BY WHEEL LOADING (LBS) [1]	50,000 SWG / 75,000 DWG		99,000 SWG / 149,950 DWG		99,000 SWG / 149,950 DWG		50,000 SWG / 75,000 DWG		50,000 SWG / 75,000 DWG		N/A	
	PCN (FOR BEARING STRENGTH OF 12,500 LBS OR GREATER)	40 / F / C / X / T		TBD		TBD		10 / F / C / X / T		10 / F / C / X / T		N/A	
	SURFACE TREATMENT	NONE		NONE		NONE		NONE		NONE		NONE	
RUNWAY GRADIENT	EFFECTIVE (%)	0.13%		0.15%		0.16%		0.41%		0.41%		0.54%	
	MAXIMUM (%)	0.56%		0.56%		0.56%		1.00%		1.00%		1.13%	
	LINE OF SIGHT MET (Y OR N)	Y		Y		Y		Y		Y		Y	
PERCENT WIND COVERAGE	A-I / B-I - 10.5 KTS	91.64%		91.64%		91.64%		92.84%		92.84%		-	
	A-II / B-II - 13 KTS	94.56%		94.56%		94.56%		95.91%		95.91%		-	
	A-II / B-II / C-III - 16 KTS	97.82%		97.82%		97.82%		-		-		-	
RUNWAY DIMENSIONS (FT)		7,399 x 100		8,822 x 100		10,131 x 150		5,298 x 75		5,298 x 75		2,049 x 60	
RUNWAY SAFETY AREA (RSA)	WIDTH (FT)	500		500		500		150		150		120	
	LENGTH BEYOND RUNWAY END (FT)	1,000 [2]	1,000	1,000	1,000	1,000	1,000	300	300	300	300	240	240
RUNWAY COORDINATES (NAD 83)	RUNWAY END LATITUDE	N 39° 00' 41.32"	N 38° 59' 28.20"	N 39° 00' 41.32"	N 38° 59' 14.14"	N 39° 00' 41.32"	N 38° 59' 01.20"	N 39° 00' 19.76"	N 38° 59' 42.87"	N 39° 00' 19.76"	N 38° 59' 42.87"	N 38° 59' 45.40"	N 38° 59' 59.67"
	RUNWAY END LONGITUDE	W 119° 45' 07.13"	W 119° 45' 06.78"	W 119° 45' 07.13"	W 119° 45' 06.72"	W 119° 45' 07.13"	W 119° 45' 06.65"	W 119° 45' 30.76"	W 119° 44' 43.14"	W 119° 45' 30.76"	W 119° 44' 43.14"	W 119° 44' 36.51"	W 119° 44' 54.93"
	DISPLACED THRESHOLD LAT.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	DISPLACED THRESHOLD LONG.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
RUNWAY ELEVATIONS (NAVD 88)	RUNWAY END (FT)	4707.7	4717.2	4707.7	4719.4	4707.7	4721.5	4700.2	4722.1	4700.2	4722.1	4723.6	4712.4
	DISPLACED THRESHOLD (FT)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	TOUCHDOWN ZONE (TDZ) (FT)	N/A	N/A	4708.0	4719.4	4708.0	4721.5	N/A	N/A	N/A	N/A	N/A	N/A
	HIGH POINT (FT)	4717.2		4719.4		4721.5		4722.1		4722.1		4723.6	
	LOW POINT (FT)	4707.7		4707.7		4707.7		4700.2		4700.2		4712.4	
RUNWAY LIGHTING TYPE		MIRL		HIRL		HIRL		NONE		MIRL		NONE	
RUNWAY PROTECTION ZONE (RPZ) (FT)		500 x 1,010 x 1,700	500 x 1,010 x 1,700	500 x 1,010 x 1,700	500 x 1,010 x 1,700	1,000 x 1,750 x 2,500	1,000 x 1,750 x 2,500	500 x 700 x 1,000	500 x 700 x 1,000	500 x 700 x 1,000	500 x 700 x 1,000	250 x 450 x 1,000	N/A
RUNWAY MARKING TYPE		NON-PRECISION	NON-PRECISION	NON-PRECISION	NON-PRECISION	PRECISION	PRECISION	BASIC	BASIC	BASIC	BASIC	N/A	N/A
14 CFR PART 77 APPROACH SURFACES	APPROACH TYPE	VISUAL	VISUAL	NON-PRECISION	NON-PRECISION	PRECISION	PRECISION	CIRCLING	CIRCLING	CIRCLING	CIRCLING	CIRCLING	N/A
	VISIBILITY MINIMUMS (FT)	VIS	VIS	5,000	5,000	2,400	2,400	VIS	VIS	VIS	VIS	VIS	N/A
	APPROACH SURFACE DIMENSIONS (FT)	500 x 1,500 x 5,000	500 x 1,500 x 5,000	500 x 3,500 x 10,000	500 x 3,500 x 10,000	1,000 x 16,000 x 10,000 / 40,000	1,000 x 16,000 x 10,000 / 40,000	250 x 1,250 x 5,000	250 x 1,250 x 5,000	250 x 1,250 x 5,000	250 x 1,250 x 5,000	250 x 1,250 x 5,000	N/A
	APPROACH SURFACE SLOPE	20:1	20:1	34:1	34:1	50:1 / 40:1	50:1 / 40:1	20:1	20:1	20:1	20:1	20:1	N/A
TYPE OF AERONAUTICAL SURVEY REQUIRED FOR APPROACH		N/A		VERTICALLY GUIDED		VERTICALLY GUIDED		N/A		N/A		N/A	
RUNWAY DEPARTURE SURFACE (YES OR N/A)		YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	N/A	N/A
RUNWAY OBJECT FREE AREA (ROFA)	WIDTH (FT)	800		800		800		500		500		250	
	LENGTH BEYOND RUNWAY END (FT)	1,000 [2]	1,000	1,000	1,000	1,000	1,000	300	300	300	300	240	240
OBSTACLE FREE ZONE (OFZ)	WIDTH (FT)	400		400		400		400		400		250	
	LENGTH BEYOND RUNWAY END (FT)	200	200	200	200	200	200	200	200	200	200	200	200
THRESHOLD SITING SURFACE (TSS)	DIMENSIONS (FT)	800 x 3,800 x 10,000	800 x 3,800 x 10,000	800 x 3,800 x 10,000	800 x 3,800 x 10,000	800 x 3,800 x 10,000	800 x 3,800 x 10,000	400 x 1,000 x 10,000	400 x 1,000 x 10,000	400 x 3,800 x 10,000	400 x 3,800 x 10,000	250 x 700 x 5,000	N/A
	SLOPE	20:1	20:1	20:1	20:1	34:1	34:1	20:1	20:1	20:1	20:1	20:1	N/A
	PENETRATIONS	YES	YES	NONE	NONE	NONE	NONE	NONE	NONE	NONE	NONE	YES	NONE
VISUAL AND INSTRUMENT NAVAIDS		VASI	VASI	PAPI	PAPI	PAPI / MALSR	PAPI / MALSR	NONE	NONE	PAPI	PAPI	N/A	N/A

HORIZONTAL DATUM: NORTH AMERICAN DATUM OF 1983 (DAD 83); VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88). ELEVATIONS & RUNWAY END COORDINATES FROM WOOLPERT SURVEY DATA DATED 06/2016.

[1] EXISTING PUBLISHED PAVEMENT STRENGTH

[2] RSA = 998' ACTUAL; ROFA = 941' ACTUAL (FENCE PENETRATES RSA & ROFA; BLISS ROAD PENETRATES ROFA)

TAXIWAY AND TAXILANE DIMENSIONS

TAXIWAYS AND TAXLINES	ALL (E)(F)(U)	ALL (E)(F)(U)	ALL (E)(F)(U)
TAXIWAY AND TAXILANE DESIGN GROUP (TDG) / AIRPLANE DESIGN GROUP (ADG)	1 / I	2 / II	3 / III
TAXIWAY AND TAXILANE WIDTH (FT)	25	35	50
TAXIWAY AND TAXILANE SAFETY AREA (FT)	49	79	118
TAXIWAY AND TAXILANE OBJECT FREE AREA (FT)	89 / 79	131 / 115	186 / 162
TAXIWAY AND TAXILANE SEPARATION (FT)	70	105	152
TAXIWAY AND TAXILANE LIGHTING	RETROREFLECTOR	RETROREFLECTOR	MITL

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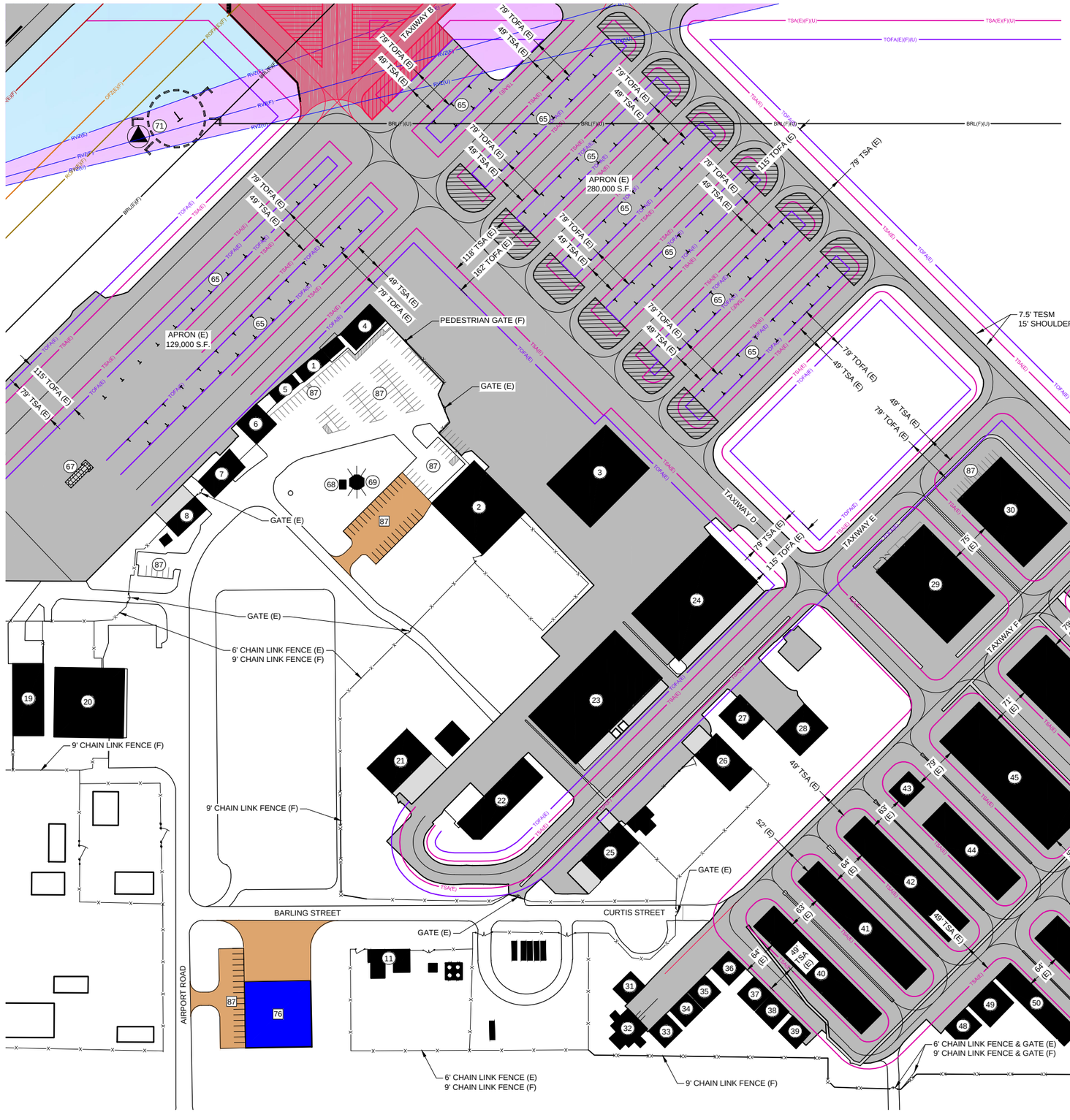
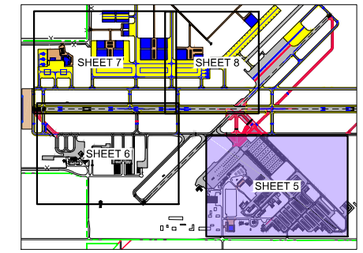
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd
0	156310	11/2016	ORIGINAL ISSUE	6310502	LKB	JMR	JZP

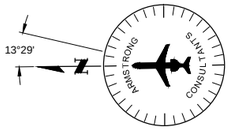
AIRPORT DATA SHEET





KEY MAP

NOT TO SCALE



MAGNETIC NORTH SOURCE:
NOAA GEOPHYSICAL DATA CENTER
MAGNETIC DECLINATION 13°29' EAST
RATE OF CHANGE 0°6' WEST PER YEAR
OBTAINED: 02/09/16

100 0 100 200

SCALE IN FEET

LEGEND

EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)
RVZ(E)	RVZ(F)(U)	RUNWAY VISIBILITY ZONE (RVZ)
	N/A	VASI
		ROADS / VEHICLE PARKING
		MARKINGS
X	XX	FENCING
	N/A	AIRPORT BEACON
N/A		HELICOPTER PARKING
N/A		TO BE REMOVED

NOTE: SEE SHEET 8 FOR FACILITIES LIST.

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MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

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TERMINAL AREA DRAWING

Sheet: 5 of: 29

RUNWAY 16/34

150' (F)(U)

100' (E)

50' (F)(U)

50' (E)

RW ℄ TO HOLDING POSITION 250' (E)

RW ℄ TO HOLDING POSITION 297' (F)(U)

500' RW ℄ TO TW ℄ (E)(F)(U)

118' TSA

186' TOFA

745' BRL (35' STRUCTURE) (F)(U)

495' BRL (35' STRUCTURE) (E)

50' (E)(F)(U)

10' TESM
20' SHOULDER

1' (E)(F)(U)

TAXIWAY A1 (F)(U)

TAXIWAY A1 (E)

TAXIWAY A (E)(F)(U)

TAXIWAY A2 (E)

TAXIWAY A3 (F)(U)

118' TSA
162' TOFA
59'

118' TSA
162' TOFA
60'

118' TSA
162' TOFA
60'

79' TOFA
49' (TSA)

35'

38'

6' CHAIN LINK FENCE & GATE (E)
9' CHAIN LINK FENCE & GATE (F)

PEDESTRIAN GATE (E)

9' CHAIN LINK FENCE & PEDESTRIAN GATE (F)

4' BARBED WIRE FENCE (E)
9' CHAIN LINK FENCE (F)

BLISS ROAD

WASS WAY

GATE (F)

9' CHAIN LINK FENCE (F)

9' CHAIN LINK FENCE (E)

6' CHAIN LINK FENCE (E)
9' CHAIN LINK FENCE (F)

P51 CT

AIRPORT PROPERTY LINE (E)

FIREBRAND RD

70' TW ℄ TO FIXED OR MOVABLE OBJECT (E)

131' TOFA (E)
79' TSA (E)

50' (E)(F)

275' RW ℄ TO TW ℄ (F)

RW ℄ TO HOLDING POSITION 213' (E)(F)

RUNWAY 12/30

400' OFZ

150' RSA

500' ROFA

370' BRL (35' STRUCTURE) (E)(F)

75' (E)(F)

12

30

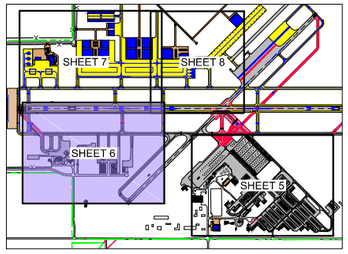
13°29'

100 0 100 200
SCALE IN FEET

LEGEND

EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
	N/A	AIRPORT PROPERTY LINE (APL)
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)
RVZ(E)	N/A	RUNWAY VISIBILITY ZONE (RVZ)
	N/A	VASI
N/A		PAPI
	N/A	ROADS / VEHICLE PARKING
		MARKINGS
X	XX	FENCING
N/A		TO BE REMOVED

NOTE: SEE SHEET 8 FOR FACILITIES LIST.



KEY MAP
NOT TO SCALE

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DOUGLAS COUNTY, NEVADA

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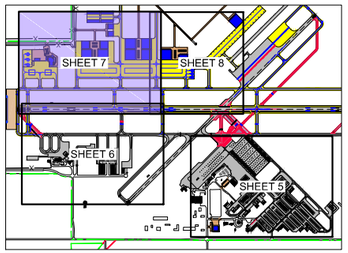
TERMINAL AREA DRAWING

Sheet: 6 of: 29

LEGEND		
EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
	N/A	AIRPORT PROPERTY LINE (APL)
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)
RVZ(E)	N/A	RUNWAY VISIBILITY ZONE (RVZ)
	N/A	LIGHTED WIND CONE
		ROADS / VEHICLE PARKING
		MARKINGS
X	XX	FENCING

NOTE: SEE SHEET 8 FOR FACILITIES LIST.



KEY MAP
NOT TO SCALE

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AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

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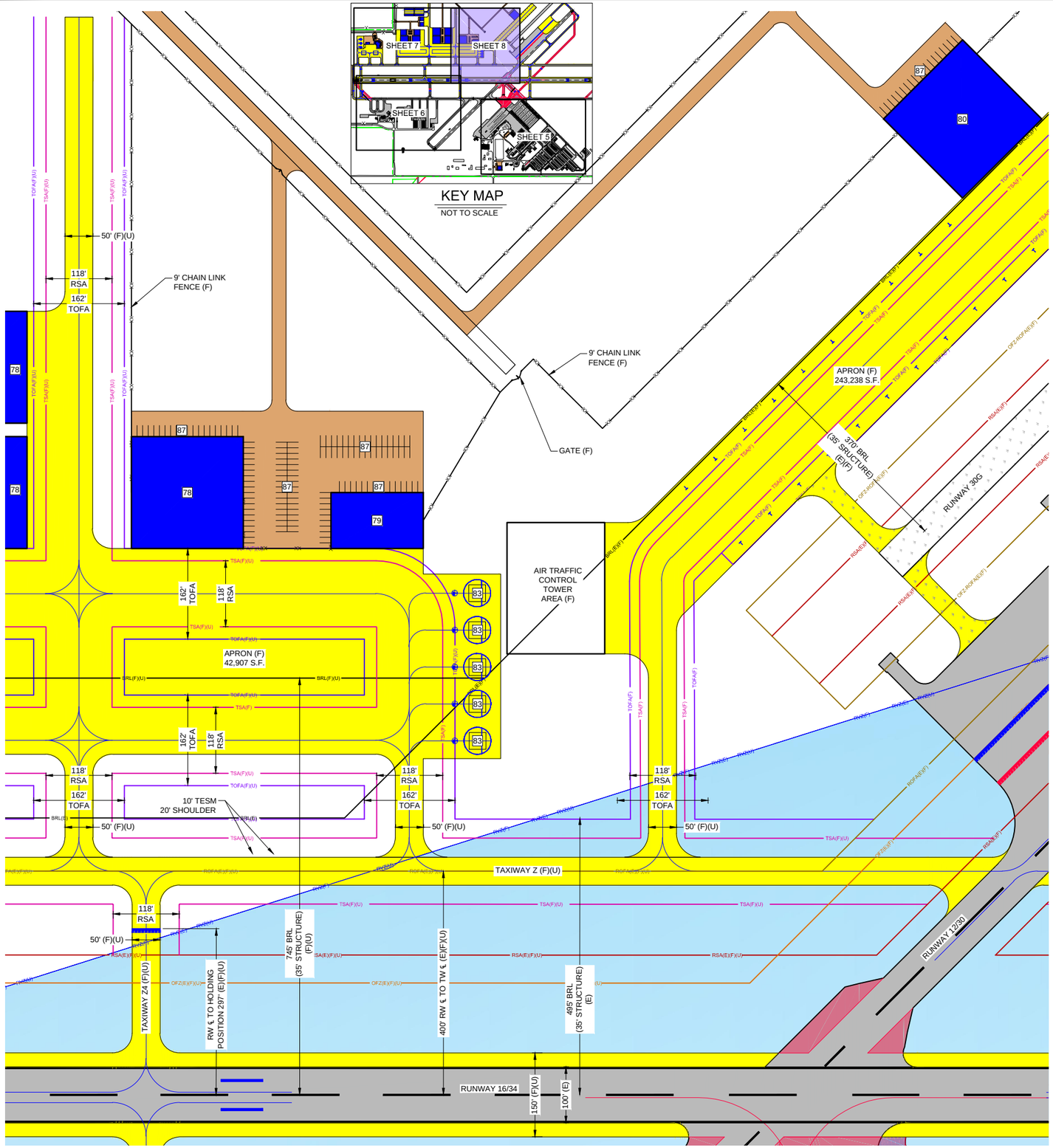
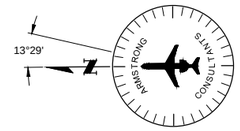
0	156310	11/2016	ORIGINAL ISSUE	6310503	LKB	JMR	JZP

TERMINAL AREA DRAWING

Sheet: 7 of: 29





LEGEND

EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
		GRAVEL / TURF / DIRT
	N/A	AIRPORT PROPERTY LINE (APL)
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)
RVZ(E)	N/A	RUNWAY VISIBILITY ZONE (RVZ)
		ROADS / VEHICLE PARKING
		MARKINGS
X	N/A	FENCING
N/A		TO BE REMOVED

AIRPORT FACILITIES LIST

NO.	FACILITY DESCRIPTION	TOP ELEV. (MSL-EST.)	NO.	FACILITY DESCRIPTION	TOP ELEV. (MSL-EST.)
1	AIRPORT ADMINISTRATION	4720'	44	HANGAR	4722'
2	FBO	4731'	45	HANGAR	4733'
3	FBO	4739'	46	HANGAR	4733'
4	RESTAURANT	4719'	47	HANGAR	4727'
5	CIVIL AIR PATROL	4718'	48	HANGAR	4721'
6	SoaringNV	4732'	49	HANGAR	4726'
7	AIRPORT MAINTENANCE BUILDING	4732'	50	T-HANGARS	4720'
8	SIERRA SKYPORT	4723'	51	HANGAR	4727'
9	MINDEN AIR CORP	4726'	52	HANGAR	4723'
10	SIERRA FRONT INTERAGENCY DISPATCH FACILITY	4718'	53	HANGAR	4725'
11	FLYERS ENERGY	4723'	54	HANGAR	4725'
12	COMMERCIAL HANGAR	4735'	55	HANGAR	4735'
13	COMMERCIAL HANGAR	4734'	56	HANGAR	4726'
14	COMMERCIAL HANGAR	4734'	57	HANGAR	4722'
15	COMMERCIAL HANGAR	4734'	58	HANGAR	4726'
16	HANGAR	4726'	59	HANGAR	4727'
17	HANGAR	4726'	60	HANGAR	4727'
18	BUILDINGS	4716'	61	HANGAR	4724'
19	HANGAR	4732'	62	HANGAR	4724'
20	HANGAR	4721'	63	HANGAR	4725'
21	HANGAR	4727'	64	HANGAR	4729'
22	HANGAR	4729'	65	AIRCRAFT TIE DOWNS	-
23	HANGAR	4739'	66	AIRPORT FUEL STORAGE FACILITY	4714'-0"
24	HANGAR	4735'	67	SELF SERVICE FUEL SYSTEM	4716'
25	HANGAR	4726'	68	ELECTRICAL VAULT	4717'
26	HANGAR	4719'	69	BEACON	4760'
27	HANGAR	4725'	70	AWOS	4750'
28	HANGAR	4725'	71	LIGHTED WIND CONE & SEGMENTED CIRCLE	4730'
29	HANGAR	4738'	72	SUPPLEMENTAL WIND CONE	4708'
30	HANGAR	4739'	73	SUPPLEMENTAL WIND CONE	4721'
31	HANGAR	4721'	74	SUPPLEMENTAL WIND CONE	4724'
32	HANGAR	4722'	75	VASI's	-
33	HANGAR	4718'	76	SRE BUILDING	4740'
34	HANGAR	4720'	77	AIR TANKER APRON AND BASE	4750'
35	HANGAR	4720'	78	CORPORATE HANGARS	4747'
36	HANGAR	4720'	79	GA SERVICES BUILDING	4746'
37	HANGAR	4720'	80	GLIDER OPERATIONS BUILDING/HANGAR	4755'
38	HANGAR	4720'	81	HANGARS	4755'
39	HANGAR	4717'	82	T-HANGARS	4738'
40	HANGAR	4721'	83	HELICOPTER PARKING	-
41	HANGAR	4725'	84	PAPI's	-
42	HANGAR	4722'	85	REIL's	-
43	HANGAR	4722'	86	MALSR	-
◯	EXISTING		87	VEHICLE PARKING	-
□	FUTURE				

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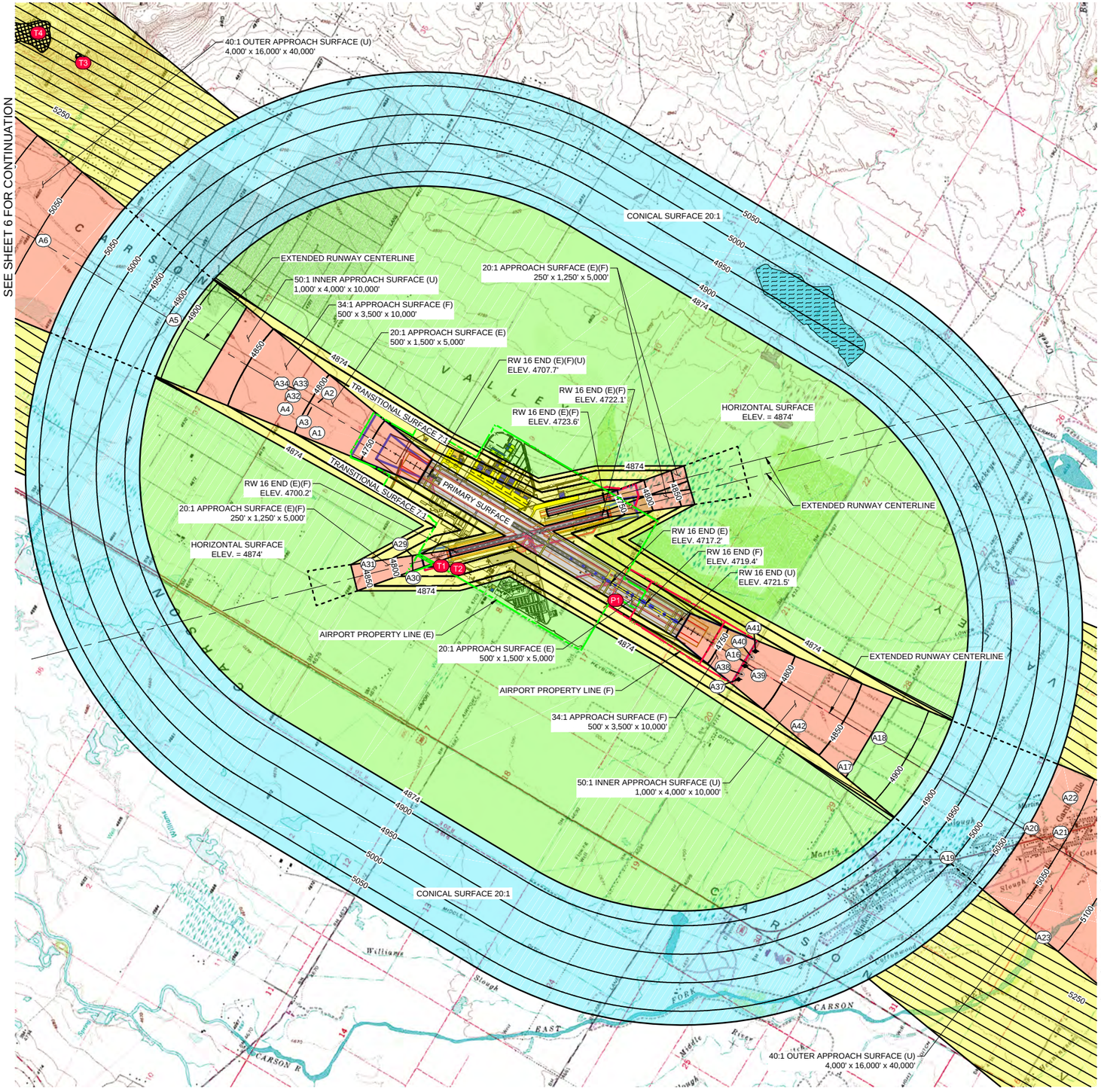
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd
0	156310	11/2016	ORIGINAL ISSUE	6310503	LKB	JMR	JZP

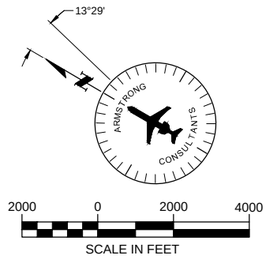
TERMINAL AREA DRAWING

Sheet: 8 of: 29



PLAN VIEW (U)

SCALE: PER BARSCALE



OBSTRUCTION CHART

PART 77 SURFACE	ITEM No.	DESCRIPTION	GROUND ELEVATION (MSL)(FEET)	ESTIMATED TOP ELEVATION (MSL)(FEET)	PENETRATION (FEET)	REMARKS
PRIMARY	P1	*** WELL FACILITY	4710	4726	+9'	SEE NOTE 1
7:1 TRANSITIONAL	T1	** UTILITY POLE	4699	4752	+5'	SEE NOTE 1
	T2	*** MONO POLE	4714	4769	+1	SEE NOTE 1
	T3	* TERRAIN	5558	5558	+43	SEE NOTE 1
	T4	* TERRAIN	5680	5680	+146	SEE NOTE 1
HORIZONTAL	NONE					
20:1 CONICAL	NONE					
APPROACH	SEE PROFILE SHEETS FOR APPROACH SURFACE OBJECTS.					

NOTE:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. SEE INNER APPROACH DRAWINGS FOR OBSTRUCTIONS IN RPZ.
3. * GROUND ELEVATIONS ESTIMATED FROM 30m DEM.
4. ** OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
5. *** OBJECT PENETRATIONS WERE IDENTIFIED USING THE FAA OE/AAA DATABASE.
6. AIRPORT ELEVATION: 4723.6'

LEGEND

- HORIZONTAL SURFACE
- TRANSITIONAL SURFACE
- CONICAL SURFACE
- APPROACH SURFACE
- PRIMARY SURFACE
- TERRAIN PENETRATION
- WATER

NOTES

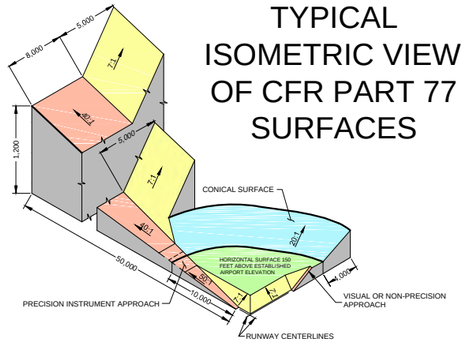
A. REFER TO "INNER PORTION OF THE APPROACH SURFACE" DRAWINGS FOR DETAILS ON ANY CLOSE-IN APPROACH OBSTRUCTIONS.

B. AN FAA FORM 7460-1, "NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION" MUST BE SUBMITTED FOR ANY CONSTRUCTION OR ALTERATION (INCLUDING HANGARS AND OTHER ON-AIRPORT AND OFF-AIRPORT STRUCTURES, TOWERS, ETC.) WITHIN 20,000 HORIZONTAL FEET OF THE AIRPORT GREATER IN HEIGHT THAN AN IMAGINARY SURFACE EXTENDING OUTWARD AND UPWARD FROM THE RUNWAY AT A SLOPE OF 100 TO 1 OR GREATER IN HEIGHT THAN 200 FEET ABOVE GROUND LEVEL.

C. APPROACH SURFACES BASED ON ULTIMATE CONDITION.

D. OBSTRUCTION INFORMATION WAS DETERMINED USING PREVIOUS OBSTRUCTION SURVEY INFORMATION AND AN INQUIRY OF THE FAA OE/AAA DATABASE.

TYPICAL ISOMETRIC VIEW OF CFR PART 77 SURFACES



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DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd	Apprvd
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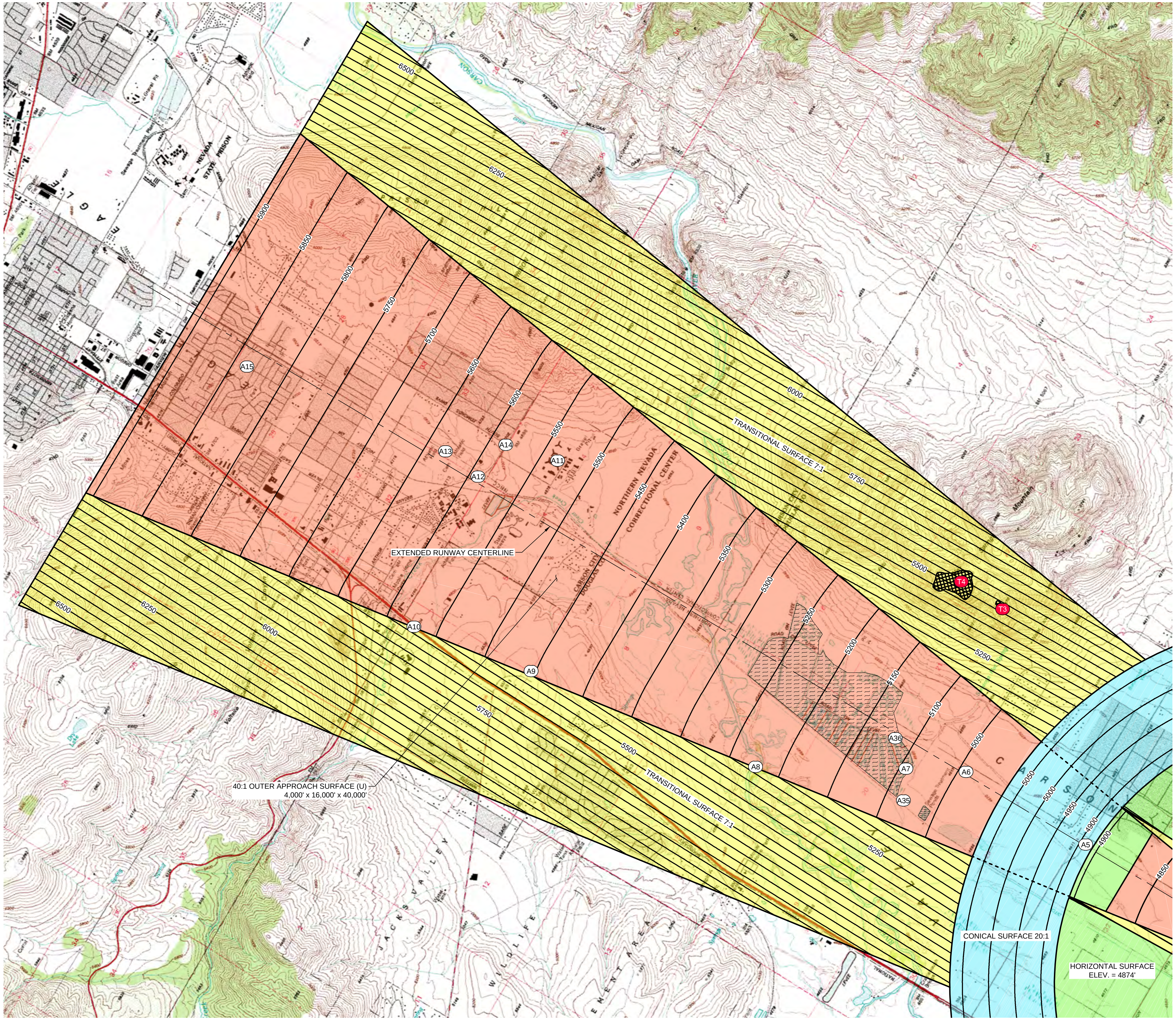
14 CFR PART "77" AIRSPACE DRAWING



SEE SHEET 5 FOR CONTINUATION

13°29'

2000 0 2000 4000
SCALE IN FEET

RUNWAY 16 PRECISION APPROACH - PLAN VIEW (U)

SCALE: PER BARSCALE

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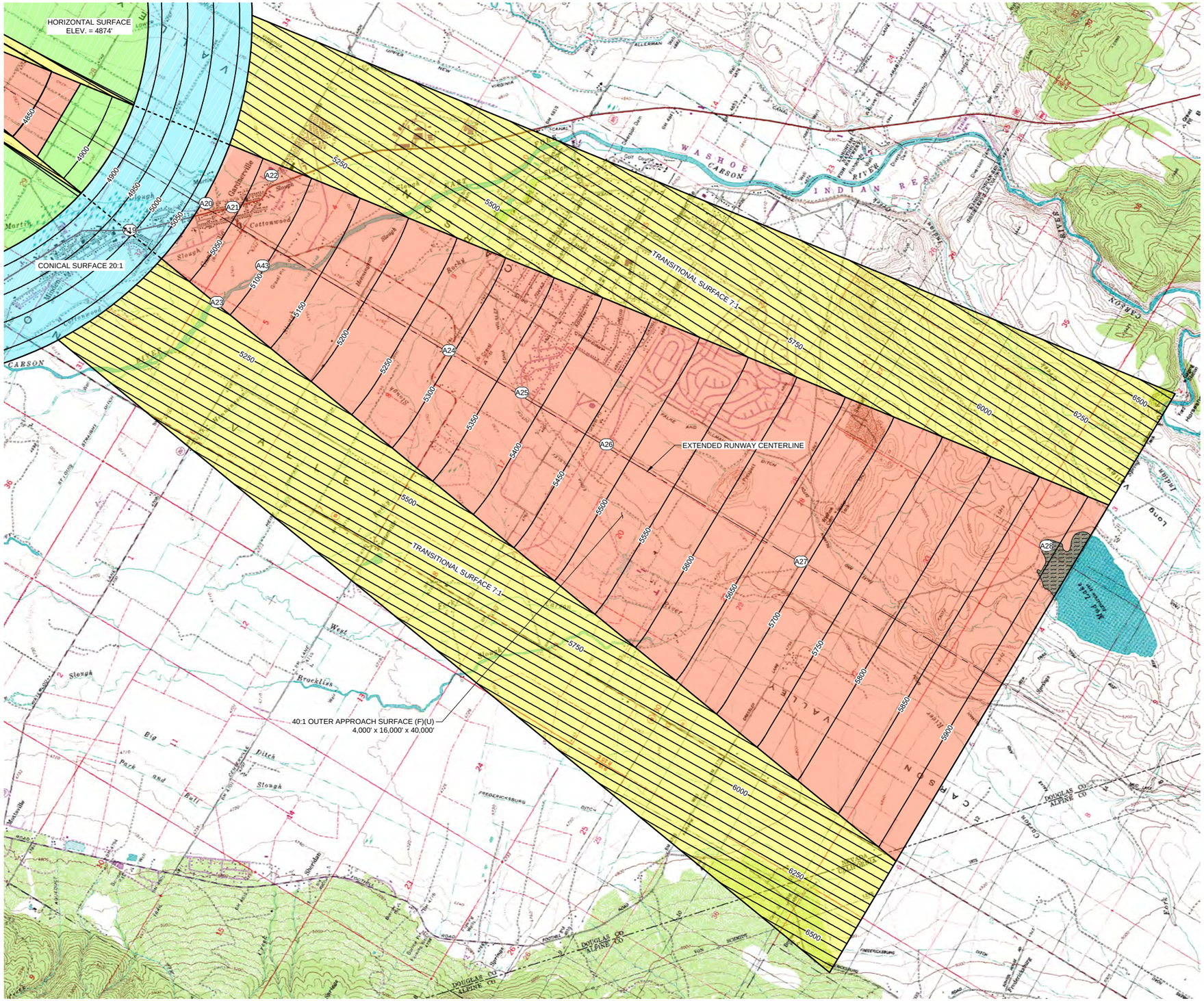
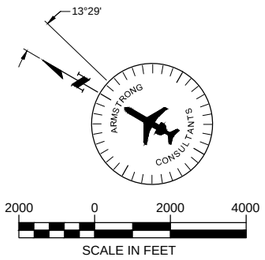
14 CFR PART "77" AIRSPACE DRAWING



RUNWAY 34 PRECISION APPROACH - PLAN VIEW (U)

SCALE: PER BARSCALE



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14 CFR
PART "77"
AIRSPACE
DRAWING

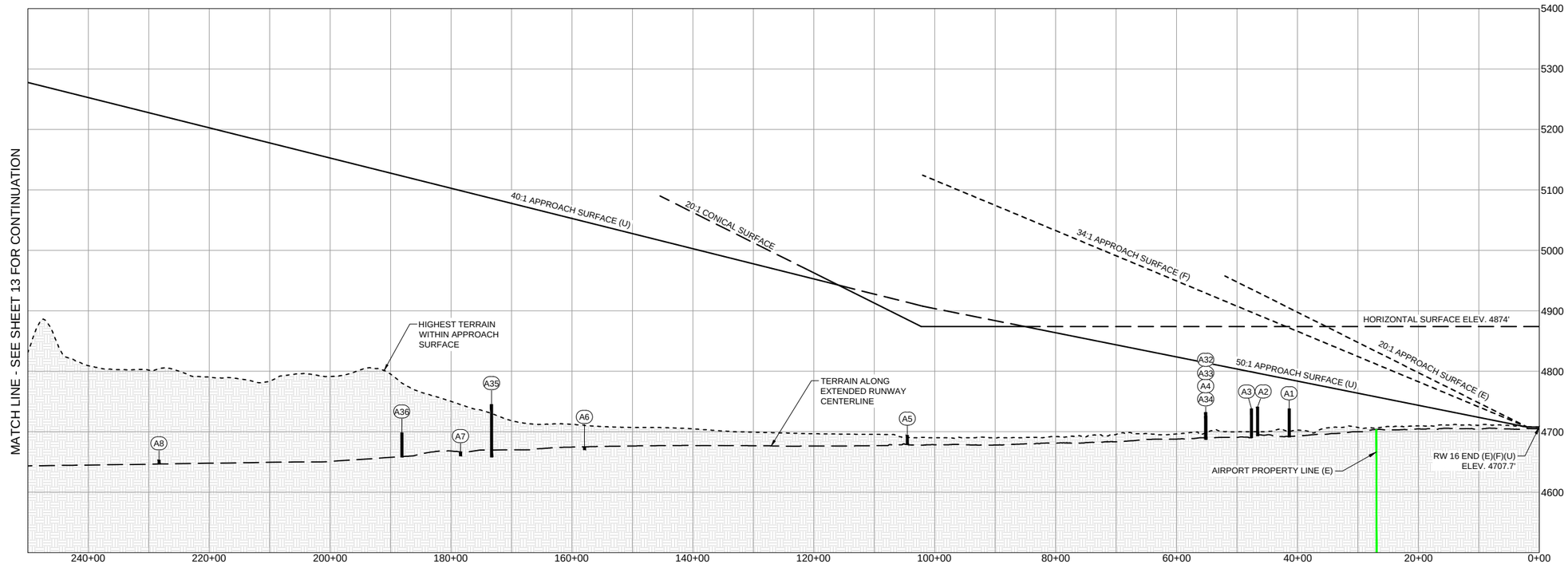
Sheet: 11 of: 29

OBSTRUCTION CHART

PART 77 SURFACE	ITEM No.	DESCRIPTION	GROUND ELEVATION (MSL)(FEET)	ESTIMATED TOP ELEVATION (MSL)(FEET)	PENETRATION (FEET)	REMARKS
APPROACH	A1	** TREE	4691	4738	NONE	-
	A2	** TREE	4693	4741	NONE	-
	A3	** TREE	4690	4743	NONE	-
	A4	** POWER POLE	4687	4726	NONE	-
	A5	* ROAD	4679	4694	NONE	-
	A6	* SEWAGE POND	4670	4670	NONE	-
	A7	* PONDS	4660	4660	NONE	-
	A8	* RIVER	4648	4648	NONE	-
	A32	** POWER POLE	4689	4732	NONE	-
	A33	** POWER POLE	4693	4730	NONE	-
	A34	* ROAD	4690	4705	NONE	-
	A35	** ANTENNA TOWER	4658	4745	NONE	-
	A36	** TREE	4658	4698	NONE	-

NOTE:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. SEE INNER APPROACH DRAWINGS FOR OBSTRUCTIONS IN RPZ.
3. * GROUND ELEVATIONS ESTIMATED FROM 30m DEM.
4. ** OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
5. AIRPORT ELEVATION: 4723.6'



RUNWAY 16 END PROFILE VIEW (U)

SCALE: PER BARSCALE

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14 CFR PART "77" RW 16 END PROFILE

OBSTRUCTION CHART

PART 77 SURFACE	ITEM No.	DESCRIPTION	GROUND ELEVATION (MSL)(FEET)	ESTIMATED TOP ELEVATION (MSL)(FEET)	PENETRATION (FEET)	REMARKS
APPROACH	A9	* SCHOOL	4930	4980	NONE	-
	A10	* U.S. HIGHWAY	4806	4823	NONE	-
	A11	* PRISON	4677	4707	NONE	-
	A12	* ROAD	4722	4737	NONE	-
	A13	* SPORTS COMPLEX	4730	4750	NONE	-
	A14	* ROAD	4694	4709	NONE	-

NOTE:

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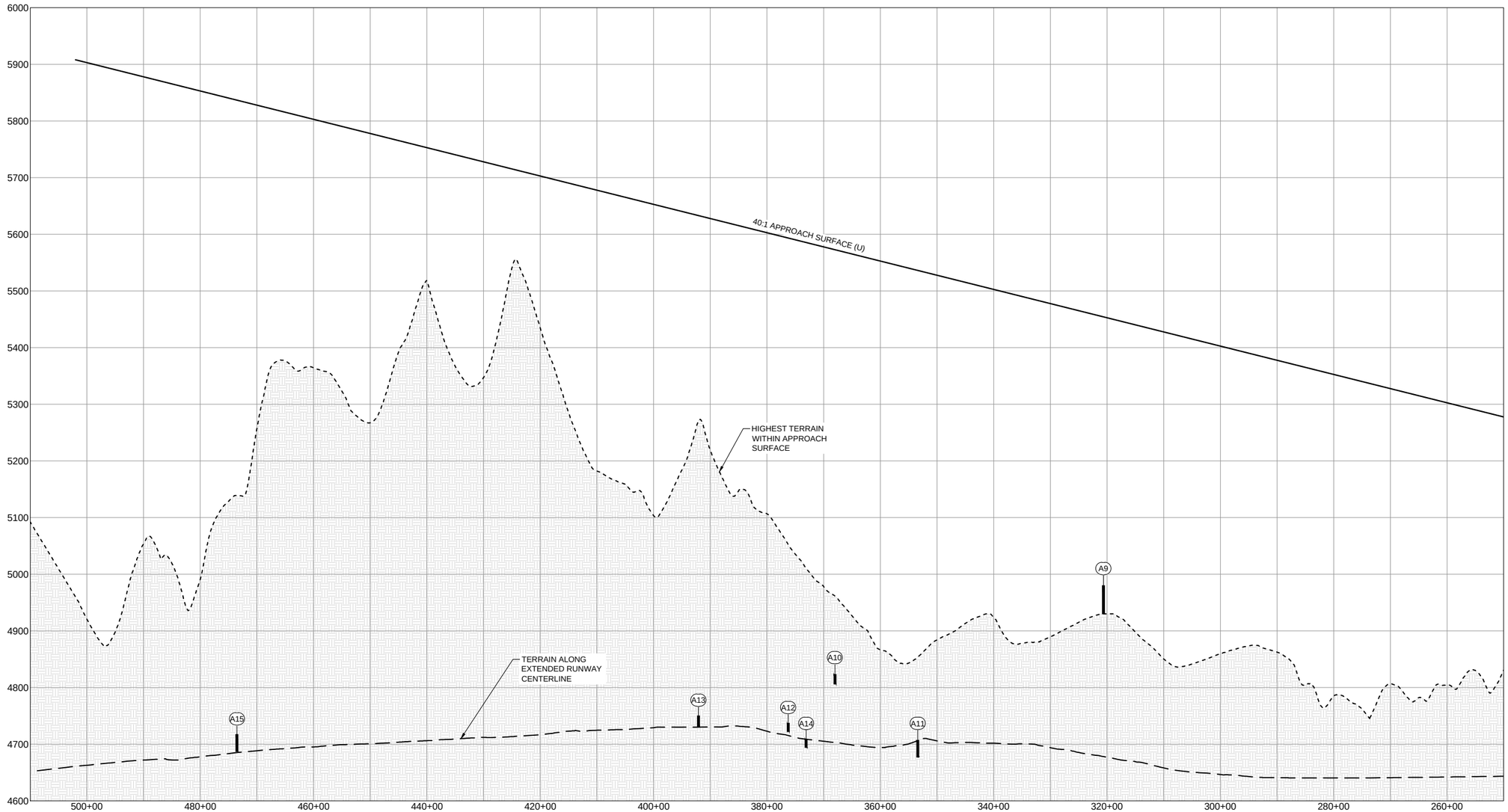

RUNWAY 16 END PROFILE VIEW (U)

SCALE: PER BARSCALE

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14 CFR PART "77" RW 16 END PROFILE

Sheet: 13 of: 29

OBSTRUCTION CHART

PART 77 SURFACE	ITEM No.	DESCRIPTION	GROUND ELEVATION (MSL)(FEET)	ESTIMATED TOP ELEVATION (MSL)(FEET)	PENETRATION (FEET)	REMARKS
APPROACH	A16	* ROAD	4726	4741	NONE	-
	A17	* SCHOOL	4729	4759	NONE	-
	A18	* ROAD	4735	4750	NONE	-
	A19	* U.S. HIGHWAY	4734	4751	NONE	-
	A20	* SCHOOL	4746	4776	NONE	-
	A21	* ROAD	4751	4766	NONE	-
	A22	* SCHOOL	4760	4790	NONE	-
	A23	* RIVER	4738	4738	NONE	-
	A37	** POWER POLE	4724	4808	+34'	SEE NOTE 1
	A38	** BUSH	4725	4732	NONE	-
	A39	** POWER POLE	4726	4790	+16'	SEE NOTE 1
	A40	** BUSH	4729	4736	NONE	-
	A41	** POWER POLE	4731	4778	+4'	SEE NOTE 1
	A42	** POWER POLE	4725	4775	NONE	-
	A43	** TREE	4747	4858	NONE	-

NOTE:

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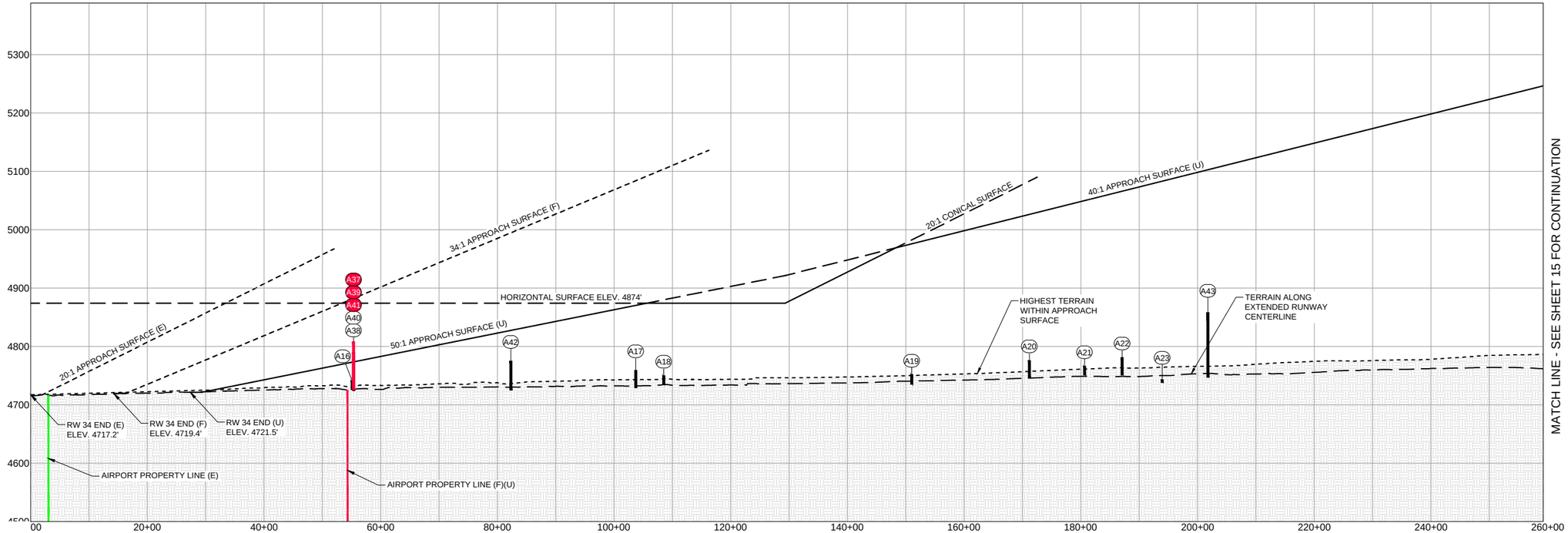
5. AIRPORT ELEVATION: 4723.6'



RUNWAY 34 END PROFILE VIEW (U)

SCALE: PER BARSCALE

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14 CFR
PART "77"
RW 34 END
PROFILE

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OBSTRUCTION CHART

PART 77 SURFACE	ITEM No.	DESCRIPTION	GROUND ELEVATION (MSL)(FEET)	ESTIMATED TOP ELEVATION (MSL)(FEET)	PENETRATION (FEET)	REMARKS
APPROACH	A24	* ROAD	4777	4792	NONE	-
	A25	* ROAD	4799	4814	NONE	-
	A26	* ROAD	4807	4832	NONE	-
	A27	* ROAD	4830	4845	NONE	-
	A28	* LAKE	5110	5110	NONE	-

NOTE:

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3. * GROUND ELEVATIONS ESTIMATED FROM 30m DEM.
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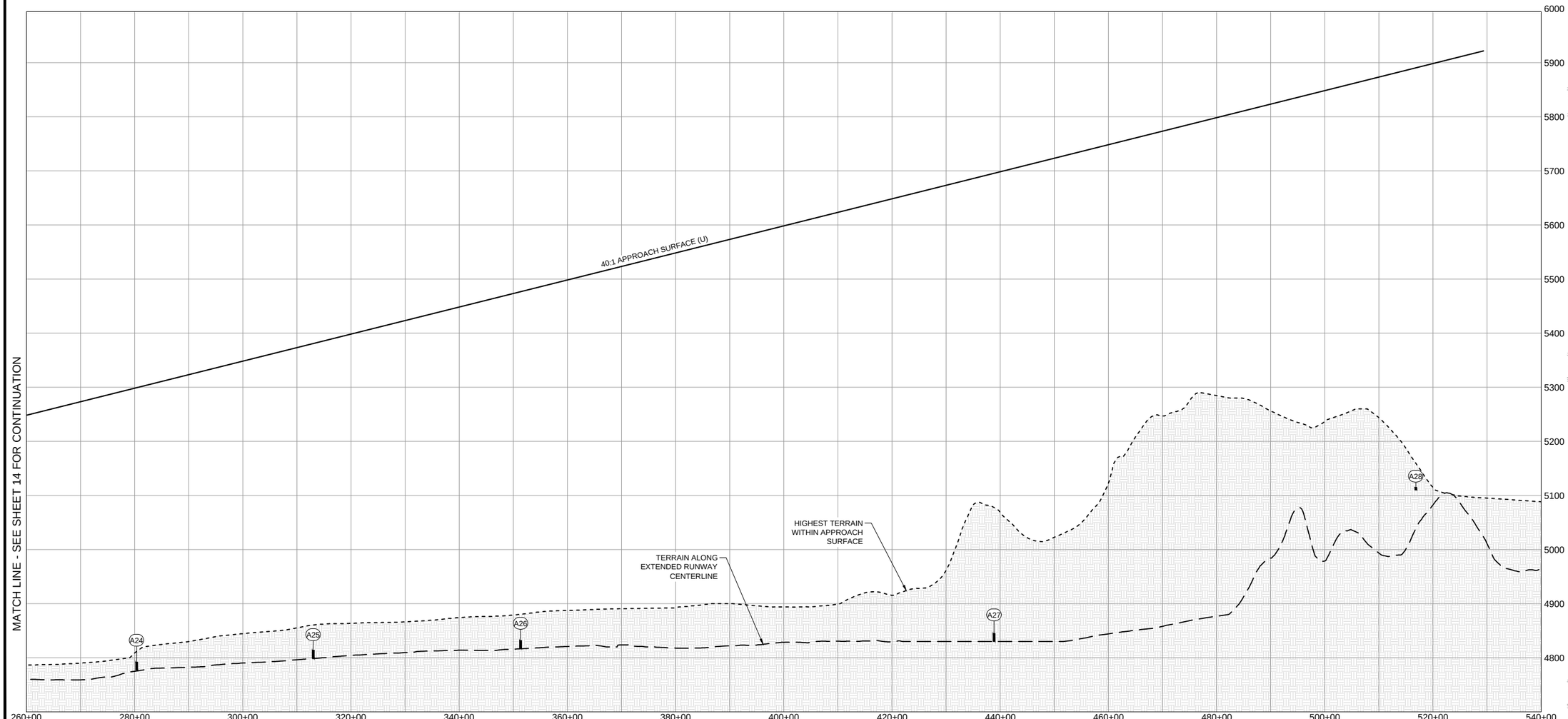

RUNWAY 34 END PROFILE VIEW (U)

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14 CFR PART "77" RW 34 END PROFILE

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OBSTRUCTION CHART

PART 77 SURFACE	ITEM No.	DESCRIPTION	GROUND ELEVATION (MSL)(FEET)	ESTIMATED TOP ELEVATION (MSL)(FEET)	PENETRATION (FEET)	REMARKS
APPROACH	A29	* BUILDING	4695	4710	NONE	-
	A30	** TREES	4695	4767	NONE	-
	A31	* ROAD	4691	4706	NONE	-

NOTE:

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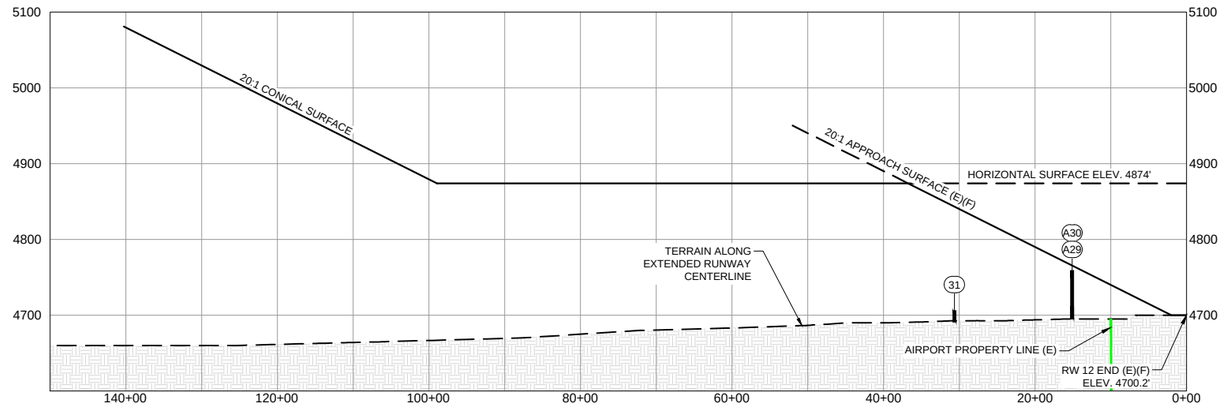
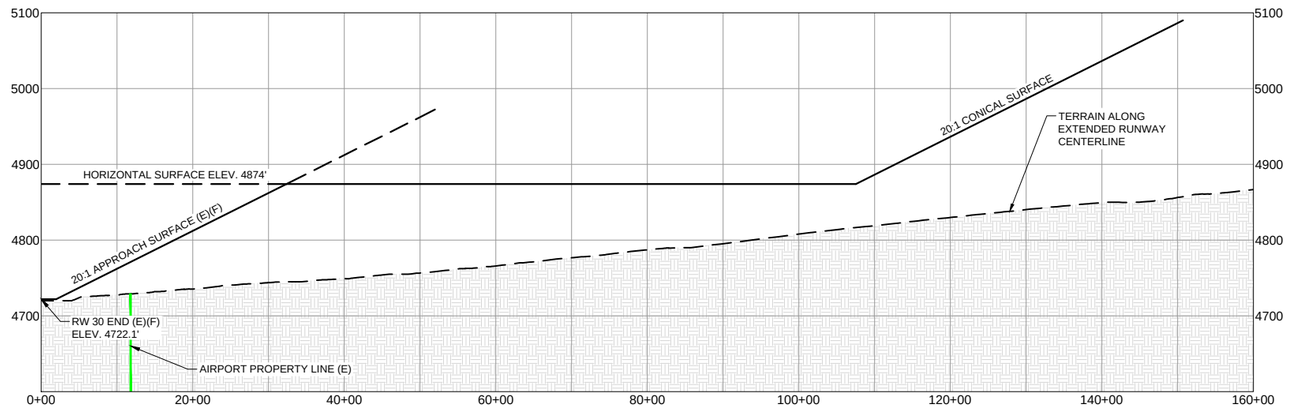


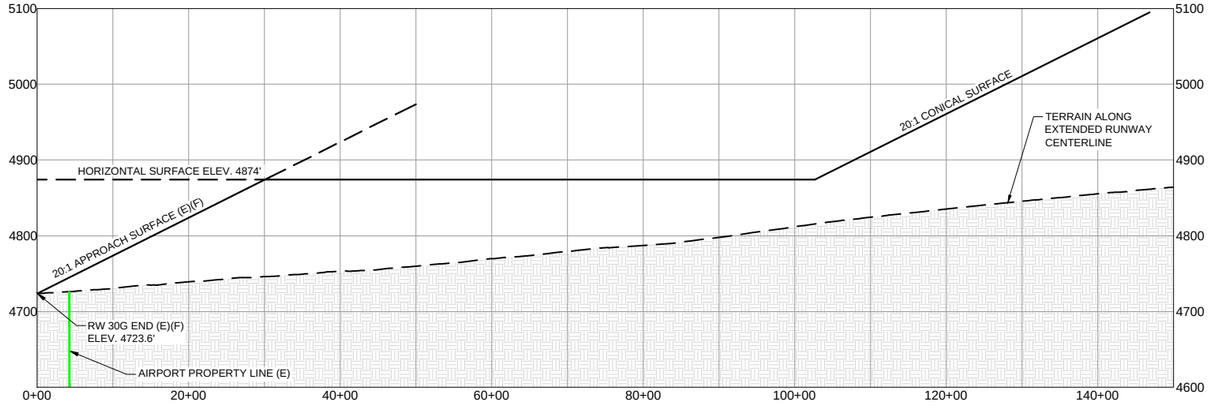
RUNWAY 12 END PROFILE VIEW (F)

SCALE: PER BARSCALE



RUNWAY 30 END PROFILE VIEW (F)

SCALE: PER BARSCALE



RUNWAY 30G END PROFILE VIEW (F)

SCALE: PER BARSCALE

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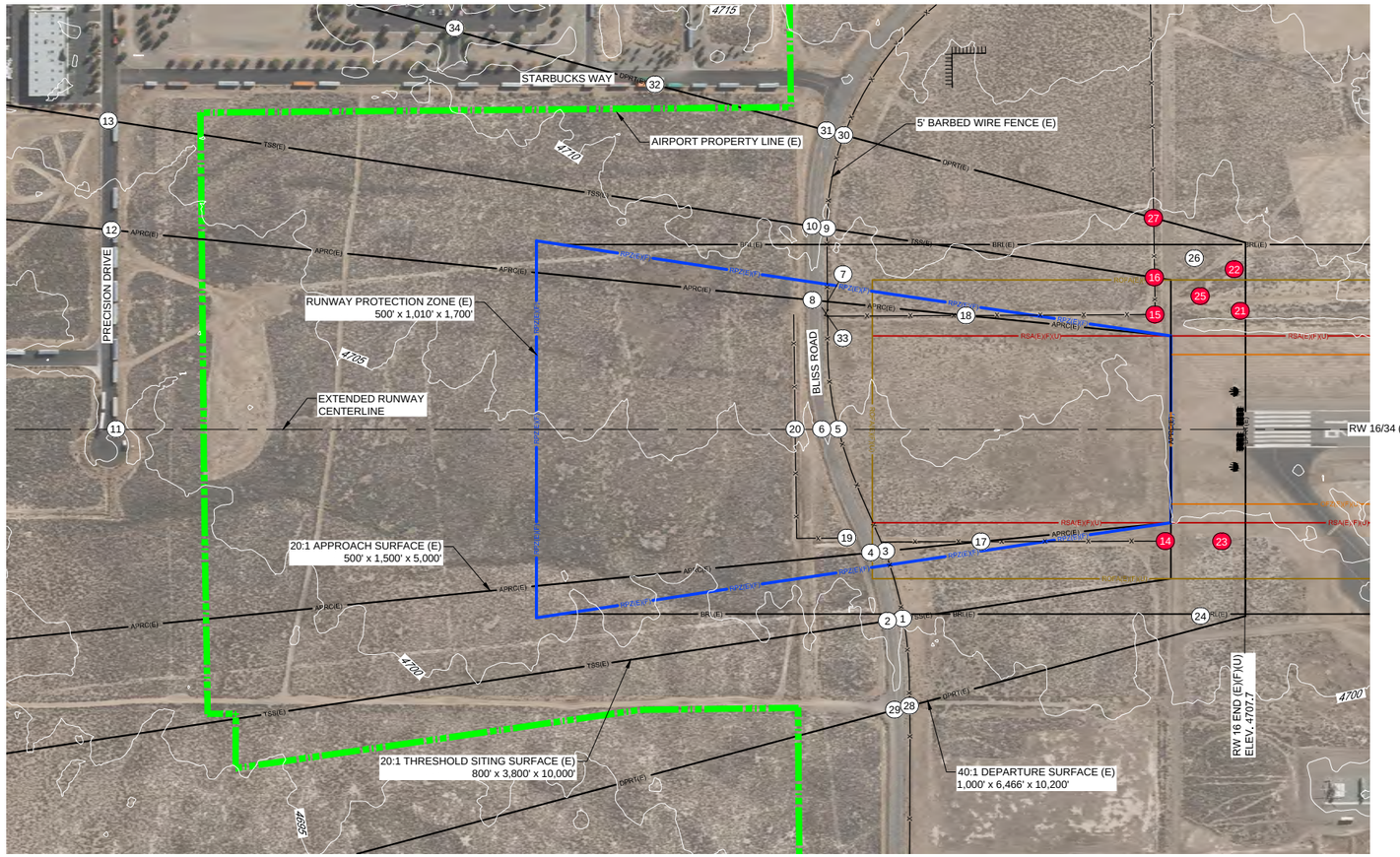
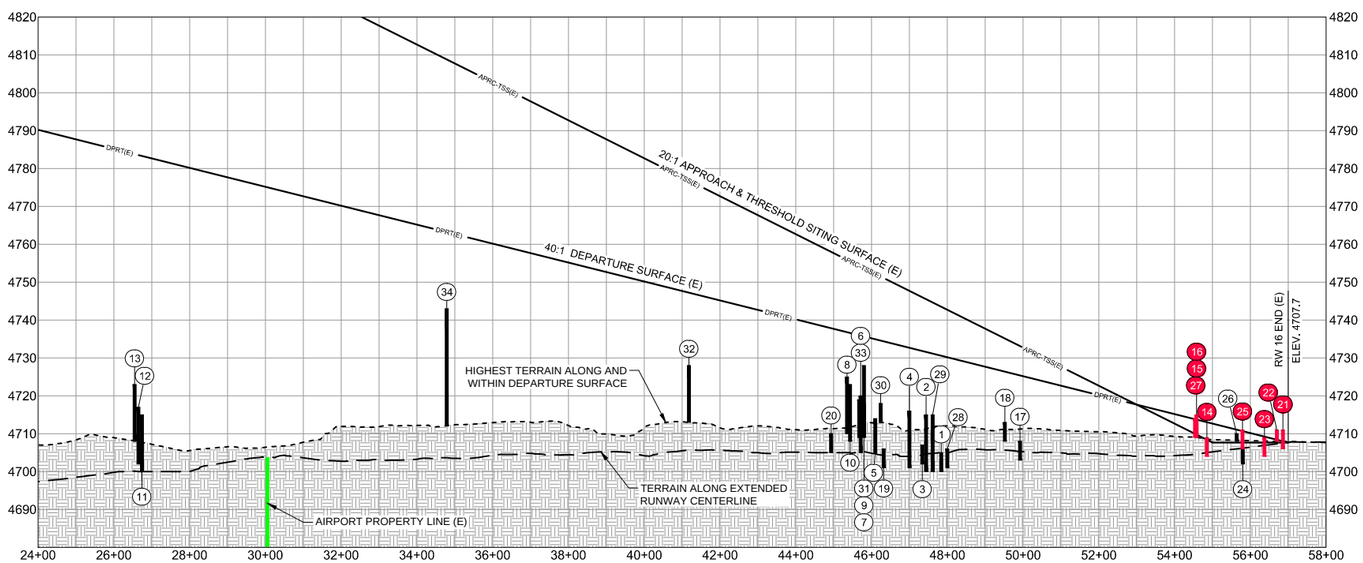
14 CFR PART "77" RW 12, 30 & 30G ENDS PROFILE

Sheet: 16 of: 29



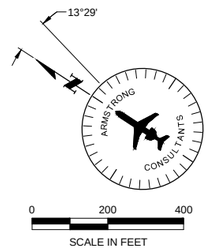
PLAN

SCALE: PER BAR SCALE



PROFILE

SCALE: PER GRID



OBJECTS WITHIN RUNWAY 16 TSS, APRC AND DEPARTURE SURFACES (E)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	20:1 TSS PEN.	20:1 APRC SURFACE PEN.	40:1 DPRT SURFACE PEN.	REMARKS
1	* FENCE (E)	5'	4705'	NONE	-	NONE	
2	* ROAD (E)	15'	4715'	NONE	-	NONE	
3	* FENCE (E)	5'	4707'	NONE	NONE	NONE	
4	* ROAD (E)	15'	4716'	NONE	NONE	NONE	
5	* FENCE (E)	5'	4710'	NONE	NONE	NONE	
6	** ROAD (E)	15'	4720'	NONE	NONE	NONE	
7	* FENCE (E)	5'	4714'	NONE	NONE	NONE	
8	** ROAD (E)	15'	4724'	NONE	NONE	NONE	
9	* FENCE (E)	5'	4715'	NONE	-	NONE	
10	** ROAD (E)	15'	4726'	NONE	-	NONE	
11	* ROAD (E)	15'	4715'	NONE	NONE	NONE	
12	* ROAD (E)	15'	4718'	NONE	NONE	NONE	
13	* ROAD (E)	15'	4723'	NONE	-	NONE	
14	* FENCE (E)	5'	4709'	+1'	-	NONE	FENCE TO BE REMOVED IN 2016 FENCING PROJECT
15	** FENCE (E)	5'	4714'	+4'	-	NONE	
16	* FENCE (E)	5'	4715'	+5'	-	+1'	
17	* FENCE (E)	5'	4708'	NONE	NONE	NONE	
18	* FENCE (E)	5'	4723'	NONE	NONE	NONE	
19	* FENCE (E)	5'	4706'	NONE	NONE	NONE	
20	* FENCE (E)	5'	4710'	NONE	NONE	NONE	
21	** BUSH	5'	4711'	+3'	-	+3'	SEE NOTES 2 & 3
22	** BUSH	3'	4711'	-	-	+3'	SEE NOTES 2 & 3
23	** BUSH	5'	4709'	+1'	-	NONE	SEE NOTE 3
24	** BUSH	4'	4706'	-	-	NONE	
25	** BUSH	5'	4711'	+3'	-	+1'	SEE NOTES 2 & 3
26	** BUSH	2'	4710'	-	-	NONE	
27	* FENCE (E)	5'	47147'	-	-	+1'	SEE NOTE 2
28	* FENCE (E)	5'	4708'	-	-	NONE	
29	* ROAD	15'	4715'	-	-	NONE	
30	* FENCE (E)	5'	4718'	-	-	NONE	
31	** ROAD	15'	4728'	-	-	NONE	
32	* ROAD	15'	4728'	-	-	NONE	
33	** SIGN	10'	4719'	NONE	NONE	NONE	
34	** POLE	31'	4743'	-	-	NONE	

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
* = OBJECT ELEVATIONS ARE ESTIMATED AND NOT BASED ON A SURVEY.
** = OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
\- = OBJECT IS NOT LOCATED WITHIN THIS SURFACE.
● = OBJECT PENETRATION LOCATION

EST. = ESTIMATED; ELEV. = ELEVATION; HT. = HEIGHT; PEN. = PENETRATION; N/A = NOT APPLICABLE; APRC = APPROACH SURFACE; TSS = THRESHOLD SITING SURFACE; DPRT = DEPARTURE SURFACE

NOTES:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. LESS THAN 35' LOW, CLOSE-IN DEPARTURE SURFACE PENETRATIONS: ADD NOTE TO DEPARTURE PROCEDURE OR LOWER, MARK AND LIGHT, OR REMOVE PER FAA FLIGHT PROCEDURES OFFICE DETERMINATION.
3. THRESHOLD SITING SURFACE OBJECT PENETRATIONS TO BE REMOVED.

LEGEND

EXISTING (E)	DESCRIPTION
	AIRFIELD DEVELOPMENT (ASPHALT)
	STRUCTURE/FACILITIES (BUILDING)
	AIRPORT PROPERTY LINE (APL)
RSA(E)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BUILDING RESTRICTION LINE (BRL)
APRC(E)	APPROACH SURFACE
TSS(E)	THRESHOLD SITING SURFACE
DPRT(E)	DEPARTURE SURFACE
	THRESHOLD LIGHTS
	REIL
4125	CONTOURS
	ROAD
	MARKINGS
	FENCE

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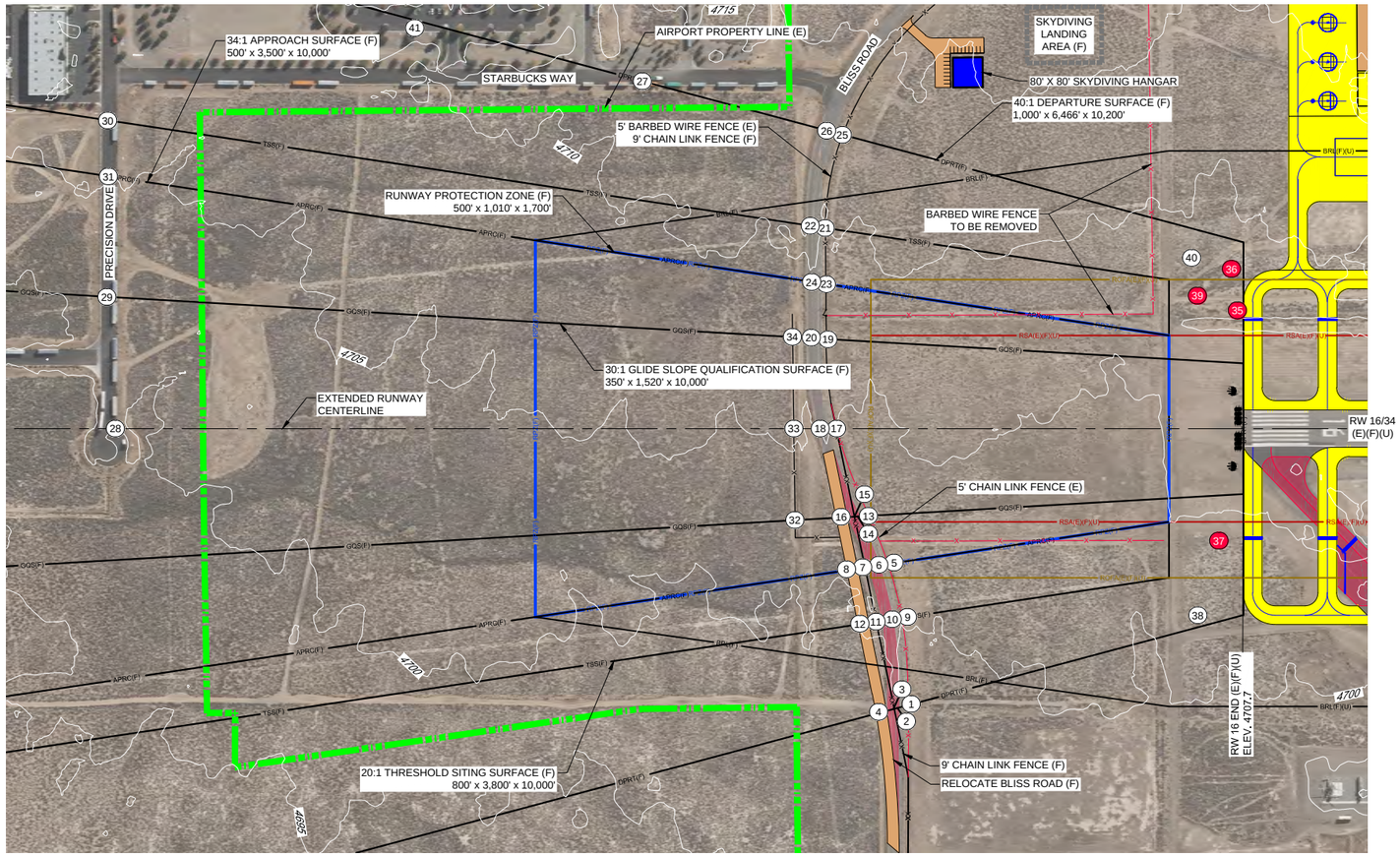
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

No.	Project No.	Date	Revision / Description	File	Dwn.	Chkd.	Apprvd.
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

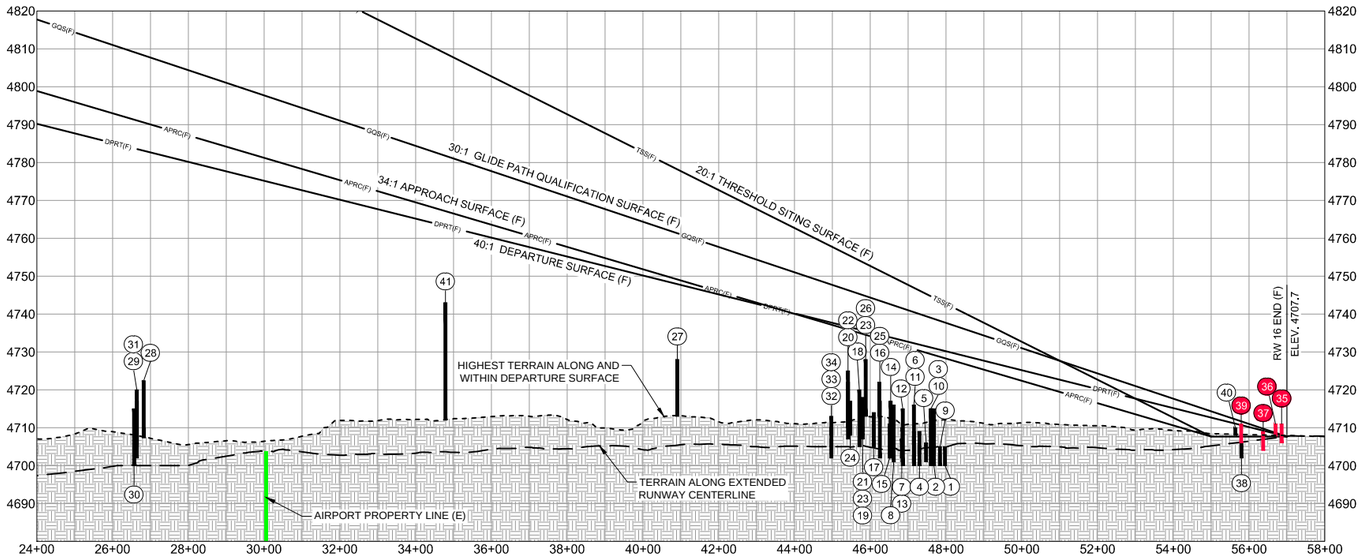
RUNWAY 16
INNER
APPROACH
(E)

Sheet: 17 of: 29



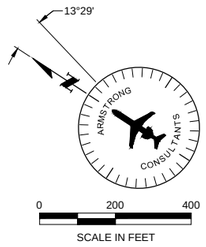
PLAN

SCALE: PER BAR SCALE



PROFILE

SCALE: PER GRID



OBJECTS WITHIN RUNWAY 16 GQS, TSS, APRC AND DEPARTURE SURFACES (F)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	30:1 GQS PEN.	20:1 TSS PEN.	50:1 APRC SURFACE PEN.	40:1 DPRT PEN.	REMARKS
1	* FENCE (E)	5'	4705'	-	-	-	NONE	
2	* ROAD (E)	15'	4715'	-	-	-	NONE	
3	* FENCE (F)	9'	4709'	-	-	-	NONE	
4	* ROAD (F)	15'	4715'	-	-	-	NONE	
5	* FENCE (E)	5'	4706'	-	NONE	NONE	NONE	
6	* ROAD (E)	15'	4716'	-	NONE	NONE	NONE	
7	* FENCE (F)	9'	4710'	-	NONE	NONE	NONE	
8	* ROAD (F)	15'	4716'	-	NONE	NONE	NONE	
9	* FENCE (E)	5'	4705'	-	NONE	NONE	NONE	
10	* ROAD (E)	15'	4715'	-	NONE	NONE	NONE	
11	* FENCE (F)	9'	4709'	-	NONE	NONE	NONE	
12	* ROAD (F)	15'	4715'	-	NONE	NONE	NONE	
13	* FENCE (E)	5'	4707'	NONE	NONE	NONE	NONE	
14	** ROAD (E)	15'	4719'	NONE	NONE	NONE	NONE	
15	* FENCE (F)	9'	4711'	NONE	NONE	NONE	NONE	
16	* ROAD (F)	15'	4717'	NONE	NONE	NONE	NONE	
17	* FENCE (E)	9'	4714'	NONE	NONE	NONE	NONE	
18	** ROAD (E)	15'	4721'	NONE	NONE	NONE	NONE	
19	* FENCE (E)	9'	4716'	NONE	NONE	NONE	NONE	
20	** ROAD (E)	15'	4723'	NONE	NONE	NONE	NONE	
21	* FENCE (E)	9'	4719'	-	NONE	NONE	NONE	
22	** ROAD (E)	15'	4726'	-	NONE	NONE	NONE	
23	* FENCE (E)	9'	4718'	-	NONE	NONE	NONE	
24	** ROAD (E)	15'	4724'	-	NONE	NONE	NONE	
25	* FENCE (E)	9'	4722'	-	-	-	NONE	
26	** ROAD (E)	15'	4728'	-	-	-	NONE	
27	* ROAD (E)	15'	4728'	-	-	-	NONE	
28	* ROAD (E)	15'	4723'	NONE	NONE	NONE	NONE	
29	* ROAD (E)	15'	4717'	NONE	NONE	NONE	NONE	
30	* ROAD (E)	15'	4715'	-	NONE	NONE	NONE	
31	* ROAD (E)	15'	4720'	-	NONE	NONE	NONE	
32	* FENCE (E)	5'	4707'	NONE	NONE	NONE	NONE	
33	** FENCE (E)	5'	4710'	NONE	NONE	NONE	NONE	
34	* FENCE (E)	5'	4713'	NONE	NONE	NONE	NONE	
35	** BUSH	5'	4711'	-	+3'	-	+3'	SEE NOTES 2 & 3
36	** BUSH	3'	4711'	-	-	-	+3'	SEE NOTES 2 & 3
37	** BUSH	5'	4709'	-	+1'	-	NONE	SEE NOTE 3
38	** BUSH	4'	4706'	-	-	-	NONE	
39	** BUSH	5'	4711'	-	+3'	-	+1'	SEE NOTES 2 & 3
40	** BUSH	2'	4710'	-	-	-	NONE	
41	** POLE	31'	4743'	-	-	-	NONE	

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
* = OBJECT ELEVATIONS ARE ESTIMATED AND NOT BASED ON A SURVEY.
** = OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
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NOTES:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. LESS THAN 35' LOW, CLOSE-IN DEPARTURE SURFACE PENETRATIONS: ADD NOTE TO DEPARTURE PROCEDURE OR LOWER, MARK AND LIGHT, OR REMOVE PER FAA FLIGHT PROCEDURES OFFICE DETERMINATION.
3. THRESHOLD SITING SURFACE OBJECT PENETRATIONS TO BE REMOVED.

LEGEND

EXISTING (E)	FUTURE (F)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
	N/A	AIRPORT PROPERTY LINE (APL)
N/A	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)
N/A	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)
N/A	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)
N/A	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)
N/A	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)
N/A	APRC(F)(U)	APPROACH SURFACE
N/A	DPRT(F)(U)	DEPARTURE SURFACE
N/A	TSS(F)(U)	THRESHOLD SITING SURFACE
N/A	GQS(F)(U)	GLIDE PATH QUALIFICATION SURFACE
	N/A	THRESHOLD LIGHTS
	N/A	REIL
4125	N/A	CONTOURS
		ROAD
		MARKINGS
X	XX	FENCE
N/A		TO BE REMOVED

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AIP No. 3-32-0013-028-2015
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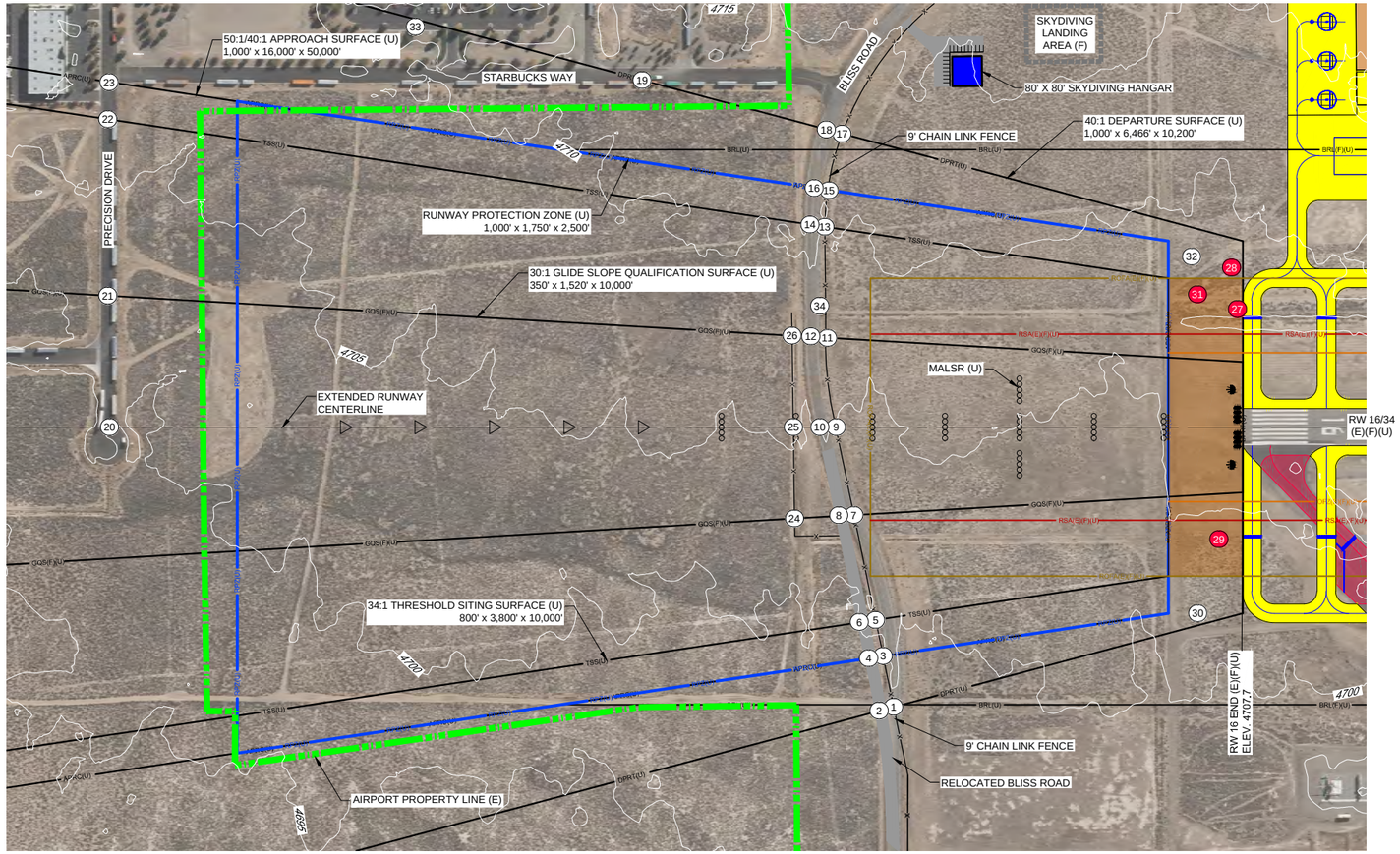
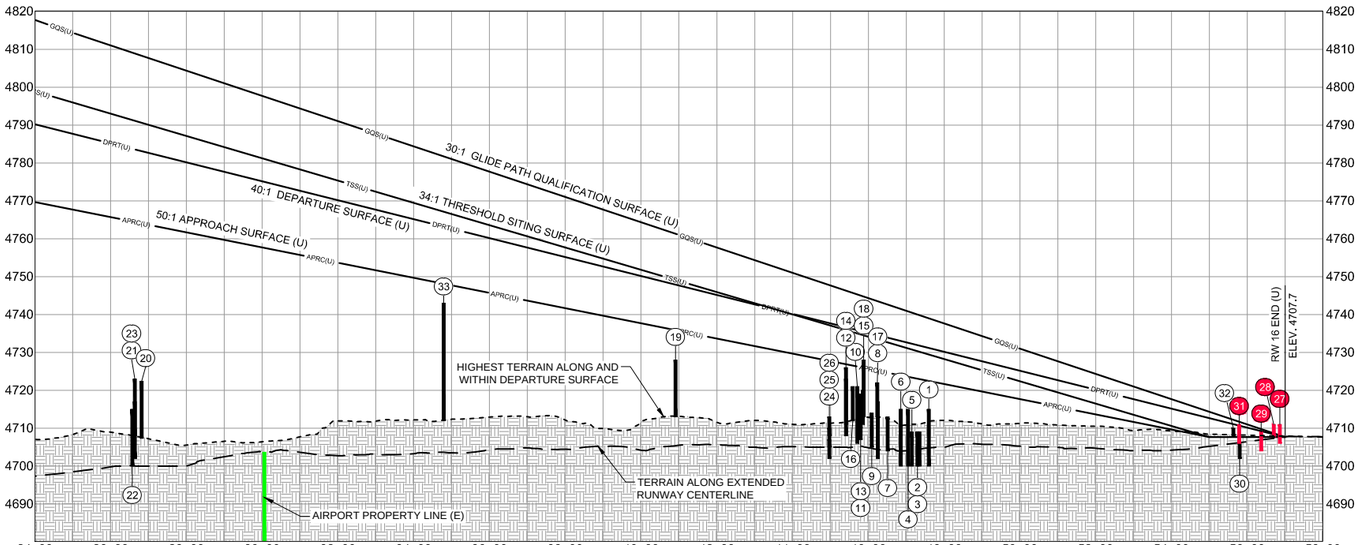
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

RUNWAY 16
INNER
APPROACH
(F)



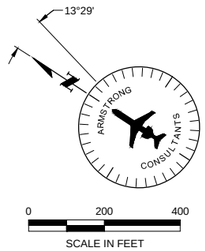
PLAN

SCALE: PER BAR SCALE



PROFILE

SCALE: PER GRID



OBJECTS WITHIN RUNWAY 16 GQS, TSS, APRC AND DEPARTURE SURFACES (U)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	30:1 GQS PEN.	34:1 TSS PEN.	50:1 APRC SURFACE PEN.	40:1 DPRT PEN.	REMARKS
(1)	* FENCE (E)	9'	4709'	-	-	-	NONE	
(2)	* ROAD (E)	15'	4715'	-	-	-	NONE	
(3)	* FENCE (E)	9'	4710'	-	NONE	NONE	NONE	
(4)	* ROAD (E)	15'	4716'	-	NONE	NONE	NONE	
(5)	* FENCE (E)	9'	4709'	-	NONE	NONE	NONE	
(6)	* ROAD (E)	15'	4715'	-	NONE	NONE	NONE	
(7)	* FENCE (E)	9'	4713'	NONE	NONE	NONE	NONE	
(8)	* ROAD (E)	15'	4717'	NONE	NONE	NONE	NONE	
(9)	* FENCE (E)	9'	4714'	NONE	NONE	NONE	NONE	
(10)	** ROAD (E)	15'	4721'	NONE	NONE	NONE	NONE	
(11)	* FENCE (E)	9'	4716'	NONE	NONE	NONE	NONE	
(12)	** ROAD (E)	15'	4723'	NONE	NONE	NONE	NONE	
(13)	* FENCE (E)	9'	4719'	-	NONE	NONE	NONE	
(14)	** ROAD (E)	15'	4726'	-	NONE	NONE	NONE	
(15)	* FENCE (E)	9'	4718'	-	NONE	NONE	NONE	
(16)	** ROAD (E)	15'	4727'	-	NONE	NONE	NONE	
(17)	* FENCE (E)	9'	4722'	-	-	-	NONE	
(18)	* ROAD (E)	15'	4728'	-	-	-	NONE	
(19)	* ROAD (E)	15'	4728'	-	-	-	NONE	
(20)	* ROAD (E)	15'	4723'	NONE	NONE	NONE	NONE	
(21)	* ROAD (E)	15'	4717'	NONE	NONE	NONE	NONE	
(22)	* ROAD (E)	15'	4715'	-	NONE	NONE	NONE	
(23)	* ROAD (E)	15'	4723'	-	-	-	NONE	
(24)	* FENCE (E)	5'	4707'	NONE	NONE	NONE	NONE	
(25)	** FENCE (E)	5'	4710'	NONE	NONE	NONE	NONE	
(26)	* FENCE (E)	5'	4713'	NONE	NONE	NONE	NONE	
(27)	** BUSH	5'	4711'	-	+3'	-	+3'	SEE NOTES 2 & 3
(28)	** BUSH	3'	4711'	-	-	-	+3'	SEE NOTES 2 & 3
(29)	** BUSH	5'	4709'	-	+1'	-	NONE	SEE NOTE 3
(30)	** BUSH	4'	4706'	-	-	-	NONE	
(31)	** BUSH	5'	4711'	-	+3'	-	+1'	SEE NOTES 2 & 3
(32)	** BUSH	2'	4710'	-	-	-	NONE	
(33)	** POLE	31'	4743'	-	-	-	NONE	
(34)	** SIGN	10;	4719'	-	NONE	NONE	NONE	

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
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EST. = ESTIMATED; ELEV. = ELEVATION; HT. = HEIGHT; PEN. = PENETRATION; N/A = NOT APPLICABLE; APRC = APPROACH SURFACE; TSS = THRESHOLD SITING SURFACE; DPRT = DEPARTURE SURFACE

NOTES:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. LESS THAN 35' LOW, CLOSE-IN DEPARTURE SURFACE PENETRATIONS: ADD NOTE TO DEPARTURE PROCEDURE OR LOWER, MARK AND LIGHT, OR REMOVE PER FAA FLIGHT PROCEDURES OFFICE DETERMINATION.
3. THRESHOLD SITING SURFACE OBJECT PENETRATIONS TO BE REMOVED.

LEGEND

EXISTING (E)	ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
		AIRPORT PROPERTY LINE (APL)
N/A	RSA(U)	RUNWAY SAFETY AREA (RSA)
N/A	OFZ(U)	OBSTACLE FREE ZONE (OFZ)
N/A	ROFA(U)	RUNWAY OBJECT FREE AREA (ROFA)
N/A	RPZ(U)	RUNWAY PROTECTION ZONE (RPZ)
N/A	BRL(U)	BUILDING RESTRICTION LINE (BRL)
N/A	APRC(U)	APPROACH SURFACE
N/A	DPRT(U)	DEPARTURE SURFACE
N/A	TSS(U)	THRESHOLD SITING SURFACE
N/A	GQS(U)	GLIDE PATH QUALIFICATION SURFACE
	N/A	THRESHOLD LIGHTS
	N/A	REIL
4125	N/A	CONTOURS
		ROAD
		MARKINGS
X	N/A	FENCE
N/A		MALSR
N/A		TO BE REMOVED
N/A		PRECISION OBSTACLE FREE ZONE

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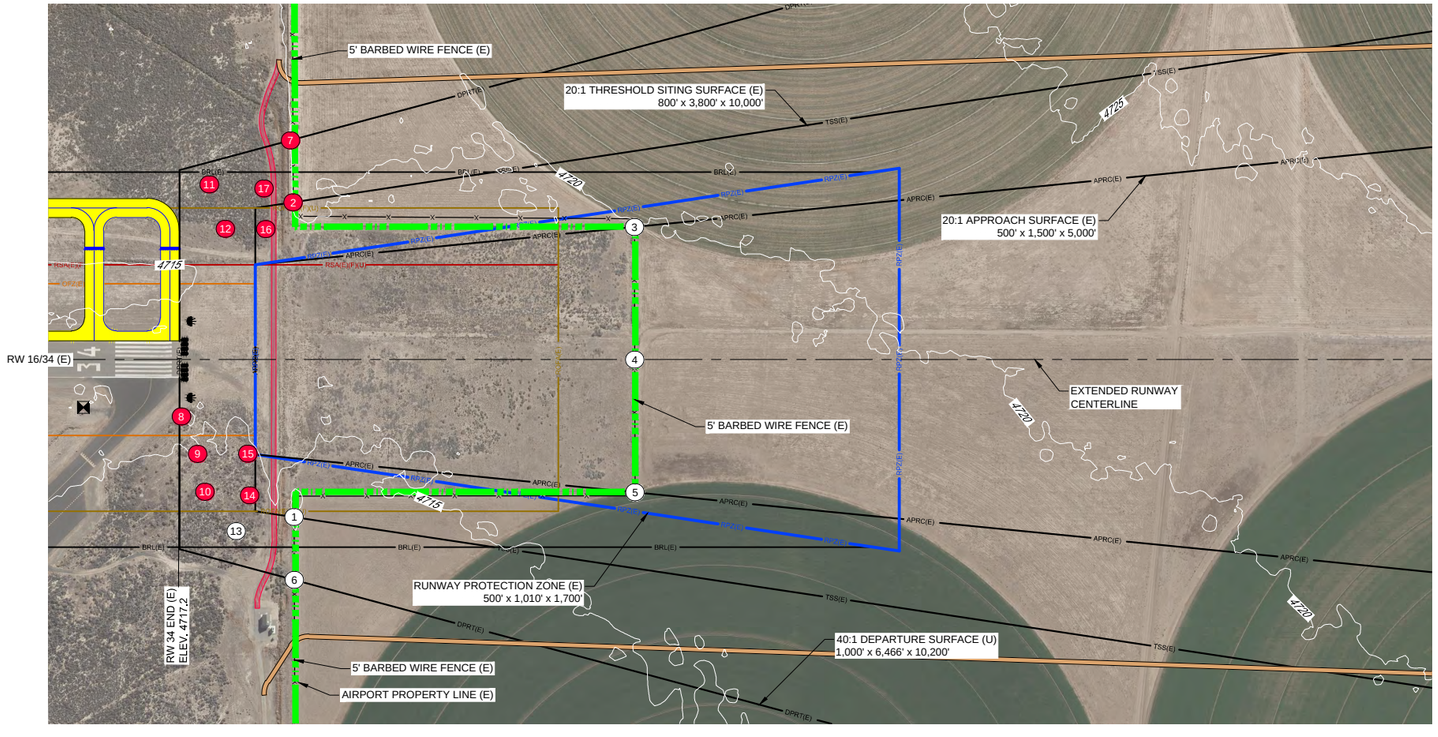
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

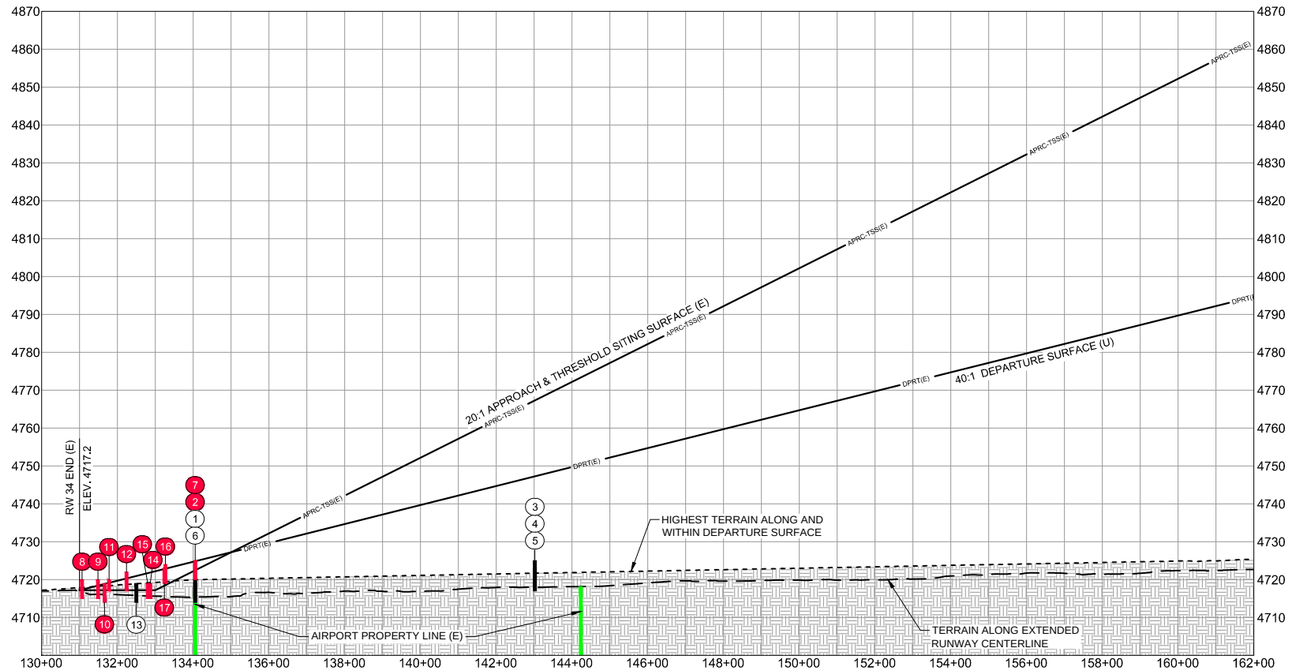
RUNWAY 16
INNER
APPROACH
(U)

Sheet: 19 of: 29



PLAN

SCALE: PER BAR SCALE



PROFILE

SCALE: PER GRID

OBJECTS WITHIN RUNWAY 34 APRC, TSS AND DEPARTURE SURFACES (E)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	20:1 TSS PEN.	20:1 APRC SURFACE PEN.	40:1 DPRT PEN.	REMARKS
1	* FENCE	5'	4720'	NONE	-	NONE	
2	* FENCE	5'	4725'	+3'	-	+1'	SEE NOTES 2 & 3
3	** FENCE	5'	4725'	NONE	NONE	NONE	
4	* FENCE	5'	4723'	NONE	NONE	NONE	
5	* FENCE	5'	4722'	NONE	NONE	NONE	
6	* FENCE	5'	4719'	-	-	NONE	
7	* FENCE	5'	4725'	-	-	+1'	SEE NOTE 2
8	** BUSH	5'	4720'	+3'	+3'	+3'	SEE NOTES 1, 2 & 3
9	** BUSH	5'	4720'	+3'	+3'	+2'	SEE NOTES 1, 2 & 3
10	** BUSH	5'	4719'	+2'	-	+1'	SEE NOTES 2 & 3
11	** BUSH	3'	4720'	-	-	+1'	SEE NOTE 2
12	** BUSH	5'	4722'	+5'	-	+2'	SEE NOTES 2 & 3
13	** BUSH	6'	4720'	-	-	NONE	
14	** BUSH	4'	4719'	+2'	-	NONE	SEE NOTE 3
15	** BUSH	4'	4719'	+2'	+2'	NONE	SEE NOTES 1 & 3
16	** BUSH	5'	4724'	+5'	-	+1'	SEE NOTES 2 & 3
17	** BUSH	4'	4723'	-	-	+1'	SEE NOTE 2

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
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- = OBJECT IS NOT LOCATED WITHIN THIS SURFACE.
● = OBJECT PENETRATION LOCATION

EST. = ESTIMATED; ELEV. = ELEVATION; HT. = HEIGHT; PEN. = PENETRATION; N/A = NOT APPLICABLE; APRC = APPROACH SURFACE; TSS = THRESHOLD SITING SURFACE; DPRT = DEPARTURE SURFACE

NOTES:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. LESS THAN 35' LOW, CLOSE-IN DEPARTURE SURFACE PENETRATIONS: ADD NOTE TO DEPARTURE PROCEDURE OR LOWER, MARK AND LIGHT, OR REMOVE PER FAA FLIGHT PROCEDURES OFFICE DETERMINATION.
3. THRESHOLD SITING SURFACE OBJECT PENETRATIONS TO BE REMOVED.

LEGEND

EXISTING (E)	DESCRIPTION
	AIRFIELD DEVELOPMENT (ASPHALT)
	STRUCTURE/FACILITIES (BUILDING)
	AIRPORT PROPERTY LINE (APL)
RSA(E)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BUILDING RESTRICTION LINE (BRL)
APRC(E)	APPROACH SURFACE
TSS(E)	THRESHOLD SITING SURFACE
	THRESHOLD LIGHTS
	REIL
	VASI
4125	CONTOURS
	ROAD
	MARKINGS
X	FENCE

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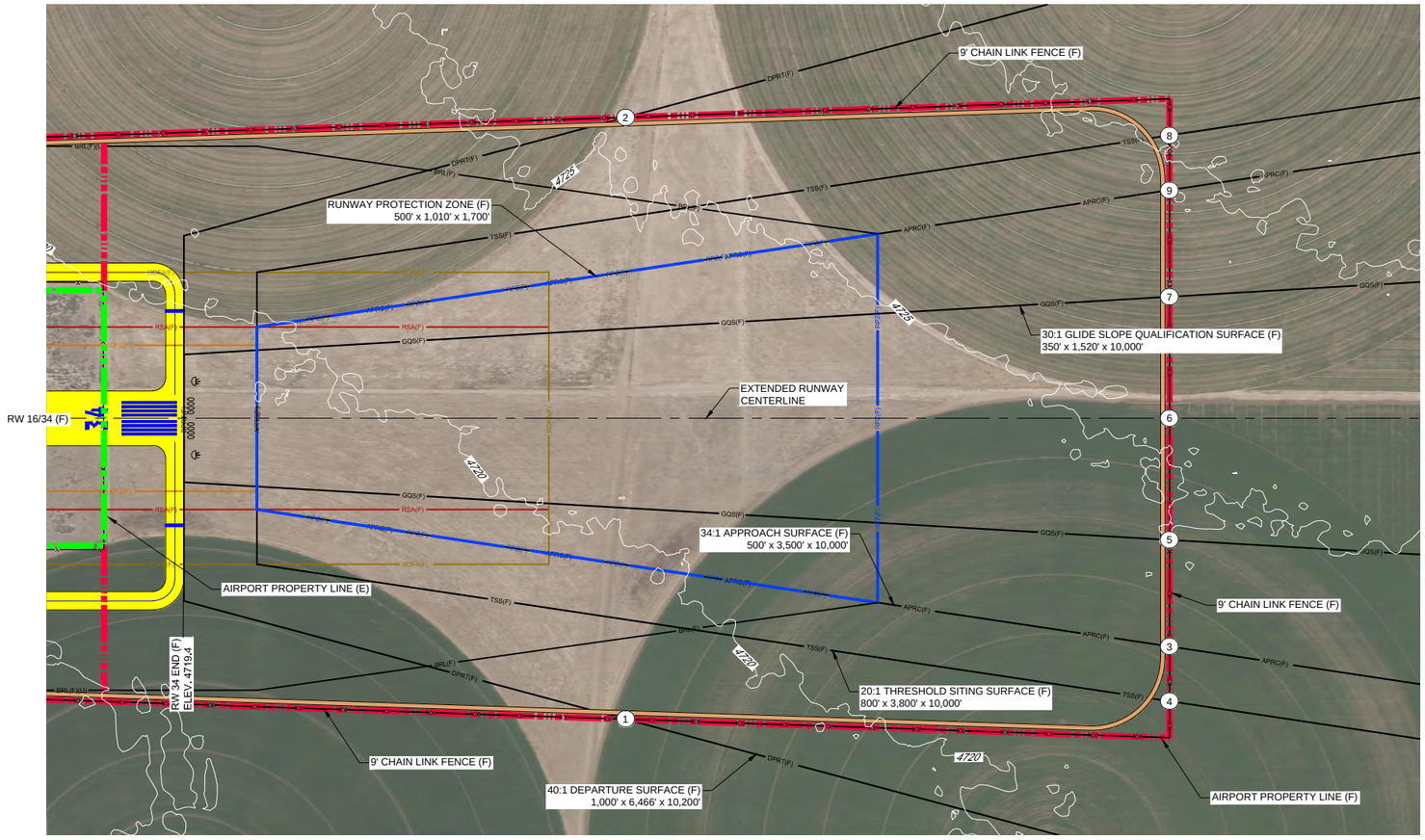
MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

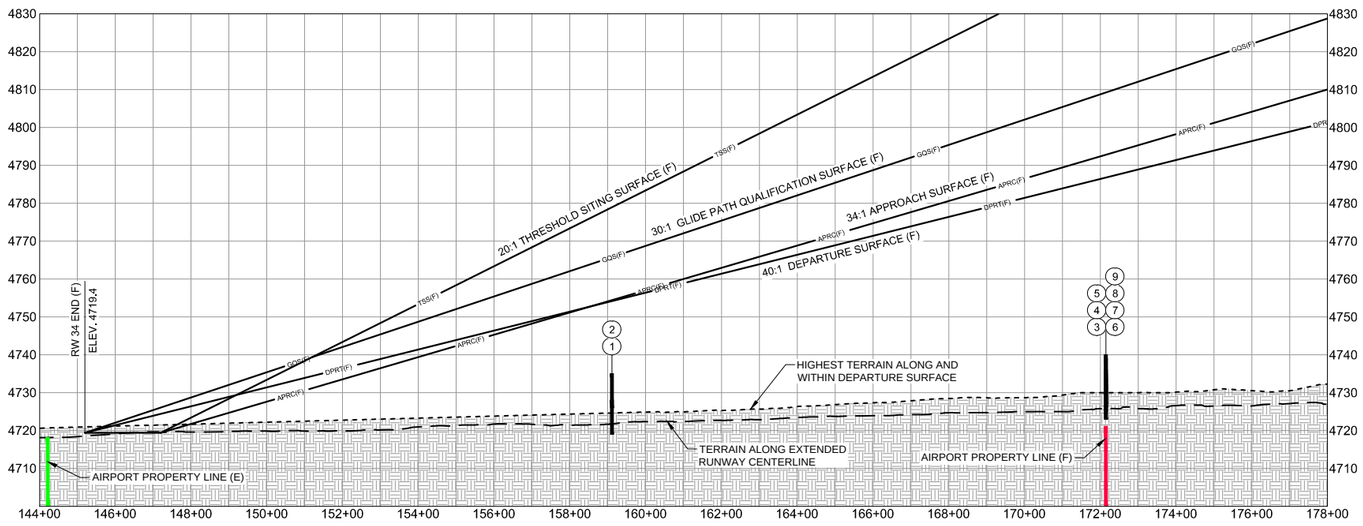
No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

RUNWAY 34
INNER
APPROACH
(E)



PLAN

SCALE: PER BAR SCALE



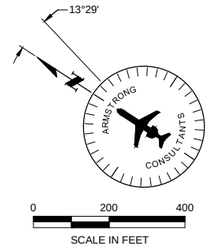
PROFILE

SCALE: PER GRID

OBJECTS WITHIN RUNWAY 34 GQS, TSS, APRC AND DEPARTURE SURFACES (F)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	30:1 GQS PEN.	34:1 TSS PEN.	50:1 APRC SURFACE PEN.	40:1 DPRT PEN.	REMARKS
1	* FENCE (F)	9'	4728'	-	-	-	NONE	
2	* FENCE (F)	9'	4735'	-	-	-	NONE	
3	* FENCE (F)	9'	4733'	-	-	NONE	NONE	
4	* FENCE (F)	9'	4732'	-	NONE	NONE	NONE	
5	* FENCE (F)	9'	4734'	NONE	NONE	NONE	NONE	
6	* FENCE (F)	9'	4735'	NONE	NONE	NONE	NONE	
7	* FENCE (F)	9'	4736'	NONE	NONE	NONE	NONE	
8	* FENCE (F)	9'	4739'	-	NONE	NONE	NONE	
9	* FENCE (F)	9'	4739'	-	-	NONE	NONE	

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
* = OBJECT ELEVATIONS ARE ESTIMATED AND NOT BASED ON A SURVEY.
** = OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
\- = OBJECT IS NOT LOCATED WITHIN THIS SURFACE.
EST. = ESTIMATED; ELEV. = ELEVATION; HT. = HEIGHT; PEN. = PENETRATION; N/A = NOT APPLICABLE; GQS = GLIDESLOPE QUALIFICATION SURFACE; APRC = APPROACH SURFACE; TSS = THRESHOLD SITING SURFACE; DPRT = DEPARTURE SURFACE



LEGEND

EXISTING (E)	FUTURE (F)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
		AIRPORT PROPERTY LINE (APL)
N/A	RSA(F)	RUNWAY SAFETY AREA (RSA)
N/A	OFZ(F)	OBSTACLE FREE ZONE (OFZ)
N/A	ROFA(F)	RUNWAY OBJECT FREE AREA (ROFA)
N/A	RPZ(F)	RUNWAY PROTECTION ZONE (RPZ)
N/A	BRL(F)	BUILDING RESTRICTION LINE (BRL)
N/A	APRC(F)	APPROACH SURFACE
N/A	DPRT(F)	DEPARTURE SURFACE
N/A	TSS(F)	THRESHOLD SITING SURFACE
N/A	GQS(F)	GLIDE PATH QUALIFICATION SURFACE
N/A	0000 0000	THRESHOLD LIGHTS
N/A		REIL
4125	N/A	CONTOURS
	N/A	ROAD
		MARKINGS
X	XX	FENCE

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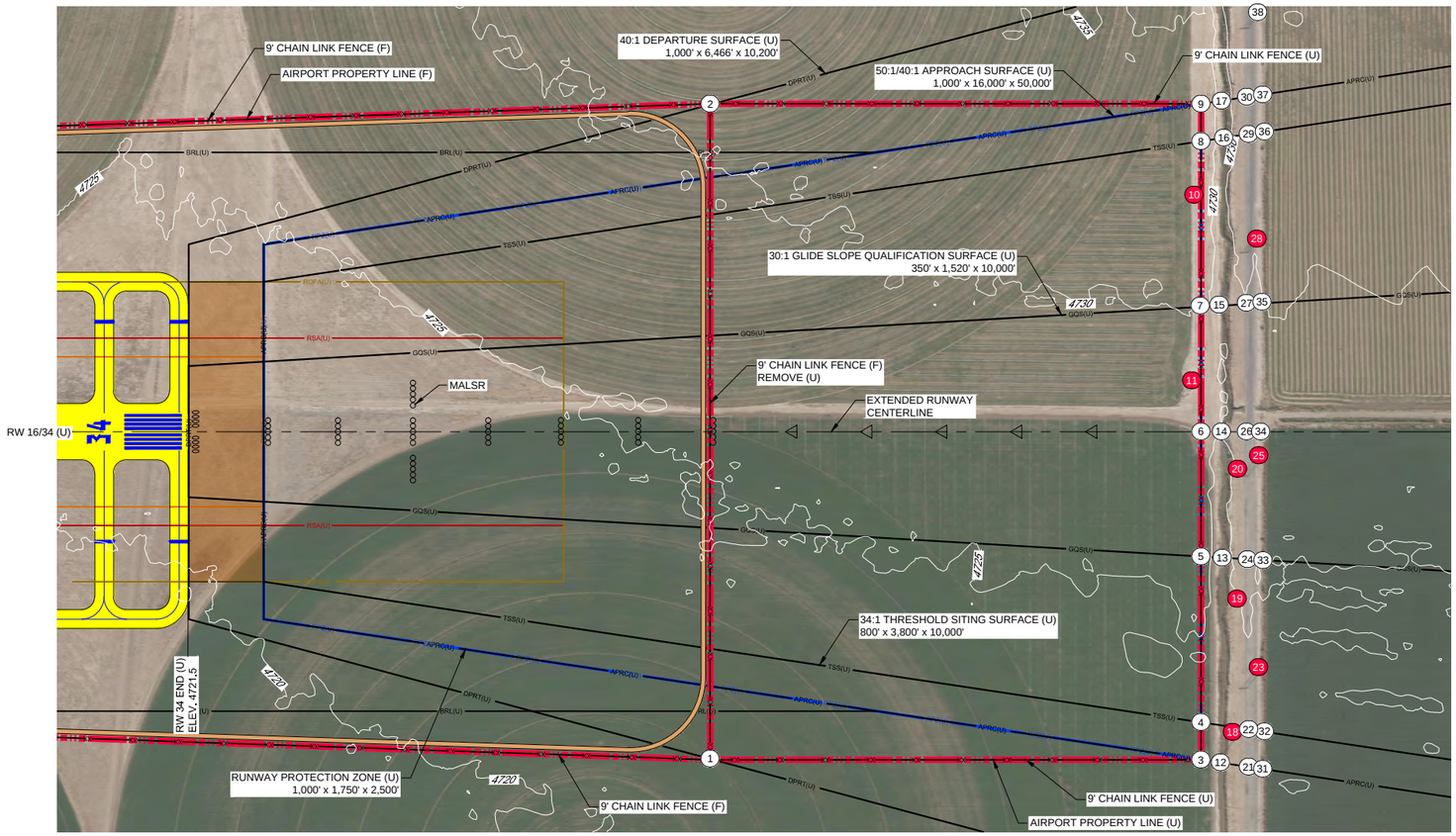
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

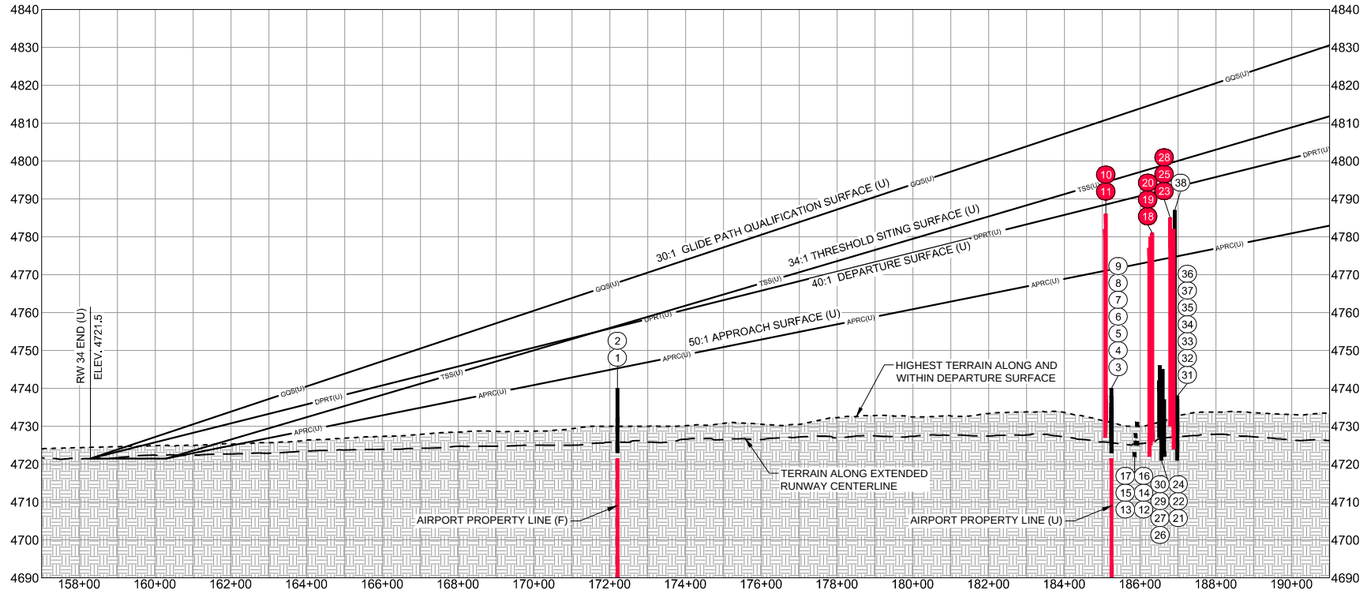
No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

RUNWAY 34
INNER
APPROACH
(F)



PLAN

SCALE: PER BAR SCALE



PROFILE

SCALE: PER GRID

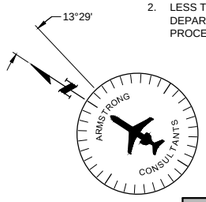
OBJECTS WITHIN RUNWAY 34 GQS, TSS, APRC AND DEPARTURE SURFACES (U)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	30:1 GQS PEN.	34:1 TSS PEN.	50:1 APRC SURFACE PEN.	40:1 DPRT PEN.	REMARKS
1	* FENCE (F)	9'	4732'	-	-	-	NONE	
2	* FENCE (F)	9'	4740'	-	-	-	NONE	
3	* FENCE (U)	9'	4732'	-	-	NONE	NONE	
4	* FENCE (U)	9'	4732'	-	NONE	NONE	NONE	
5	* FENCE (U)	9'	4734'	NONE	NONE	NONE	NONE	
6	* FENCE (U)	9'	4735'	NONE	NONE	NONE	NONE	
7	* FENCE (U)	9'	4738'	NONE	NONE	NONE	NONE	
8	* FENCE (U)	9'	4740'	-	NONE	NONE	NONE	
9	* FENCE (U)	9'	4740'	-	-	NONE	NONE	
10	* POLE (E)	50'	4781'	-	NONE	+15'	NONE	SEE NOTE 1
11	* POLE (E)	50'	4777'	NONE	NONE	+11'	NONE	SEE NOTE 1
12	* DITCH (E)	-	4722'	-	-	NONE	NONE	
13	* DITCH (E)	-	4725'	NONE	NONE	NONE	NONE	
14	* DITCH (E)	-	4725'	NONE	NONE	NONE	NONE	
15	* DITCH (E)	-	4727'	NONE	NONE	NONE	NONE	
16	* DITCH (E)	-	4730'	-	NONE	NONE	NONE	
17	* DITCH (E)	-	4730'	-	-	NONE	NONE	
18	* POLE (E)	50'	4777'	-	NONE	+4'	NONE	SEE NOTE 1
19	* POLE (E)	50'	4775'	-	NONE	+7'	NONE	SEE NOTE 1
20	* POLE (E)	50'	4776'	NONE	NONE	+8'	NONE	SEE NOTE 1
21	* ROAD (E)	15'	4736'	-	-	NONE	NONE	
22	* ROAD (E)	15'	4737'	-	NONE	NONE	NONE	
23	* POLE (E)	50'	4774'	-	NONE	+4'	NONE	SEE NOTE 1
24	* ROAD (E)	15'	4725'	NONE	NONE	NONE	NONE	
25	* POLE (E)	50'	4777'	NONE	NONE	+7'	NONE	SEE NOTE 1
26	* ROAD (E)	15'	4742'	NONE	NONE	NONE	NONE	
27	* ROAD (E)	15'	4743'	NONE	NONE	NONE	NONE	
28	* POLE (E)	50'	4780'	-	NONE	+11'	NONE	SEE NOTE 1
29	* ROAD (E)	15'	4747'	-	NONE	NONE	NONE	
30	* ROAD (E)	15'	4746'	-	-	NONE	NONE	
31	* FENCE (E)	5'	4726'	-	-	NONE	NONE	
32	* FENCE (E)	5'	4727'	-	-	NONE	NONE	
33	* FENCE (E)	5'	4730'	NONE	NONE	NONE	NONE	
34	* FENCE (E)	5'	4732'	NONE	NONE	NONE	NONE	
35	* FENCE (E)	5'	4735'	NONE	NONE	NONE	NONE	
36	* FENCE (E)	5'	4738'	-	NONE	NONE	NONE	
37	* FENCE (E)	5'	4737'	-	-	NONE	NONE	
38	* POLE (E)	50'	4782'	-	-	-	NONE	

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
* = OBJECT ELEVATIONS ARE ESTIMATED AND NOT BASED ON A SURVEY.
** = OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
\- = OBJECT IS NOT LOCATED WITHIN THIS SURFACE.
● = OBJECT PENETRATION LOCATION
EST. = ESTIMATED; ELEV. = ELEVATION; HT. = HEIGHT; PEN. = PENETRATION; N/A = NOT APPLICABLE; GQS = GLIDESLOPE QUALIFICATION SURFACE; APRC = APPROACH SURFACE; TSS = THRESHOLD SITING SURFACE; DPRT = DEPARTURE SURFACE

NOTES:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. LESS THAN 35' LOW, CLOSE-IN DEPARTURE SURFACE PENETRATIONS: ADD NOTE TO DEPARTURE PROCEDURE OR LOWER, MARK AND LIGHT, OR REMOVE PER FAA FLIGHT PROCEDURES OFFICE DETERMINATION.



0 200 400

SCALE IN FEET

LEGEND

EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
		AIRPORT PROPERTY LINE (APL)
N/A	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)
N/A	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)
N/A	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)
N/A	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)
N/A	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)
N/A	APRC(F)(U)	APPROACH SURFACE
N/A	DPRT(F)(U)	DEPARTURE SURFACE
N/A	TSS(F)(U)	THRESHOLD SITING SURFACE
N/A	GQS(F)(U)	GLIDE PATH QUALIFICATION SURFACE
N/A	0000 0000	THRESHOLD LIGHTS
4125	N/A	CONTOURS
	N/A	ROAD
		MARKINGS
X	XX	FENCE
N/A		MALSR
N/A		PRECISION OBSTACLE FREE ZONE

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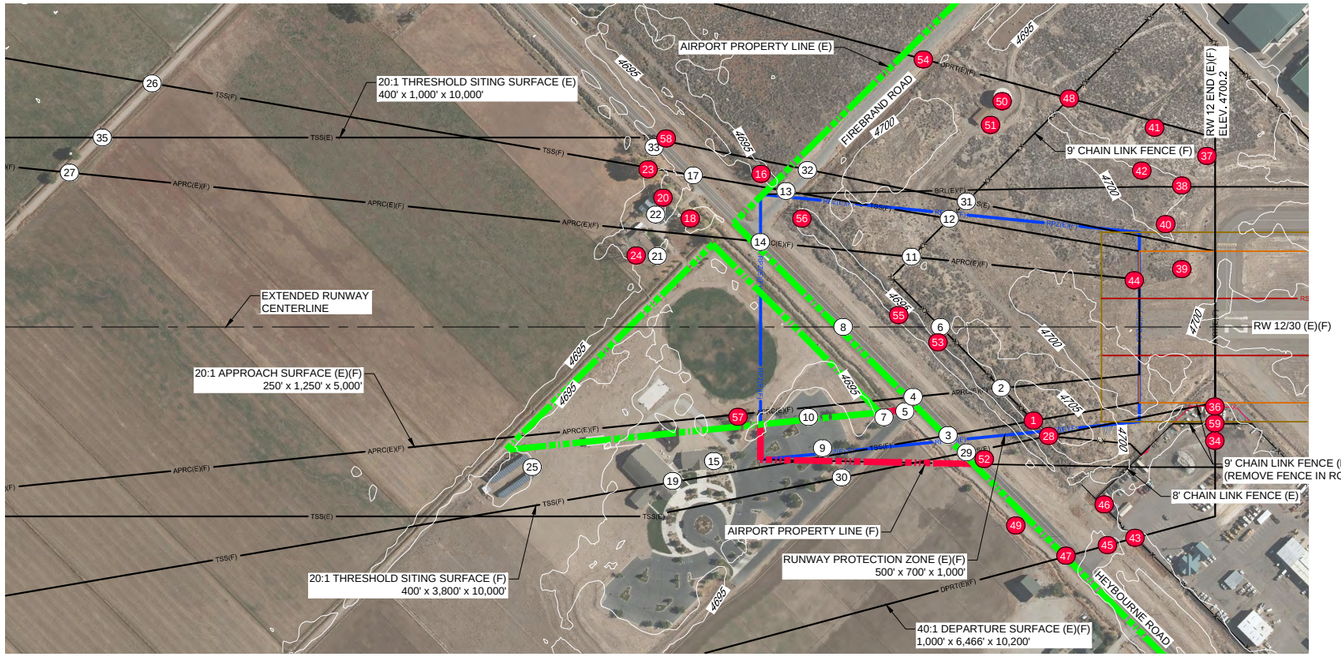
AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

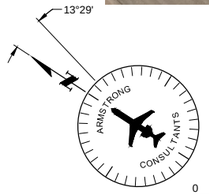
RUNWAY 34
INNER
APPROACH
(U)

Sheet: 22 of: 29



PLAN

SCALE: PER BAR SCALE



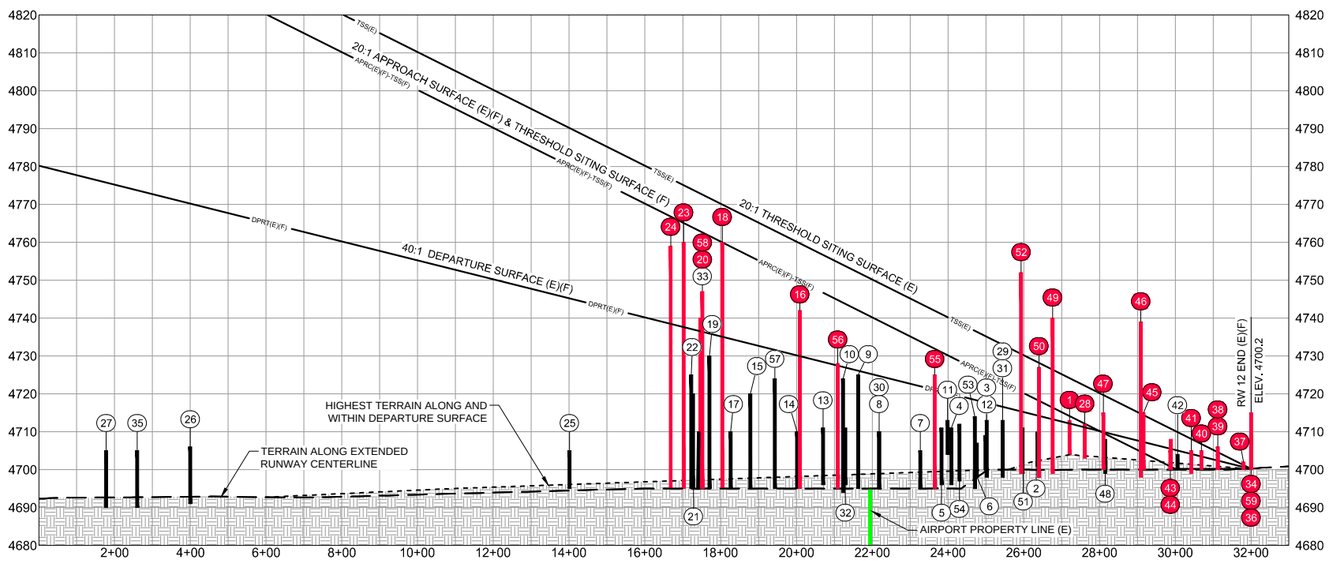
0 200 400

SCALE IN FEET

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
* = OBJECT ELEVATIONS ARE ESTIMATED AND NOT BASED ON A SURVEY.
** = OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
\- = OBJECT IS NOT LOCATED WITHIN THIS SURFACE.
● = OBJECT PENETRATION LOCATION
EST. = ESTIMATED; ELEV. = ELEVATION; HT. = HEIGHT; PEN. = PENETRATION; N/A = NOT APPLICABLE;
APRC = APPROACH SURFACE; TSS = THRESHOLD SITING SURFACE; DPRT = DEPARTURE SURFACE

NOTES:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. LESS THAN 35' LOW, CLOSE-IN DEPARTURE SURFACE PENETRATIONS: ADD NOTE TO DEPARTURE PROCEDURE OR LOWER, MARK AND LIGHT, OR REMOVE PER FAA FLIGHT PROCEDURES OFFICE DETERMINATION.
3. THRESHOLD SITING SURFACE OBJECT PENETRATIONS TO BE REMOVED.



PROFILE

SCALE: PER GRID

OBJECTS WITHIN RUNWAY 12 APRC, DEPARTURE AND TSS (E)(F)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	20:1 TSS PEN. (E)	20:1 TSS PEN. (F)	20:1 APRC SURFACE PEN. (E)(F)	40:1 DPRT SURFACE (E)(F)	REMARKS
1	* FENCE (F)	9'	4713'	NONE	NONE	-	+1'	SEE NOTE 2
(2)	* FENCE (F)	9'	4710'	NONE	NONE	NONE	NONE	
(3)	* ROAD (E)	15'	4713'	NONE	NONE	-	NONE	
(4)	* ROAD (E)	15'	4711'	NONE	NONE	NONE	NONE	
(5)	* ROAD (E)	15'	4711'	NONE	NONE	-	NONE	
(6)	* FENCE (F)	9'	4707'	NONE	NONE	NONE	NONE	
(7)	* TREE	10'	4705'	NONE	NONE	-	NONE	
(8)	* ROAD (E)	15'	4710'	NONE	NONE	NONE	NONE	
(9)	* LIGHT POLE (E)	30'	4725'	NONE	NONE	-	NONE	
(10)	** LIGHT POLE (E)	29'	4724'	NONE	NONE	-	NONE	
(11)	* FENCE (F)	9'	4708'	NONE	NONE	NONE	NONE	
(12)	* FENCE (F)	9'	4709'	NONE	NONE	-	NONE	
(13)	** ROAD (E)	15'	4711'	NONE	NONE	-	NONE	
(14)	** ROAD (E)	15'	4710'	NONE	NONE	NONE	NONE	
(15)	* CHURCH (E)	25'	4720'	NONE	NONE	-	NONE	
16	** TREE	47'	4742'	NONE	NONE	-	+12'	SEE NOTE 2
(17)	* ROAD (E)	15'	4710'	NONE	NONE	-	NONE	
18	** TREE	65'	4760'	NONE	NONE	-	+25'	SEE NOTE 2
(19)	* CHURCH (E)	35'	4730'	NONE	NONE	-	NONE	
20	* TREE	45'	4740'	NONE	NONE	-	+4'	SEE NOTE 2
(21)	* BUILDING (E)	25'	4720'	NONE	NONE	NONE	NONE	
(22)	* BUILDING (E)	30'	4725'	NONE	NONE	-	NONE	
23	** TREE	65'	4760'	NONE	NONE	-	+22'	SEE NOTE 2
24	** TREE	64'	4750'	NONE	NONE	NONE	+21'	SEE NOTE 2
(25)	* SOLAR PANELS (E)	10'	4705'	NONE	NONE	-	NONE	
(26)	* ROAD (E)	15'	4706'	-	NONE	-	NONE	
(27)	* ROAD (E)	15'	4705'	NONE	NONE	NONE	NONE	
28	* FENCE (F)	9'	4712'	NONE	-	-	+1'	SEE NOTE 2
(29)	* ROAD (E)	15'	4713'	NONE	-	-	NONE	
(30)	* ROAD (E)	15'	4710'	NONE	-	-	NONE	
(31)	* FENCE (F)	9'	4709'	NONE	-	-	NONE	
(32)	** ROAD (E)	15'	4711'	NONE	-	-	NONE	
(33)	* ROAD (E)	15'	4710'	NONE	-	-	NONE	
34	* PARKING (E)	15'	4715'	-	-	-	+15'	SEE NOTE 2
(35)	* ROAD (E)	15'	4705'	NONE	NONE	-	NONE	
36	** FENCE (E)	8'	4708'	-	-	-	+8'	SEE NOTE 2
37	** BUSH	2'	4702'	-	-	-	+1'	SEE NOTE 2
38	** BUSH	6'	4706'	-	-	-	+4'	SEE NOTE 2
39	** BUSH	4'	4704'	NONE	+4'	-	+2'	SEE NOTES 2 & 3
40	** BUSH	5'	4705'	-	-	-	+2'	SEE NOTE 2
41	** BUSH	6'	4705'	-	-	-	+1'	SEE NOTE 2
(42)	** BUSH	4'	4704'	-	-	-	NONE	
43	* FENCE (E)	8'	4708'	-	-	-	+3'	SEE NOTE 2
44	** BUSH	5'	4705'	NONE	+4'	+4'	NONE	SEE NOTES 1 & 2
45	* ROAD	15'	4715'	-	-	-	+8'	SEE NOTE 2
46	** POWER POLE	41'	4739'	-	-	-	+32'	SEE NOTE 2
47	** ROAD	15'	4715'	-	-	-	+5'	SEE NOTE 2
(48)	* FENCE (F)	9'	4708'	-	-	-	NONE	
49	** POWER POLE	40'	4739'	-	-	-	+27'	SEE NOTE 2
50	** TANK	29'	4727'	-	-	-	+13'	SEE NOTE 2
(51)	* BUILDING	12'	4711'	-	-	-	NONE	
52	** POWER POLE	53'	4752'	-	-	-	+2'	SEE NOTE 2
(53)	** TREE	19'	4714'	NONE	NONE	NONE	NONE	
(54)	* ROAD	15'	4712'	-	-	-	NONE	
55	** TREE	30'	4725'	NONE	NONE	NONE	+4'	SEE NOTE 2
56	** TREE	33'	4728'	NONE	NONE	-	+1'	SEE NOTE 2
(57)	** TREE	29'	4724'	NONE	NONE	-	NONE	
58	** POWER POLE	52'	4747'	-	-	-	+11'	SEE NOTE 2
59	* FENCE (F)	9'	4709'	-	-	-	+9'	SEE NOTE 2

LEGEND

EXISTING (E)	FUTURE (F)	DESCRIPTION
	N/A	AIRFIELD DEVELOPMENT (ASPHALT)
	N/A	STRUCTURE/FACILITIES (BUILDING)
APL	APL	AIRPORT PROPERTY LINE (APL)
RSA(E)	RSA(F)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OFZ(F)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	ROFA(F)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RPZ(F)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BRL(F)	BUILDING RESTRICTION LINE (BRL)
APRC(E)	APRC(F)	APPROACH SURFACE
TSS(E)	TSS(F)	THRESHOLD SITING SURFACE
DPRT(E)	DPRT(F)	DEPARTURE SURFACE
4125	N/A	CONTOURS
	N/A	ROAD
	N/A	MARKINGS
X	XX	FENCE
N/A	X	TO BE REMOVED

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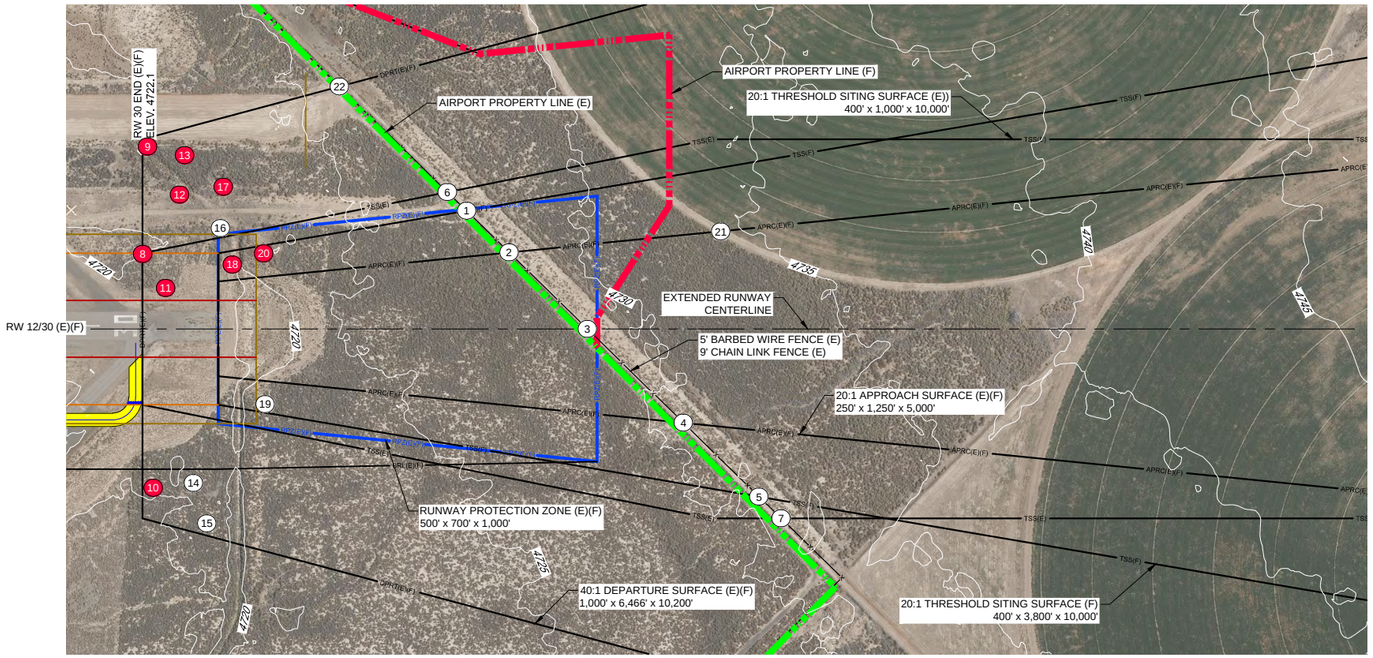
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

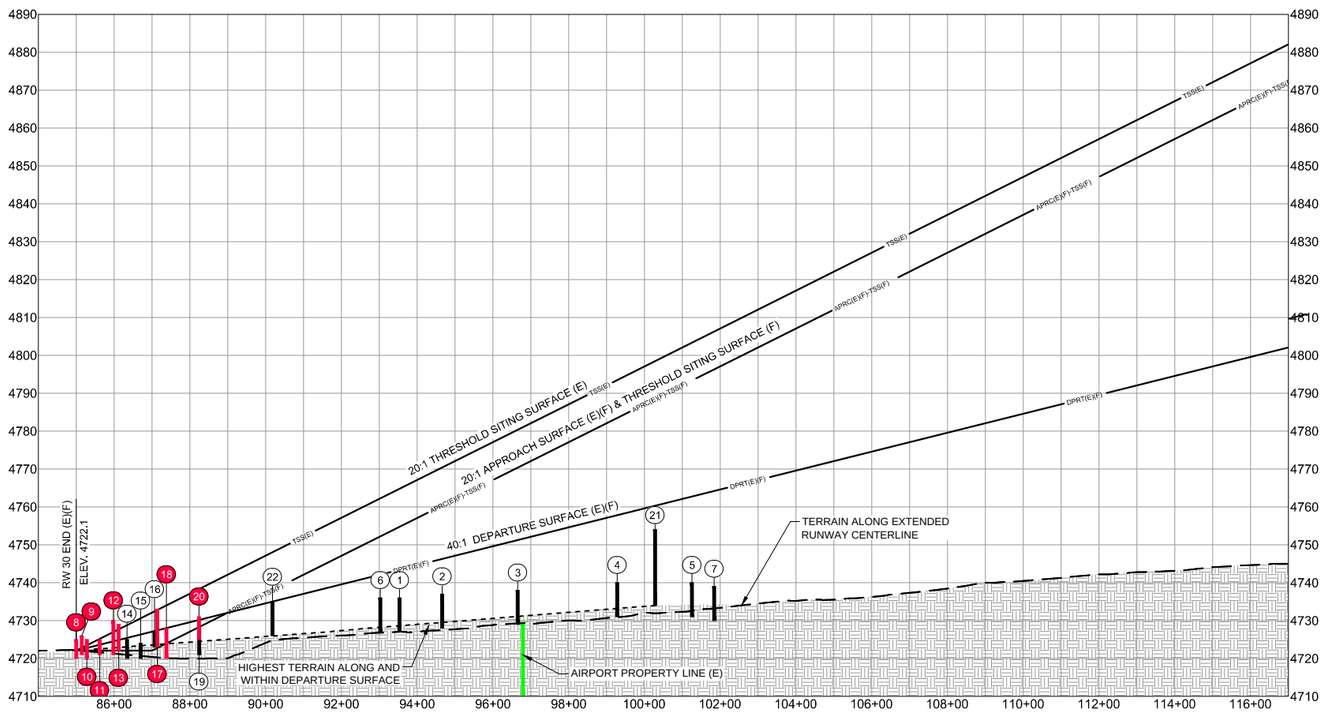
RUNWAY 12
INNER
APPROACH
(E)(F)

Sheet: 23 of: 29



PLAN

SCALE: PER BAR SCALE



PROFILE

SCALE: PER GRID

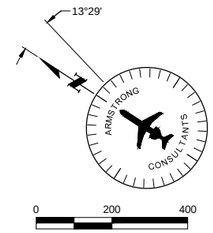
OBJECTS WITHIN RUNWAY 30 APR, DEPARTURE AND TSS (E)(F)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	20:1 TSS PEN. (E)	20:1 TSS PEN. (F)	20:1 APRC SURFACE PEN. (E)(F)	40:1 DPRT SURFACE (E)(F)	REMARKS
1	* FENCE (E) / (F)	5' / 9'	4732' / 4736'	NONE	NONE	-	NONE	
2	* FENCE (E) / (F)	5' / 9'	4733' / 4737'	NONE	NONE	NONE	NONE	
3	* FENCE (E) / (F)	5' / 9'	4734' / 4738'	NONE	NONE	NONE	NONE	
4	* FENCE (E) / (F)	5' / 9'	4736' / 4740'	NONE	NONE	NONE	NONE	
5	* FENCE (E) / (F)	5' / 9'	4736' / 4740'	NONE	NONE	-	NONE	
6	* FENCE (E) / (F)	5' / 9'	4732' / 4736'	NONE	-	-	NONE	
7	* FENCE (E) / (F)	5' / 9'	4735' / 4739'	NONE	-	-	NONE	
8	** BUSH	5'	4725'	+3'	-	-	+3'	SEE NOTES 2 & 3
9	** BUSH	5'	4726'	-	-	-	+4'	SEE NOTE 2
10	** BUSH	5'	4725'	-	-	-	+2'	SEE NOTE 2
11	** BUSH	4'	4725'	NONE	+3'	+3'	+1'	SEE NOTES 1, 2 & 3
12	** BUSH	9'	4760'	-	-	-	+5'	SEE NOTE 2
13	** BUSH	7'	4729'	-	-	-	+4'	SEE NOTE 2
14	** BUSH	5'	4725'	-	-	-	NONE	
15	** BUSH	4'	4724'	-	-	-	NONE	
16	** BUSH	5'	4728'	-	-	-	NONE	
17	** BUSH	10'	4733'	-	-	-	+6'	SEE NOTE 2
18	** BUSH	8'	4728'	NONE	+4'	-	NONE	SEE NOTE 3
19	** BUSH	7'	4728'	NONE	NONE	-	NONE	
20	** BUSH	6'	4731'	NONE	NONE	+3'	+1'	SEE NOTES 1 & 2
21	** AGG. EQUIPMENT	20'	4754'	NONE	NONE	NONE	NONE	
22	* FENCE (E) / (F)	5' / 9'	4726' / 4735'	-	-	-	NONE	

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
* = OBJECT ELEVATIONS ARE ESTIMATED AND NOT BASED ON A SURVEY.
** = OBJECT TOP ELEVATIONS AND LOCATIONS ARE BASED ON A SURVEY BY: WOOLPERT, DATED: 06/2016.
\- = OBJECT IS NOT LOCATED WITHIN THIS SURFACE.
● = OBJECT PENETRATION LOCATION
EST. = ESTIMATED; ELEV. = ELEVATION; HT. = HEIGHT; PEN. = PENETRATION; N/A = NOT APPLICABLE;
APRC = APPROACH SURFACE; TSS = THRESHOLD SITING SURFACE; DPRT = DEPARTURE SURFACE

NOTES:

1. SURFACE PENETRATIONS: LOWER, MARK AND LIGHT, REMOVE OR TAKE APPROPRIATE ACTION PER FAA FLIGHT PROCEDURES OFFICE DETERMINATIONS.
2. LESS THAN 35' LOW, CLOSE-IN DEPARTURE SURFACE PENETRATIONS: ADD NOTE TO DEPARTURE PROCEDURE OR LOWER, MARK AND LIGHT, OR REMOVE PER FAA FLIGHT PROCEDURES OFFICE DETERMINATION.
3. THRESHOLD SITING SURFACE OBJECT PENETRATIONS TO BE REMOVED.



LEGEND

EXISTING (E)	FUTURE (F)	DESCRIPTION
	N/A	AIRFIELD DEVELOPMENT (ASPHALT)
	N/A	STRUCTURE/FACILITIES (BUILDING)
APL	APL	AIRPORT PROPERTY LINE (APL)
RSA(E)	RSA(F)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OFZ(F)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	ROFA(F)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RPZ(F)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BRL(F)	BUILDING RESTRICTION LINE (BRL)
APRC(E)	APRC(F)	APPROACH SURFACE
TSS(E)	TSS(F)	THRESHOLD SITING SURFACE
4125	N/A	CONTOURS
	N/A	ROAD
	N/A	MARKINGS
X	N/A	FENCE

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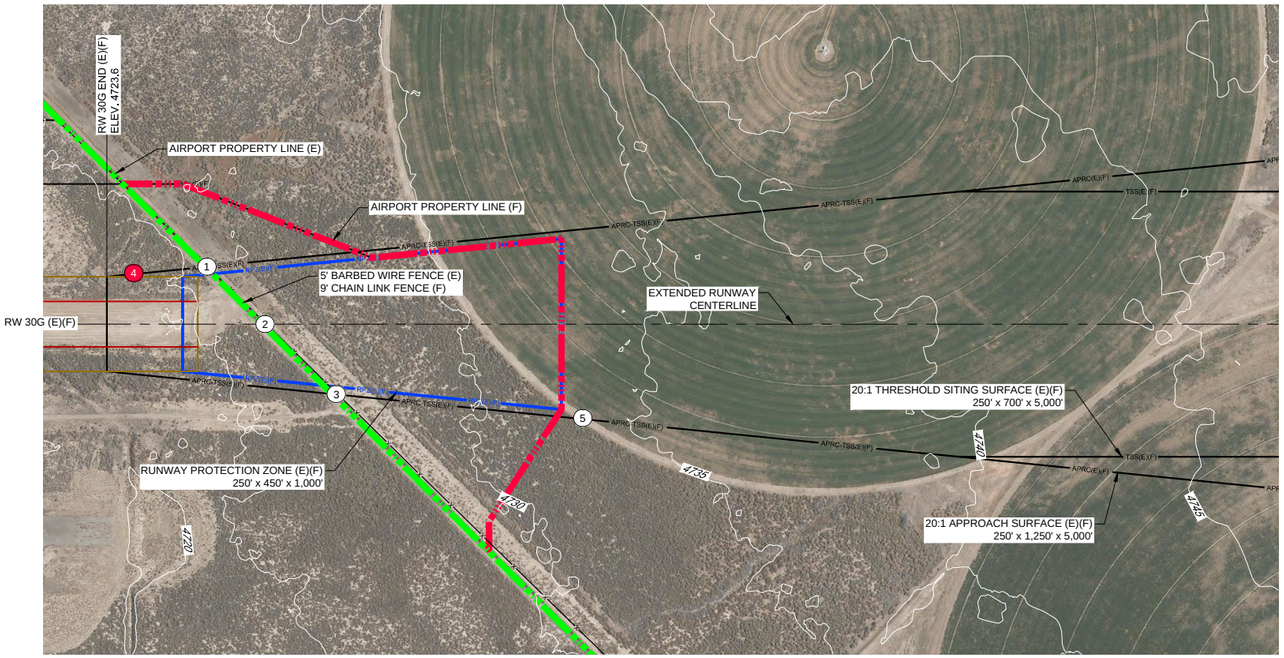
DOUGLAS COUNTY, NEVADA

AIP No. 3-32-0013-028-2015
AIRPORT LAYOUT PLANS

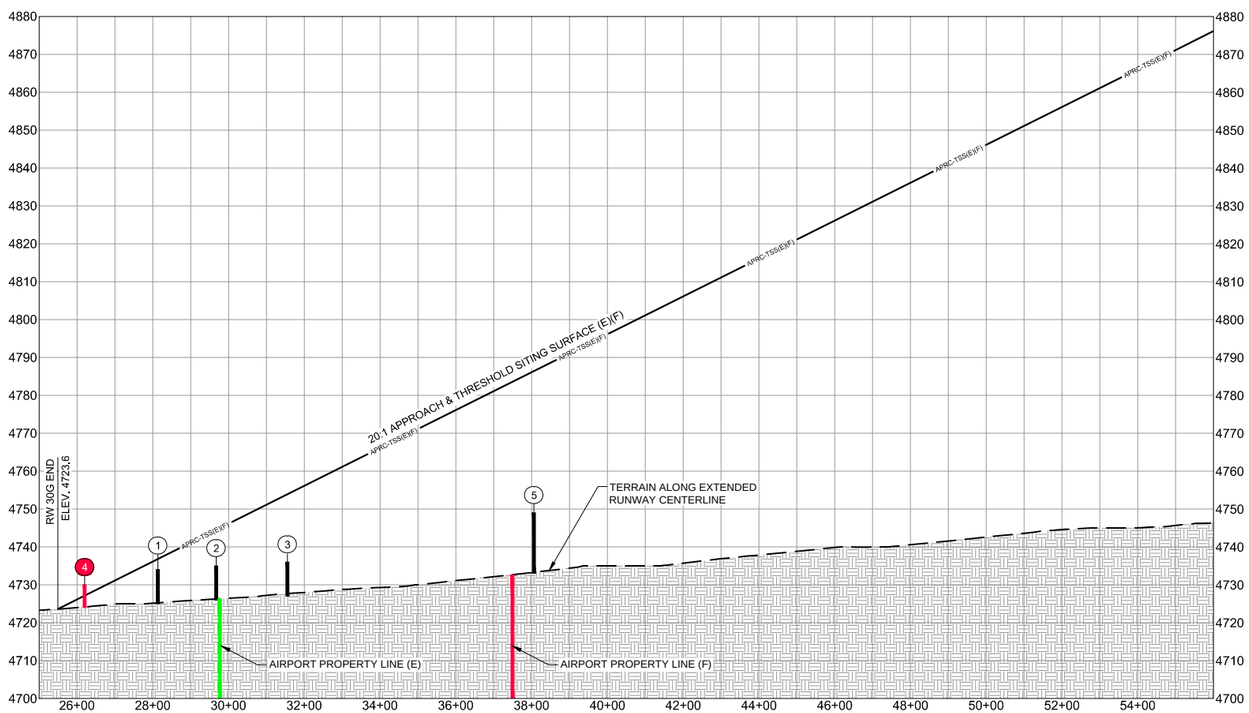
No.	Project No.	Date	Revision / Description	File	Dwn.	Chkd.	Apprvd.
0	156310	11/2016	ORIGINAL ISSUE	6310505	LKB	JMR	JZP

RUNWAY 30
INNER
APPROACH
(E)(F)



PLAN

SCALE: PER BAR SCALE



PROFILE

SCALE: PER GRID

OBJECTS WITHIN RUNWAY 30G APRC AND TSS (E)(F)

No.	OBJECT	EST. OBJECT HT.	TOP ELEV. (MSL)	20:1 TSS PEN.	20:1 APRC SURFACE PEN.	REMARKS
1	* FENCE (E) / (F)	5' / 9'	4730' / 4734'	NONE	NONE	
2	* FENCE (E) / (F)	5' / 9'	4731' / 4735'	NONE	NONE	
3	* FENCE (E) / (F)	5' / 9'	4732' / 4736'	NONE	NONE	
4	** BUSH	6'	4730'	+3'	+3'	SEE NOTES 1 & 2
5	** AGG. EQUIPMENT	16'	4749'	NONE	NONE	

NOTE: OBJECT ELEVATIONS IN FEET MSL (VERTICAL DATUM NAVD88).
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NOTES:

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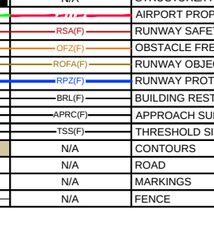
2. THRESHOLD SITING SURFACE OBJECT PENETRATIONS TO BE REMOVED.



LEGEND

EXISTING (E)	FUTURE (F)	DESCRIPTION
	N/A	AIRFIELD DEVELOPMENT (ASPHALT)
	N/A	STRUCTURE/FACILITIES (BUILDING)
		AIRPORT PROPERTY LINE (APL)
RSA(E)	RSA(F)	RUNWAY SAFETY AREA (RSA)
OFZ(E)	OFZ(F)	OBSTACLE FREE ZONE (OFZ)
ROFA(E)	ROFA(F)	RUNWAY OBJECT FREE AREA (ROFA)
RPZ(E)	RPZ(F)	RUNWAY PROTECTION ZONE (RPZ)
BRL(E)	BRL(F)	BUILDING RESTRICTION LINE (BRL)
APRC(E)	APRC(F)	APPROACH SURFACE
TSS(E)	TSS(F)	THRESHOLD SITING SURFACE
4125	N/A	CONTOURS
	N/A	ROAD
	N/A	MARKINGS
X	N/A	FENCE

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AIP No. 3-32-0013-028-2015

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RUNWAY 30G
INNER
APPROACH
(E)(F)

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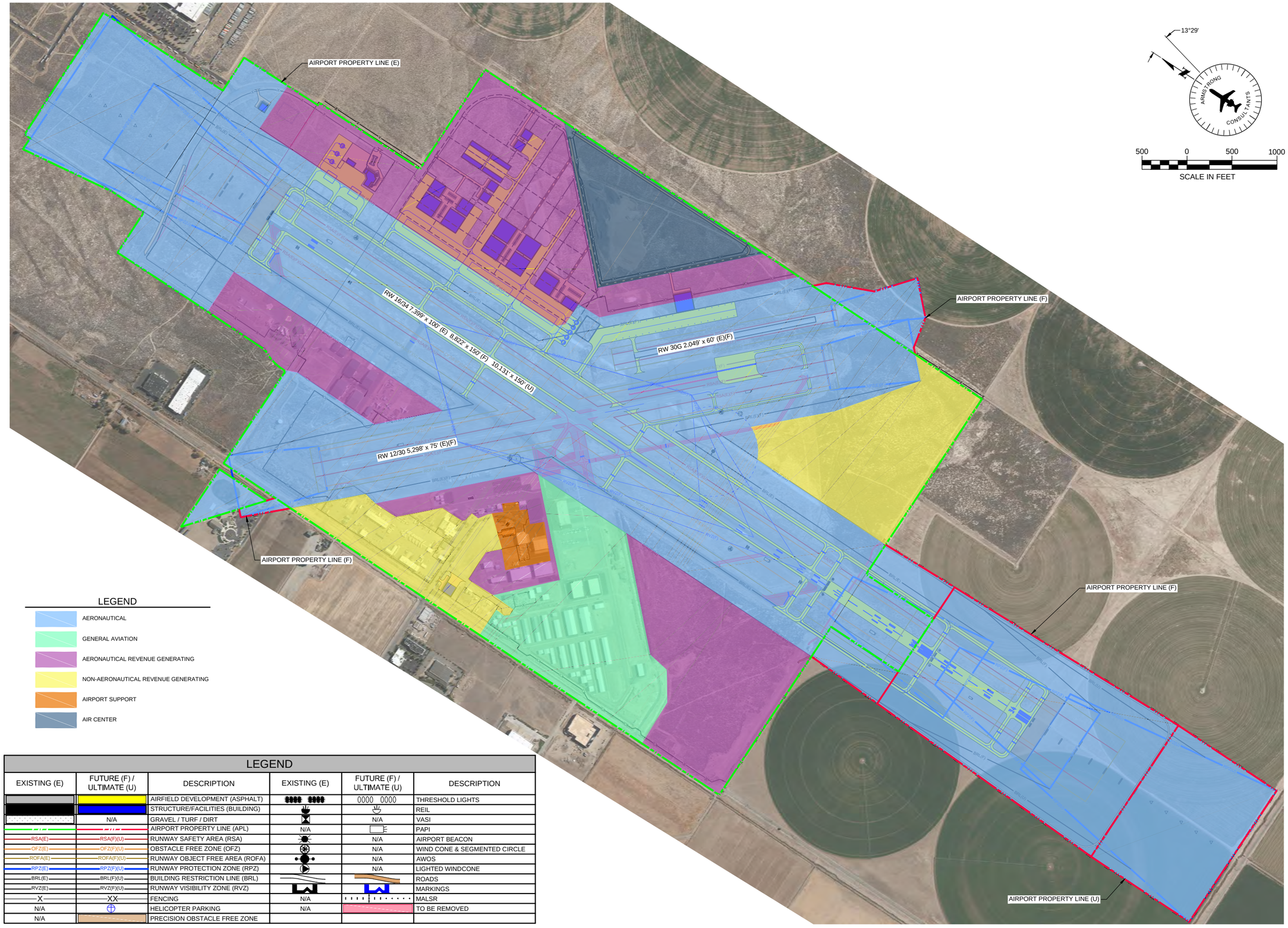

LEGEND

- AERONAUTICAL
- GENERAL AVIATION
- AERONAUTICAL REVENUE GENERATING
- NON-AERONAUTICAL REVENUE GENERATING
- AIRPORT SUPPORT
- AIR CENTER

LEGEND

EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION	EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)			THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)			REIL
	N/A	GRAVEL / TURF / DIRT		N/A	VASI
		AIRPORT PROPERTY LINE (APL)	N/A		PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)		N/A	AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)		N/A	WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)		N/A	AWOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)		N/A	LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)			ROADS
RVZ(E)	RVZ(F)(U)	RUNWAY VISIBILITY ZONE (RVZ)			MARKINGS
X	XX	FENCING	N/A		MALSR
N/A		HELICOPTER PARKING	N/A		TO BE REMOVED
N/A		PRECISION OBSTACLE FREE ZONE			

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ON AIRPORT LAND USE

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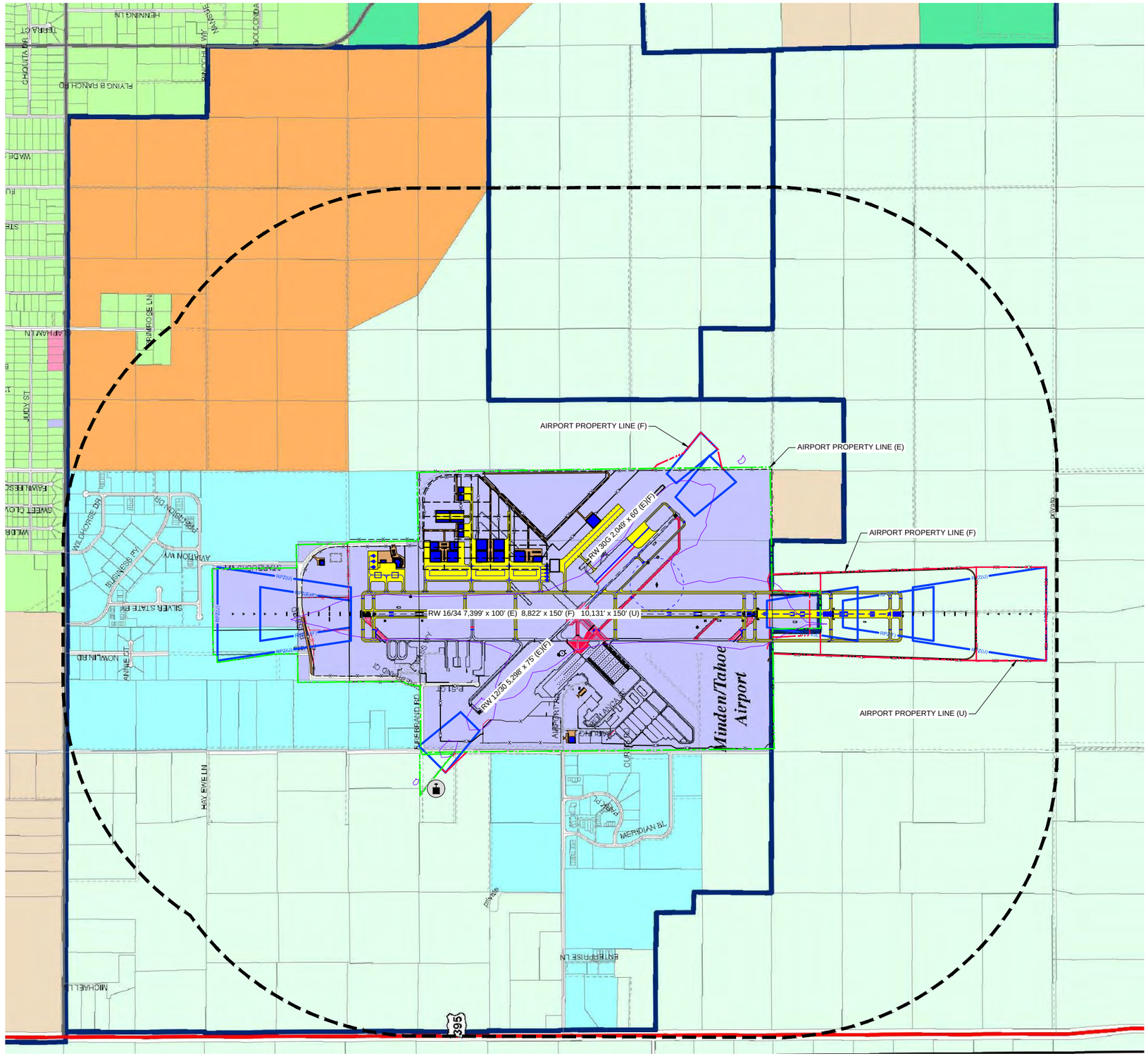


NOTICE OF PROPOSED CONSTRUCTION

An FAA Form 7460-1, "Notice of Proposed Construction or Alteration" must be submitted for any construction or alteration (including hangars and other on-airport and off-airport structures, towers, etc.) within 20,000 horizontal feet of the airport greater in height than an imaginary surface extending outward and upward from the runway at a slope of 100 to 1 or greater in height than 200 feet above ground level.

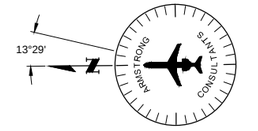
NOTES

No land fills within 5 miles of the airport.

No Section 4(F) land affected by the airport.

ORDINANCES IN EFFECT

AIRPORT INFLUENCE AREA IN EFFECT
DOUGLAS COUNTY MASTER PLAN - FUTURE LAND USE - AIRPORT COMMUNITY PLAN



1000 0 1000 2000
SCALE IN FEET

LEGEND

EXISTING	FUTURE/ULTIMATE	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)
		STRUCTURE/FACILITIES (BUILDING)
	N/A	GRAVEL / TURF / DIRT
		AIRPORT PROPERTY LINE (APL)
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)
		ROADS
		MARKINGS
X	XX	FENCING
N/A		HELICOPTER PARKING
N/A		TO BE REMOVED
		DNL NOISE CONTOUR
CHURCH		THERE ARE NO HOSPITALS, SCHOOLS OR PARKS NEAR THE AIRPORT

FUTURE LAND USE	DESCRIPTION
	COMMUNITY FACILITIES
	AGRICULTURAL
	INDUSTRIAL
	FOREST & RANGE
	RECEIVING AREA
	COMMUNITY AREAS
	1 MILE AIRPORT BUFFER

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0	156310	11/2016	ORIGINAL ISSUE	6310507	LKB	JMR	JZP

OFF AIRPORT LAND USE

EXISTING AIRPORT PROPERTY

PARCEL	CURRENT OWNER	INTEREST	ASSESSOR'S PARCEL NO.	BLOCK / LOT	BOOK / PAGE	DATE	ACREAGE	FEDERAL PARTICIPATION
1	DOUGLAS COUNTY AIRPORT	FEE SIMPLE	1320-08-002-007	- 1	1286 / 1762	12/15/86	880.04	NO
2	DOUGLAS COUNTY AIRPORT	FEE SIMPLE	1320-08-001-007	-	1002 / 547	10/02/02	79.97	NO
3	DOUGLAS COUNTY	FEE SIMPLE	1320-04-002-009	K / 27	0601 / 5640	08/07/01	22.03	3-32-0013-12
4	DOUGLAS COUNTY	FEE SIMPLE	1320-05-002-010	-	0904 / 2514	09/08/04	51.89	3-32-0013-12
5	DOUGLAS COUNTY	FEE SIMPLE	1320-04-002-007	K / 28	0502 / 636	05/02/02	42.00	3-32-0013-12
6	DOUGLAS COUNTY	AVIGATION EASEMENT	-	-	-	08/30/04	1.81	YES
7	DOUGLAS COUNTY	FEE SIMPLE	1320-08-001-018	- / 3A-2	1204 / 5279	12/13/04	5.53	3-32-0013-14
8	DOUGLAS COUNTY	FEE SIMPLE	1320-17-000-007	-	1288 / 1829-1832	10/10/88	14.42	YES

PROPERTY TO BE ACQUIRED

PARCEL	INTEREST	ACREAGE	PURPOSE
9	FEE SIMPLE	180±	AERONAUTICAL / APPROACH PROTECTION
10	FEE SIMPLE	2±	AERONAUTICAL / APPROACH PROTECTION
11	FEE SIMPLE	10±	AERONAUTICAL / APPROACH PROTECTION

NOTE:
THIS MAP IS NOT FROM A PROPERTY SURVEY. THE AIRPORT PROPERTY LINE WAS OBTAINED FROM THE DOUGLAS COUNTY RECORDER'S DATA.

LEGEND

EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION	EXISTING (E)	FUTURE (F) / ULTIMATE (U)	DESCRIPTION
		AIRFIELD DEVELOPMENT (ASPHALT)			THRESHOLD LIGHTS
		STRUCTURE/FACILITIES (BUILDING)			REIL
	N/A	GRAVEL / TURF / DIRT		N/A	VASI
		AIRPORT PROPERTY LINE (APL)	N/A		PAPI
RSA(E)	RSA(F)(U)	RUNWAY SAFETY AREA (RSA)		N/A	AIRPORT BEACON
OFZ(E)	OFZ(F)(U)	OBSTACLE FREE ZONE (OFZ)		N/A	WIND CONE & SEGMENTED CIRCLE
ROFA(E)	ROFA(F)(U)	RUNWAY OBJECT FREE AREA (ROFA)		N/A	AWOS
RPZ(E)	RPZ(F)(U)	RUNWAY PROTECTION ZONE (RPZ)		N/A	LIGHTED WINDCONE
BRL(E)	BRL(F)(U)	BUILDING RESTRICTION LINE (BRL)		N/A	SECTION CORNER
TSA(E)	TSA(F)(U)	TAXIWAY SAFETY AREA (TSA)	4125	N/A	CONTOURS
TOFA(E)	TOFA(F)(U)	TAXIWAY OBJECT FREE AREA (TOFA)			ROADS
RVZ(E)	RVZ(F)(U)	RUNWAY VISIBILITY ZONE (RVZ)			MARKINGS
N/A		PRECISION OBSTACLE FREE ZONE	X	XX	FENCING
N/A		TO BE REMOVED	N/A		HELICOPTER PARKING
			N/A		MALSR

600 0 600 1200
SCALE IN FEET

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AIRPORT PROPERTY MAP

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AERIAL PHOTOGRAPH

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd
0	156310	11/2016	ORIGINAL ISSUE	6310509	LKB	JMR	JZP

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Chapter Seven

Environmental Overview

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

7.1 Introduction

The protection and preservation of the local environment is an essential part of the airport master planning process. Council on Environmental Quality (CEQ) regulation 1501.2 states, "agencies shall integrate the NEPA process with other planning at the earliest possible time to insure that planning decisions reflect environmental values, avoid delays later in the process, and head off potential conflicts."

Accordingly, this environmental overview was conducted in accordance with FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementing Instructions for Airport Actions,* FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures,* and the FAA's *Environmental Desk Reference for Airport Actions*, which requires the analysis of the following environmental resource categories prior to project implementation:

- Air Quality, including greenhouse gases (GHGs) and climate
- Biotic Resources/Federally-listed Endangered and Threatened Species
- Coastal Barriers and Coastal Zone Management
- Compatible Land Use/Noise
- Construction Impacts
- Cumulative Impacts
- Department of Transportation Act, Section 4(f)
- Energy Supplies, Natural Resources, and Sustainable Design
- Farmlands
- Floodplains
- Hazardous Materials
- Historical, Architectural, Archeological, and Cultural Resources
- Light Emissions and Visual Effects
- Secondary (Induced) Impacts
- Social Impacts/Environmental Justice
- Solid Waste
- Water Quality
- Wetlands
- Wild and Scenic Rivers

FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures*, describes the types of impacts and thresholds that determine if an impact is considered to be significant. The proposed development projects will require a determination to be made regarding which of

the following environmental clearance documents would be required prior to project implementation. These environmental clearance documents include the following:

- Categorical Exclusions – Projects or actions that do not normally require an EA or EIS because they do not individually or cumulatively have a significant effect on the environment.
- Environmental Assessment (EA) – Preparation of a concise document used to describe a proposed project's anticipated environmental impacts and mitigation measures.
- Environmental Impact Statement (EIS) – Preparation of a clear, concise, and appropriately detailed document that provides the FAA, decision makers, and the public with a full and fair discussion of significant environmental impacts of the proposed project and reasonable alternatives.

Ultimately, the FAA will determine whether the proposed development project constitutes a major federal action subject to an EA or EIS, or whether it is a Categorical Exclusion not expected to have a significant adverse effect on the environment.

7.1.1 Environmental Impacts of Recommended Development

The purpose of an environmental overview is to identify significant thresholds for the resource categories contained in FAA Order 1050.1F, *Environmental Impacts: Policies and Procedures* and FAA Order 5050.4B, *National Environmental Policy Act (NEPA) Implementation Instructions for Airport Actions*. The environmental overview for the Minden-Tahoe Airport is illustrated in **Table 7-1**.

Table 7-1 Environmental Overview for Minden-Tahoe Airport

NEPA Resource Category	Potential Environmental Impacts	Anticipated Impact Level	Supporting Documentation
Air Quality	The U.S. Environmental Protection Agency (EPA) has adopted air quality standards that specify the maximum permissible short-term and long-term concentrations of various air contaminants. The National Ambient Air Quality Standards (NAAQS) consist of primary and secondary standards for six criteria pollutants which include: Ozone (O3), Carbon Monoxide (CO), Sulfur Dioxide (SOx), Nitrogen Oxide (NOx), Particulate matter (PM10), and Lead (Pb). Areas that exceed allowable thresholds for criteria pollutants are designated "non-attainment" areas.	**No impacts** Douglas County is not located in a non-attainment area. No significant air quality impacts are anticipated to occur as a result of the development shown.	See **Appendix C-1**
Threatened or Endangered Species and Biological Resources	A significant impact to Federally-listed threatened and endangered species would occur when the Fish and Wildlife Service determines that the proposed action would be likely to jeopardize the continued existence of the species in question, or would result in the destruction or adverse modification of Federally-designated critical habitat in the affected area.	**No impacts** The proposed projects are not anticipated to impact plant communities or cause the displacement of wildlife. No critical habitats have been identified for the areas of recommended development at Minden-Tahoe Airport.	See **Appendix C-2**
Coastal Barriers and Coastal Zone Management (CZM)	The Airport is not located within or adjacent to a coastal zone.	**No impacts** Airport is located in the State of Nevada.	Not Applicable
Compatible Land Use/Noise	**Compatible Land Use**: Federal Aviation Regulations (F.A.R.) Part 150 recommends guidelines for planning land use compatibility within various levels of aircraft noise exposure. In addition, Advisory Circular 150/5200-33 identifies land uses that are incompatible with safe airport operations because of their propensity for attracting birds or other wildlife, which in turn results in an increased risk of aircraft strikes and damage. Finally, F.A.R. Part 77 regulates the height of structures within the vicinity of the airport. **Noise**: The Yearly Day-Night Average Sound Level (DNL) is used in this study to assess	**Minor impacts** The proposed airport improvements are not anticipated to result in significant noise impacts or attract wildlife.	Not Applicable

Table 7-1 Environmental Overview for Minden-Tahoe Airport

NEPA Resource Category	Potential Environmental Impacts	Anticipated Impact Level	Supporting Documentation
	aircraft noise. DNL is the metric currently accepted by the Federal Aviation Administration (FAA), Environmental Protection Agency (EPA), and Department of Housing and Urban Development (HUD) as an appropriate measure of cumulative noise exposure. These three federal agencies have each identified the 65 DNL noise contour as the threshold of incompatibility.		
Construction Impacts	Significant impacts would most likely occur when unusual circumstances exist (e.g. construction-induced traffic congestion that would substantially degrade air quality) and when the severity of the impact cannot be mitigated below FAA's threshold levels for the affected resource.	**Minor impacts** A temporary increase in particulate emissions and fugitive dust may result from construction activities. The provisions contained in FAA Advisory Circular 150/5370-10G, *Standards for Specifying Construction of Airports,* should be incorporated into all project specifications.	Not Applicable
Cumulative Impacts	The significance threshold for cumulative impacts varies according to the affected resource. Past, present, and reasonably foreseeable future actions trigger the significance threshold for the resource analyzed.	**No impacts** The proposed projects are not anticipated to cause a cumulative impact when considering past, present and foreseeable future projects.	Not Applicable
Department of Transportation (DOT) Act, Section 4(f)	**Section 4(f) Lands.** These include publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state or local significance, or any land from a historic site of national, state or local significance.	**No impacts** The nearest Section 4(f) property is located approximately three miles south in the Town of Minden. The extent of the recommended development would remain within immediate vicinity (≤ 1.0 miles) of Minden-Tahoe Airport.	Not Applicable
Energy Supplies, Natural Resources, and Sustainable Design	When proposed construction, operation, or maintenance would cause demands that would exceed available or future (project year) natural resource or energy supplies.	**No impacts**	Not Applicable

Table 7-1 Environmental Overview for Minden-Tahoe Airport

NEPA Resource Category	Potential Environmental Impacts	Anticipated Impact Level	Supporting Documentation
Farmlands	According to the Farmland Protection Policy Act, the regulation does not apply to land already committed to "urban development or water storage," i.e., airport developed areas, regardless of its importance as defined by the NRCS.	**Minor impacts** Portions of the airport property and surrounding lands are considered to be prime farmlands, if irrigated or farmlands of statewide importance.	See **Appendix C-3**
Floodplains	When notable adverse impacts on natural and beneficial floodplain values would occur.	**Minor impacts** The FEMA FIRM Map shows the Airport to be located within a floodplain.	See **Appendix C-4**
Hazardous Materials	The action involves a property on, or eligible for, the National Priority List (NPL). The sponsor would have difficulty meeting applicable regulations on hazardous materials. There is an unresolved issue regarding hazardous materials.	**No impacts**	Not Applicable
Historical, Architectural, Archaeological, and Cultural Resources	When an action adversely affects a protected property the state and /or tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.	**Potential for impacts** Coordination with the SHPO would be conducted prior to construction.	Not Applicable
Light Emissions and Visual Effects	**For light emissions:** When an action's light emissions create annoyance to or interfere with normal activities. **For visual effects:** When consultation with Federal, State or local agencies, tribes or the public shows these effects cause a disturbance and the agencies state the effect is objectionable.	**Minor impacts** No significant light emissions or visual effects impacts are anticipated as a result of the proposed development.	Not Applicable
Secondary (Induced) Impacts	Induced impacts will normally not be significant except where there are also significant impacts in other categories, especially noise, land use, or direct social impacts.	**No impacts**	Not Applicable
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health Risks and Safety Risks	**For socioeconomic issues:** When an action would cause: Extensive relocation, but sufficient replacement housing is unavailable. Extensive relocation of community businesses that would cause severe economic hardship for affected communities.	**Socioeconomic Issues: No Impacts** **Environmental Justice: No impacts** **Children's Health & Safety: No impacts**	Not Applicable

Table 7-1 Environmental Overview for Minden-Tahoe Airport

NEPA Resource Category	Potential Environmental Impacts	Anticipated Impact Level	Supporting Documentation
	Disruption of local traffic patterns that substantially reduce the Levels of Service of roads serving the airport and its surrounding communities. A substantial loss in community tax base. **For Environmental Justice issues:** When an action would cause disproportionately high and adverse human health or environmental effects on minority and low income populations, a significant impact may occur. **For Children's Health & Safety Risks:** An action causing disproportionate health and safety risks to children may indicate a significant impact.		
Solid Waste	Solid waste generated during future project construction would be contained in designated areas and receptacles and removed once the project is completed. Pollution related to construction activities (i.e. dust) would be minimal and would not adversely affect the Airport.	**Minor impacts** Solid waste would likely be generated during construction of the recommended development. These impacts would only be temporary during construction.	Not Applicable
Water Quality	When an action has the potential to exceed water quality standards, there are water quality problems that cannot be avoided or satisfactorily mitigated, or there would be difficulty in obtaining a permit or authorization, there may be a significant impact.	**No impacts**	Not Applicable
Wetlands	When an action would: Adversely affect a wetland's function to protect the quality or quantity of a municipal water supply. Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected. Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety or welfare.	**Potential for impacts** There are wetlands located adjacent to the airport property. Coordination with the U.S. Army Corps of Engineers would be conducted during future NEPA analysis to confirm no significant impacts would occur.	See **Appendix C-5**

Table 7-1 Environmental Overview for Minden-Tahoe Airport

NEPA Resource Category	Potential Environmental Impacts	Anticipated Impact Level	Supporting Documentation
	Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically important timber, food, or fiber resources of the affected area surrounding wetlands. Promote development of secondary activities or services that would affect the above functions.		
Wild and Scenic Rivers	There are no wild or scenic rivers on or near future project areas.	**No impacts** No Wild or Scenic Rivers located within 50 miles of the Airport.	Not Applicable

Source: FAA Order 1050.1F, Environmental Impacts: Policies and Procedures , FAA Order 5050.4B, NEPA Implementing Instructions for Airport Projects , & Armstrong Consultants, Inc., 2016

7.1.2 Summary of Potential Environmental Impacts

A summary of the analysis ratings for each of the environmental impact categories with regard to the recommended development was provided in **Table 7-1**. While some categories indicate a potential minor impact, they are all estimated to be below the threshold of significance as described in FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Projects*. It is expected that most recommended development projects would be categorically excluded, with the exception of the runway extension project, which would likely require an EA.

Chapter Eight

Implementation and Financial Plan

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

8.1 Introduction

A program of recommended airport development has been formulated to guide the systematic development of the Minden-Tahoe Airport and to aid the Federal Aviation Administration and Airport in allocating funding over the planning period. The recommended airport development plan is based on the facility requirements, as well as the development alternatives, identified earlier in this report.

8.2 Implantation Plan

Future development at the Minden-Tahoe Airport, as included in this study, covers a 20-year planning period. Development items are grouped into three phases:

- Phase I is short-term (1-5 years)
- Phase II is intermediate-term (6-10 years)
- Phase III is long-term (11-20 years)

The phasing of projects (shown on the airport layout plan) assists the airport sponsor in budgetary planning for construction projects. A drawing showing the phasing of each project is included at the end of this Chapter. The sequence in which the projects are completed is important as the ultimate configuration of the airport will require numerous projects. Estimated development costs are included in **Table 8-1** for each of the recommended improvements.

Phase I (1-5 Years) Short-Term Development Items

- A1: Improvements to airfield lighting system
- A2: Construct Glider Staging Area
- A3: Improve airport perimeter fencing
- A4: Acquire Sweeper
- A5: Construct Taxiway Z – Phase I
- A6: Construct Snow Removal Equipment Building
- A7: Utility/Fire Suppression Analysis
- A8: Utility/Fire Suppression improvements
- A9: Correct non-standard Runway 16-34 conditions and realign Bliss Road
- A10: Construct additional automobile parking
- A11: Install Approach Lighting System – Runway 16
- A12: Pavement rehabilitation projects, as needed

Phase II (6-10 Years) Intermediate-Term Development Items

- B1: Correct non-standard taxiway geometries
- B2: Construct East Fixed-Wing Aircraft Parking Apron – Phase I
- B3: Construct Taxiway Z – Phase II
- B4: Construct General Aviation Services Building
- B5: Construct helicopter parking pads
- B6: Environmental assessment for Runway 16-34 extension
- B7: Extend Runway 16-34 and Taxiway A – Phase I (including land acquisition)
- B8: Pavement rehabilitation projects, as needed

Phase III (11-20 Years) Long-Term Development Items

- C1: Construct Taxiway Z – Phase III
- C2: Construct East Fixed-Wing Aircraft Parking Apron – Phase II
- C3: Extend Runway 16-34 and Taxiway A – Phase II
- C4: Install Approach Lighting System – Runway 34
- C5: Construct Taxiway Z – Phase IV
- C6: Airport Master Plan
- C7: Pavement rehabilitation projects, as needed

Table 8-1 Twenty Year Development Plan

Development Items	FAA Portion 93.75%	Local Portion 6.25%	Project Cost 100%
A1: Improvements to airfield lighting system	$550,000	$36,667	$586,667
A2: Construct Glider Staging Area	$918,750	$61,250	$980,000
A3: Improve airport perimeter fencing	$3,462,500	$230,833	$3,693,333
A4: Acquire Sweeper	$253,125	$16,875	$270,000
A5: Land acquisition for Runway 34 ROFA	$93,750	$6,250	$100,000
A6: Construct Taxiway Z – Phase I	$1,959,375	$130,625	$2,090,000
A7: Construct Snow Removal Equipment Building	$421,875	$28,125	$450,000
A8: Utility/Fire Suppression Analysis	$103,125	$6,875	$110,000
A9: Utility/Fire Suppression improvements	$1,406,250	$93,750	$1,500,000
A10: Correct non-standard Runway 16-34 conditions/realign Bliss Road	$375,000	$25,000	$400,000
A11: Construct additional automobile parking	$421,875	$28,125	$450,000
A12: Install Approach Lighting System – Runway 16	$937,500	$62,500	$1,000,000
A13: Pavement rehabilitation projects	$2,812,500	$187,500	$3,000,000
A14: Land acquisition for RPZs	$89,061	$5,939	$95,000
Short-Term Subtotal	**$13,804,686**	**$920,314**	**$14,725,000**
B1: Correct non-standard taxiway geometries	$7,007,813	$467,188	$7,475,000
B2: Construct East Fixed-Wing Aircraft Parking Apron – Phase I	$8,531,250	$568,750	$9,100,000
B3: Construct Taxiway Z – Phase II	$9,806,250	$653,750	$10,460,000
B4: Construct General Aviation Services Building	$2,343,750	$156,250	$2,500,000
B5: Construct helicopter parking pads	$1,125,000	$75,000	$1,200,000
B6: Environmental assessment for Runway 16-34 extension	$585,938	$39,063	$625,000
B7: Extend Runway 16-34 and Taxiway A – Phase I *	$5,859,375	$390,625	$6,250,000
B8: Pavement rehabilitation projects	$2,812,500	$187,500	$3,000,000
B9: Construct Glider Apron	$6,328,175	$421,875	$6,750,000
Intermediate-Term Subtotal	**$44,400,051**	**$2,960,001**	**$47,360,000**
C1: Construct Taxiway Z – Phase III	$5,606,250	$373,750	$5,980,000
C2: Construct East Fixed-Wing Aircraft Parking Apron – Phase II	$7,406,250	$493,750	$7,900,000
C3: Extend Runway & Widen 16-34 and Extend Taxiway A – Phase II	$15,140,625	$1,009,375	$16,150,000
C4: Install Approach Lighting System – Runway 34	$937,500	$62,500	$1,000,000
C5: Construct Taxiway Z – Phase IV	$4,846,875	$323,125	$5,170,000
C6: Airport Master Plan	$656,250	$43,750	$700,000
C7: Pavement rehabilitation projects	$2,812,500	$187,500	$3,000,000
Long-Term Subtotal	**$37,406,250**	**$2,493,750**	**$39,900,000**
20-Year Improvement Plan Total	**$95,610,987**	**$6,374,065**	**$101,985,000**

Source: Armstrong Consultants, Inc., 2016

Note: All cost estimates are in 2016 dollars and are for planning purposes only

*Includes land acquisition

8.3 Capital Development

Primary funding sources come from the FAA and Local contribution. This section will identify and quantify the expected sources of capital funds. As previously indicated, FAA funds represent the majority of expected capital; however, a number of sources are identified and described below.

The State of Nevada provides limited funding of airport improvement projects. However, there is pending legislation which may open additional state funds for Nevada's airports.

8.3.1 Federal Aviation Administration

The Airport and Airways Act of 1982 created and authorized the Airport Improvement Program (AIP) to assist in the development of a nationwide system of public-use airports adequate to meet the current projected growth of civil aviation. The Act provides funding for airport planning and development projects at airports included in the National Plan of Integrated Airport Systems (NPIAS).

The FAA Modernization and Reform Act of 2012 includes a federal/local matching ratio of 93.75 percent/6.25 percent for AIP approved projects in the State of Nevada. The previous bill provided a 95 percent/five percent federal/state-local matching ratio. The FAA levies user charges on aviation that are returned to airports to pay for eligible projects.

Grant eligible items typically include airfield and aeronautical related facilities such as runways, taxiways, aprons, lighting, visual aids, and equipment as well as land acquisition, planning and environmental tasks needed to accomplish the improvements. Public use (non-revenue generating) portions of passenger terminals are also grant eligible. In addition, fuel systems and hangars are also grant eligible; however, these items are considered a low priority for FAA funding.

8.3.2 Local Funding

Airport sponsors have several methods available for funding the capital required to meet the local share of development costs. The most common methods involve debt financing (which amortize the debt over the useful life of the project), force accounts, in-kind service, third-party support and donations. Minden-Tahoe Airport is financially self-sustaining and does not receive any funding from Douglas County.

Funding methods presently used by Minden-Tahoe Airport:

Revenue Bonds: Revenue Bonds are payable solely from the revenues of a particular project or from operating income of the borrowing agency, such as an airport commission which lacks taxing power. Generally, they fall outside of constitutional and statutory limitations and in many cases do not require voter approval. Because of the limitations on the other public bonds, airport sponsors are increasingly turning to revenue bonds whenever possible. However, revenue bonds normally carry a higher rate of interest because they lack the guarantees of municipal bonds. It should also be noted that the general public would usually be wary of the risk involved with a revenue bond issue for a general aviation airport. Therefore, the sale of such bonds could be more difficult than other types of bonds.

Development areas in the eastern portion of the Airport are utilizing revenue bonds to take advantage of current low interest rates.

Funding methods not currently utilized by Minden-Tahoe Airport but could be implemented, if needed:

Bank Financing: Some airport sponsors use bank financing as a means of funding airport development. Generally, two conditions are required. First, the sponsor must show the ability to repay the loan plus interest and second, capital improvements must be less than the value of the present facility or some other collateral used to secure the loan. These are standard conditions which are applied to almost all bank loan transactions.

General Obligation Bonds: General Obligation bonds (GO) are a common form of municipal bonds whose payment is secured by the full faith credit and taxing authority of the issuing agency. GO bonds are instruments of credit and because of the community guarantee, reduce the available debt level of the sponsoring community. This type of bond uses tax revenues to retire debt and the key element becomes the approval of the voters to a tax levy to support airport development. If approved, GO bonds are typically issued at a lower interest rate than other types of bonds.

Self-liquidating General Obligation Bonds: As with General Obligation bonds, Self-liquidating General Obligation Bonds are secured by the issuing government agency. They are retired, however, by cash flow from the operation of the facility. Providing the state court determines that the project is self-sustaining, the debt may be legally excluded from the community's debt limit. Since the credit of the local government bears the ultimate risk of default, the bond issue is still considered, for the purpose of financial analysis, as part of the debt burden of the community. Therefore, this method of financing may mean a higher rate of interest on all bonds sold by the community. The amount of increase in the interest rate depends, in part, upon the degree of risk of the bond. Exposure risk occurs when there is insufficient net airport operating income to cover the level of service plus coverage requirements, thus forcing the community to absorb the residual.

Combined Revenue/General Obligation Bonds: These bonds, also known as "Double-Barrel Bonds", are secured by a pledge of back-up tax revenues to cover principal and interest payments in cases where airport revenues are insufficient. The combined Revenue/General Obligation Bond interest rates are usually lower than Revenue Bonds, due to their back-up tax provisions.

Force Accounts, In-kind Service, Donations: Depending on the capabilities of the Sponsor, the use of force accounts, in-kind service, or donations may be approved by the FAA for the Sponsor to provide their share of the eligible project costs. An example of force accounts would be the use of heavy machinery and operators for earthmoving and site preparation of runways or taxiways; the installation of fencing; or the construction of

improvements to access roads. In-kind service may include surveying, engineering or other services. Donations may include land or materials such as gravel or water needed for the project. The values of these items must be verified and approved by the FAA prior to initiation of the project.

Third-Party Support: Several types of funding fall into this category. For example, individuals or interested organizations may contribute portions of the required development funds (Pilot Associations, Economic Development Associations, Chambers of Commerce, etc.). Although not a common means of airport financing, the role of private financial contributions not only increases the financial support of the project, but also stimulates moral support to airport development from local communities. Because of the potential for hangar development, private developers may be persuaded to invest in hangar development. A suggestion would be that the Airport authorize long-term leases to individuals interested in constructing a hangar on airport property. This arrangement generates revenue from the airport, stimulates airport activity, and minimizes the sponsor's capital investment requirements. Another method of third-party support involves permitting the fixed base operator (FBO) to construct and monitor facilities on property leased from the airport. Terms of the lease generally include a fixed amount plus a percentage of revenues and a fuel flowage fee. The advantage to this arrangement is that it lowers the sponsor's development costs, a large portion of which is building construction and maintenance.

The Airport funds all of the cost of capital projects by generating revenue from tenants, users and other sources. These airport funds can come from annual surplus, reserves, or borrowing. While capital projects are usually funded from variety of sources, in the end, Airport contributed funds have a role in almost all projects, particularly as seed money to initiate projects and to provide the match of FAA funds.

Other methods outside the traditional methods mentioned in the above paragraph are potential suppliers of money to construct capital improvements. These include users, tenants, investors, and other sources. Tenants often construct their own facilities particularly hangar facilities. Airport users such as corporate flight departments sometimes contribute funds for projects and agree to increased rents to recover the costs of improvements. Private capital can also be used for facilities such as general aviation and corporate hangar facilities.

8.4 Financial Plan

The ultimate goal of any airport should be to support its own operation and development through airport generated revenues. Facilities that are self-sustaining can provide services with minimal outside funding and reciprocal influence. As of 2016, the Minden-Tahoe Airport is financially self-sustaining.

8.4.1 Projected Revenues and Expenditures

Airport operating expenditures typically include insurance, utilities, maintenance, and management costs. Insurance costs include liability insurance for the airport and property insurance for any real property on the airport owned by the airport. Utility expenses primarily consist of power costs to operate airfield lighting and visual aids and water for public use areas. Pavement maintenance consists of crack sealing on an annual basis and seal coating and remarking the pavements every five years. Facility maintenance consists of mowing, snow removal and repair and replacement of parts and equipment such as light bulbs, light fixtures, fences, etc. Management costs include an airport manager and airport support staff.

Airport revenues generally consist of land leases, user fees, fuel flowage fees, and property taxes generated from on-airport improvements. Other revenue generating options include:

Land Leases: Property on the airport that is not devoted to airfield use, vehicle parking or contained within areas required to be cleared of structures may be leased to individual airport users or aviation related businesses. Typically, the individual is provided a long-term lease on which to construct a hangar, business or other facility. At the termination of the lease agreement, the structure reverts to ownership of the Minden-Tahoe Airport or the land is brought back to its original state.

Hangar Leases: Hangars on the airport owned by the airport sponsor can be leased to private aircraft operators or businesses. Terms of hangar leases at Minden-Tahoe Airport range from month-to-month for t-hangars to a maximum of five years for large box hangars. At the termination of the lease, the lessee may have the option to renew the lease or cease use of the hangar.

Hangar Rental: The fees are usually established on a monthly basis for based aircraft and on an overnight basis for transient aircraft.

Through-the-Fence Fees: A fee is typically charged to adjacent landowners who are provided access directly from their private parcel to the public use airport facilities. This fee ensures that the level of rates and charges assessed to on-airport users is equitable to off-airport users and that there is not an unfair economic advantage to operating "through-the-fence". Additionally, through-the-fence operators are required to maintain a secure airport perimeter with fencing and/or gates and to construct paved access taxiways to the airport operating areas. However, the FAA generally discourages through-the-fence operations. Therefore, it is anticipated that all aircraft operations will be conducted from on airport and therefore will not generate through-the-fence fees. In lieu of through-the-fence fees, these aircraft would generate tie-down fees or land lease revenue from hangars.

There are currently no through-the-fence operations taking place at the Minden-Tahoe Airport and it is recommended the airport refrain from establishing any in the future.

Fuel Flowage Fee: This fee is typically imposed on all aircraft fuels delivered to the airport and would include all fuels used by aircraft including AvGas and Jet-A. The fee would apply to FBO's and operators who conduct self-fueling.

Fuel Markup Fee: This fee is typically charged by the on-airport fuel provider. The fee is applied to each gallon of fuel sold on the airport and covers the costs associated with providing fuel. The fuel markup fee is imposed on both Jet-A and Avgas.

Commercial Activity Fee: This fee is imposed on commercial activities operating "for profit" at the airport. Typical commercial activities may include FBO's, maintenance services, air taxi or charter services, automobile rental, restaurants, retail or other goods and services which may be provided at the airport. This fee would be in addition to any applicable land lease.

Non-Aeronautical Revenue Generating Land Lease: The lease is for land that is located on airport property but that is not required for existing or future airport development. The lease for these areas must be setup at fair market value and all revenue generated from these leases must remain within the airport fund.

All revenues generated by the airport must be expended by the airport for capital or operating costs of the airport. **Table 8-2** shows the projected annual airport revenues and expenses over the 20-year planning period.

Table 8-2 Annual Airport Revenues and Expenses

Operating Revenues	Historical 2014	Projected Short-Term	Intermediate – Term	Long-Term
Service Charges	$42,775	$43,860	$44,944	$47,354
Interest	$9,139	$9,371	$9,602	$10,117
Special Events, Land Lease, Rent	$843,215	$864,592	$885,970	$933,475
Other	$112,003	$114,842	$117,682	$123,992
Total Operating Revenue	**$1,007,132**	**$1,032,665**	**$1,058,198**	**$1,114,938**
Operating Expenses				
Services and Supplies	$667,291	$684,208	$701,126	$738,719
Total Operating Expense	**$667,291**	**$684,208**	**$701,126**	**$738,719**
Net Operating Expense/Revenue	**$339,841**	**$348,457**	**$357,072**	**$376,219**

Prepared by: Armstrong Consultants, Inc., 2016
Note: Does not include capital improvement projects
*Increase revenue and expense based on forecasted increase in airport activity

8.4.2 Recommendations

The Minden-Tahoe Airport has been very proactive in revenue collection. The most effective means of increasing revenue at the Airport is to accommodate existing unmet demand and to continue to attract new and additional users. Several potential strategies for increasing revenues are listed below:

- Increase the number of ground leases for aircraft storage hangars
- Focus on attracting business/corporate aviation tenants
- Develop non-aeronautical land lease areas on an extremely limited basis

Increasing aircraft storage hangars at the airport would result in not only in increased direct revenues generated through property leases, but would also produce indirect revenue through increased use of airport services and facilities, such as fuel purchases. Locations for additional box hangars have been identified on the Terminal Area Drawing (TAD) of the Airport Layout Plan. Business/corporate tenants are typically flight departments for local businesses and provide employment in the local community. They generally operate multi-engine turboprop or business jet aircraft. Their land lease parcels are usually large, the aircraft are typically operated two to three times per week and fuel purchases are typically larger than other general aviation users (several hundred gallons per fueling).

8.5 Community Support

While it is certainly advantageous for an airport to support itself, the indirect and intangible benefits of the airport to the community's economy and growth must be considered. People are directly or indirectly employed by the Airport or by businesses that utilize the Airport. As airport activity increases, it is probable that employment on the airport will also grow throughout the planning period. The local construction industry will also benefit directly from implementation of the development programs. Other community benefits involve business growth and development that is enhanced by the availability of air transportation including commercial service, corporate and private aviation. Clients and suppliers of area businesses will also benefit from the future improvement to the airport.

The use of corporate and business aircraft is an increasing trend throughout the United States. The movement of American industry from large metropolitan areas to smaller communities which offer lower taxes and labor costs and a better working environment has influenced this trend. Time is money in the business environment and corporate aircraft are answering the need for quick and convenient access to and from these new locations for both executives and management personnel. The community's ability to provide convenient access to corporate aircraft will be reflected not only in benefits to existing businesses and industries but will be a strong factor in attracting new industry. Aviation trends show increased corporate and business aviation activity as companies are looking to avoid delays

and inconveniences associated with commercial airline travel. These factors place the Minden-Tahoe Airport in a prime position to capitalize on the trends in the general aviation industry and to maximize the benefits the airport provides to the community.

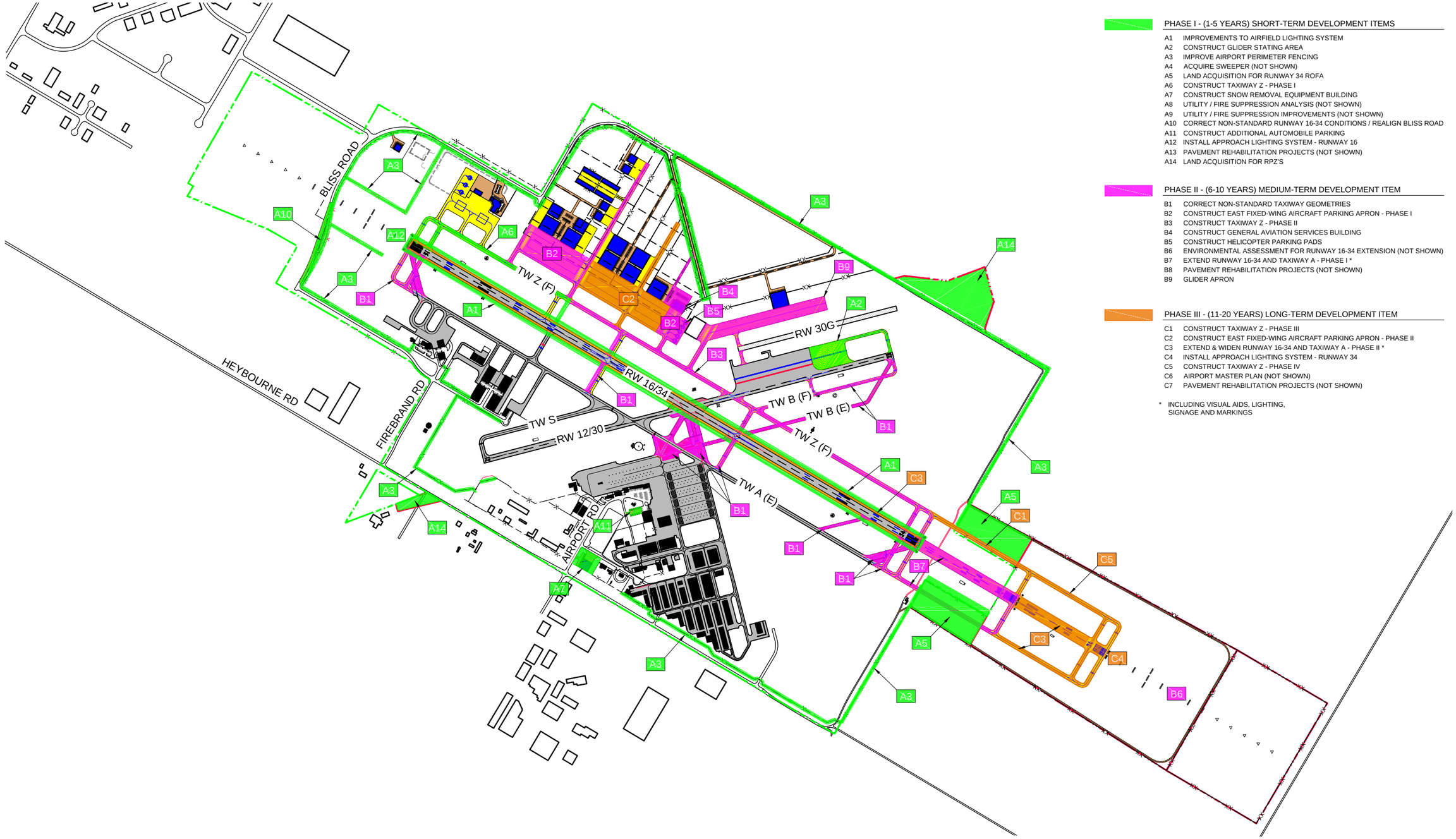
Property taxes are collected by Douglas County from hangar development, site improvements and aircraft based at Minden-Tahoe Airport. These taxes are incorporated into the County's General Fund and are utilized for essential community functions off airport property. The Minden-Tahoe Airport does not receive any funding through these property taxes.

8.6 Continuous Planning Process

Airport planning is a continuous process that does not end with the completion of a major project. The fundamental issues upon which this master plan is based are expected to remain valid for several years; however, several variables, such as based aircraft, annual aircraft operations and socioeconomic conditions are likely to change over time. The continuous planning process necessitates that the sponsor consistently monitor the progress of the airport in terms of growth in based aircraft and annual operations, as this growth is critical to the timing and need for new airport facilities. The information obtained from this monitoring process will provide the data necessary to determine if the development schedule should be accelerated, decelerated or maintained as scheduled.

Furthermore, it will be prudent to implement a public involvement program to educate the citizens of Douglas County of any major development projects which may occur at the Minden-Tahoe Airport. Certain development items may require approval by Douglas County Voters, as stipulated in the Douglas County Ordinances.

Periodic updates of the Airport Layout Plan, Capital Improvement Plan and Airport Master Plan are recommended to document physical changes to the airport, review changes in aviation activity and to update improvement plans for the airport. The primary goal of this Airport Master Planning effort is to develop a safe and efficient airport that will meet the demands of aviation users and stimulate economic development in the community. The continuous airport planning process is a valuable tool in achieving that goal.



PHASE I - (1-5 YEARS) SHORT-TERM DEVELOPMENT ITEMS

- A1 IMPROVEMENTS TO AIRFIELD LIGHTING SYSTEM
- A2 CONSTRUCT GLIDER STATING AREA
- A3 IMPROVE AIRPORT PERIMETER FENCING
- A4 ACQUIRE SWEEPER (NOT SHOWN)
- A5 LAND ACQUISITION FOR RUNWAY 34 ROFA
- A6 CONSTRUCT TAXIWAY Z - PHASE I
- A7 CONSTRUCT SNOW REMOVAL EQUIPMENT BUILDING
- A8 UTILITY / FIRE SUPPRESSION ANALYSIS (NOT SHOWN)
- A9 UTILITY / FIRE SUPPRESSION IMPROVEMENTS (NOT SHOWN)
- A10 CORRECT NON-STANDARD RUNWAY 16-34 CONDITIONS / REALIGN BLISS ROAD
- A11 CONSTRUCT ADDITIONAL AUTOMOBILE PARKING
- A12 INSTALL APPROACH LIGHTING SYSTEM - RUNWAY 16
- A13 PAVEMENT REHABILITATION PROJECTS (NOT SHOWN)
- A14 LAND ACQUISITION FOR RPZ'S

PHASE II - (6-10 YEARS) MEDIUM-TERM DEVELOPMENT ITEM

- B1 CORRECT NON-STANDARD TAXIWAY GEOMETRIES
- B2 CONSTRUCT EAST FIXED-WING AIRCRAFT PARKING APRON - PHASE I
- B3 CONSTRUCT TAXIWAY Z - PHASE II
- B4 CONSTRUCT GENERAL AVIATION SERVICES BUILDING
- B5 CONSTRUCT HELICOPTER PARKING PADS
- B6 ENVIRONMENTAL ASSESSMENT FOR RUNWAY 16-34 EXTENSION (NOT SHOWN)
- B7 EXTEND RUNWAY 16-34 AND TAXIWAY A - PHASE I *
- B8 PAVEMENT REHABILITATION PROJECTS (NOT SHOWN)
- B9 GLIDER APRON

PHASE III - (11-20 YEARS) LONG-TERM DEVELOPMENT ITEM

- C1 CONSTRUCT TAXIWAY Z - PHASE III
- C2 CONSTRUCT EAST FIXED-WING AIRCRAFT PARKING APRON - PHASE II
- C3 EXTEND & WIDEN RUNWAY 16-34 AND TAXIWAY A - PHASE II *
- C4 INSTALL APPROACH LIGHTING SYSTEM - RUNWAY 34
- C5 CONSTRUCT TAXIWAY Z - PHASE IV
- C6 AIRPORT MASTER PLAN (NOT SHOWN)
- C7 PAVEMENT REHABILITATION PROJECTS (NOT SHOWN)

* INCLUDING VISUAL AIDS, LIGHTING, SIGNAGE AND MARKINGS

LEGEND

- EXISTING AIRPORT BOUNDARY LINE
- FUTURE AIRPORT BOUNDARY LINE
- FUTURE LOT LINE
- FUTURE FENCE
- EXISTING STRUCTURE
- FUTURE STRUCTURE
- TO BE REMOVED

0 600 1200
SCALE IN FEET

ARMSTRONG
PLANNING ENGINEERING CONSTRUCTION
GRAND JUNCTION, CO: 970.242.0101
DENVER, CO: 303.296.4949
PHOENIX, AZ: 602.803.7079
ALBUQUERQUE, NM: 505.508.2192
www.armstrongconsultants.com

MINDEN-TAHOE AIRPORT

DOUGLAS COUNTY NEVADA

No.	Project No.	Date	Revision / Description	File	Drwn.	Chkd.	Apprvd.
0	156310	11/2016	FINANCIAL PLAN DRAWING	6310614	LKB	JMR	JZP

THE PREPARATION OF THIS DOCUMENT WAS FINANCED IN PART, THROUGH THE AIRPORT IMPROVEMENT PROGRAM FINANCIAL ASSISTANCE FROM THE FEDERAL AVIATION ADMINISTRATION AS PROVIDED UNDER TITLE 49, UNITED STATES CODE, SECTION 47104. THE CONTENTS DO NOT NECESSARILY REFLECT THE OFFICIAL VIEWS OR POLICY OF THE FAA. ACCEPTANCE OF THIS PLAN BY THE FAA DOES NOT IN ANY WAY CONSTITUTE A COMMITMENT ON THE PART OF THE UNITED STATES TO PARTICIPATE IN ANY DEVELOPMENT DEPICTED THEREIN NOR DOES IT INDICATE THAT THE PROPOSED DEVELOPMENT IS ENVIRONMENTALLY ACCEPTABLE OR WOULD HAVE JUSTIFICATION IN ACCORDANCE WITH APPROPRIATE PUBLIC LAWS.

FINANCIAL PLAN

FIGURE 7-1

Appendix A

2013 Nevada Department of Transportation Pavement Management System Update

Minden-Tahoe Airport

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

- ( ) A Flexible Category (CBR 15)
- ( ) B Flexible Category (CBR 10)
- (•) C Flexible Category (CBR 6)
- ( ) D Flexible Category (CBR 3)

TIRE PRESSURE

- ( ) W Unlimited
- (•) X 218 psi
- ( ) Y 145 psi
- ( ) Z 73 psi

METHOD USED

- ( ) Using Aircraft
- (•) Technical

Project info

2013 Pavement Management System Update

- ( ) A Rigid Category (k 552 pci)
- ( ) B Rigid Category (k 295 pci)
- ( ) C Rigid Category (k 147 pci)
- ( ) D Rigid Category (k 74 pci)

AIRCRAFT GEAR TYPE IN TRAFFIC MIX

- [x] S (single wheel gear)
- [x] D (dual wheel gear)
- [ ] 2D (dual tandem wheel gear)
- [ ] 3D (triple tandem wheel gear) e.g B-777
- [ ] DDT or W/B (tandem gear under wing AND tandem gear under body) e.g. B-747, A-340-600, A-380

Airport LOC-ID: MEV

Pavement ID: Runway 12/30

Enter PCN: 10

Form 5010 Data Element	Gross Weight and PCN
#35 S gear	27.0
#36 D gear	40.0
#37 DT gear	
#38 DDT gear	
#39 PCN	10/F/C/X/T

IF 3D or W/B Gear Checked, #38 = PCN
Please Add Data Element #38 Remark

3D	
2D/2D2	
2D/3D2W	
2D/3D2B	

Report Minimum Gross Weight

Airport LOC-ID	Pavement ID	#35 S GW	#36 D GW	#37 DT GW	#38 DDT GW	#39 PCN
MEV	Runway 16/34	99.0	140.0			40/F/C/X/T
MEV	Runway 12/30	27.0	40.0			10/F/C/X/T

Appendix B

FAA Forecast Approval Letter

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

U.S. Department
of Transportation
Federal Aviation Administration

Western-Pacific Region
Airports Division
Phoenix Airports District Office

3800 N. Central Avenue
Suite 1025, 10th Floor
Phoenix, AZ 85012

April 6, 2016

Ms. Bobbi Thompson
Airport Manager
Minden-Tahoe Airport
1146 Airport Road
Minden, NV 89423

To: Ms. Thompson

Minden-Tahoe Airport (MEV)
Aviation Activity Forecast Approval

The Federal Aviation Administration (FAA), PHX Airports District Office has reviewed the aviation forecast for the Minden-Tahoe Airport (MEV) airport master plan dated December 12, 2015. The FAA approves these forecasts for airport planning purposes, including Airport Layout Plan (ALP) development.

Our approval is based on the following:

1. The FAA Terminal Area Forecast (TAF) for MEV has a flat line aircraft operations forecast for the 2015-2035 planning period.
2. In making our determination we concluded that the MEV forecast is based on current data and appropriate methodologies.

However, the approval of this forecast does not automatically justify any of the capital improvements shown on the ALP or recommended in the master plan. All future projects will need to be justified by current activity levels at the time of proposed implementation. Lastly, the approved forecasts may be subject to additional analysis or the FAA may request a sensitivity analysis if this data is to be used for environmental or Part 150 noise planning purposes.

If you have any questions about this forecast approval, please call me at (602) 792-1074.

Sincerely,

Joseph Carlini

Joseph Carlini
Airport Planner, Phoenix ADO

cc: Justin Pietz, Armstrong Consultants

Appendix C

Environmental Documentation

Minden-Tahoe Airport
Airport Master Plan

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1.1 Introduction

This appendix contains the supporting documentation for the analysis conducted of the potential for environmental impacts as a result of the recommended development at Minden-Tahoe Airport. The list of supporting documents is included in **Table 1**.

Table 1 Appendix Contents

Appendix Location	Documentation	Providing Agency	Evaluated NEPA Category
C-1	Non-Attainment Map	Environmental Protection Agency	Air Quality
C-2	Threatened and Endangered Species List, Douglas County, Nevada	U.S. Fish and Wildlife Service	Threatened or Endangered Species and Biological Resources
C-3	Farmland Map	U.S. Department of Agriculture	Farmlands
C-4	Pending Floodplain Maps	Federal Emergency Management Agency	Floodplains
C-5	Wetlands Map	U.S. Fish and Wildlife Service	Wetlands

Appendix C-1

Non-Attainment Map

Minden-Tahoe Airport
Airport Master Plan

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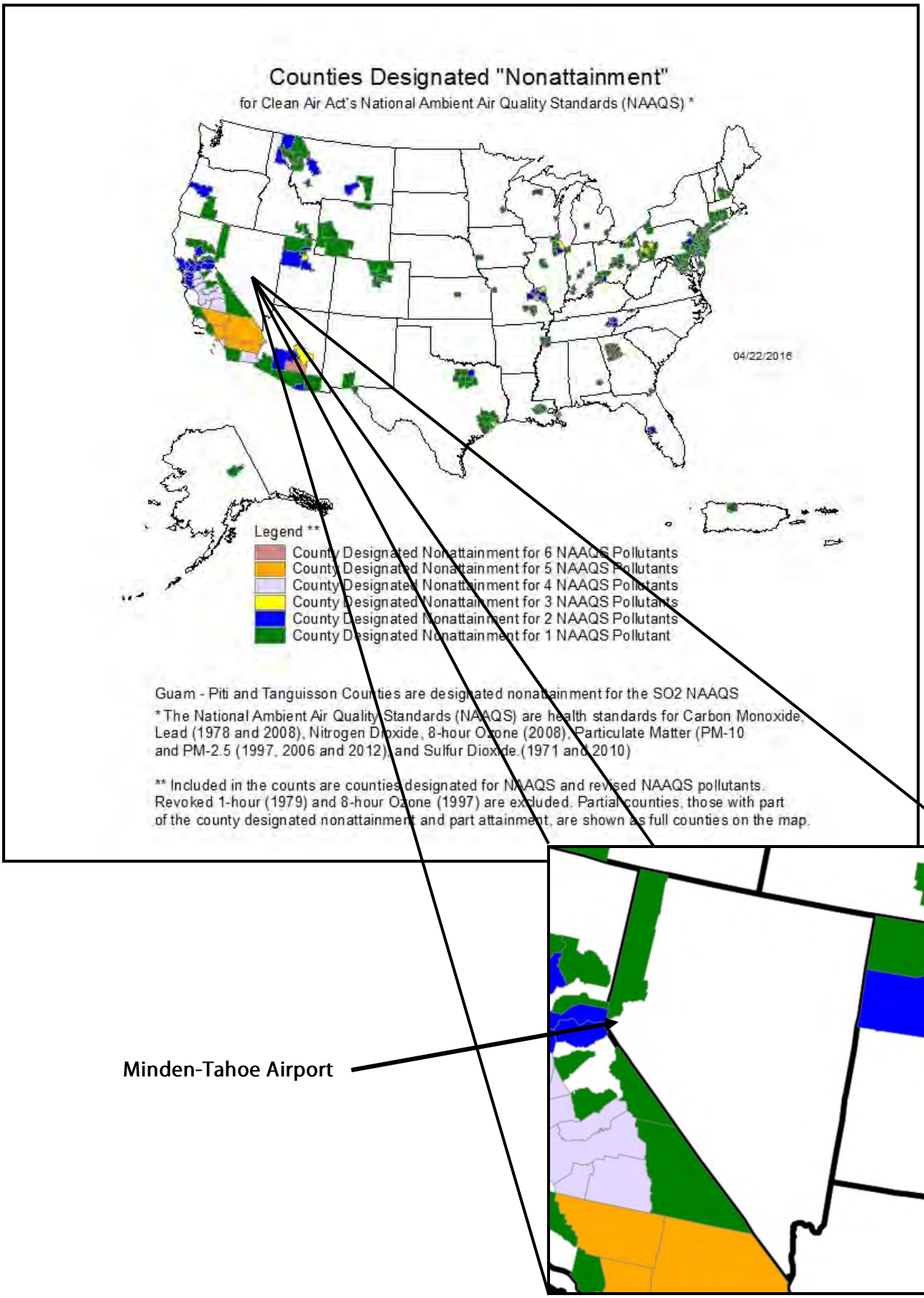
Counties Designated "Nonattainment"
for Clean Air Act's National Ambient Air Quality Standards (NAAQS) *
04/22/2016
Legend **
County Designated Nonattainment for 6 NAAQS Pollutants
County Designated Nonattainment for 5 NAAQS Pollutants
County Designated Nonattainment for 4 NAAQS Pollutants
County Designated Nonattainment for 3 NAAQS Pollutants
County Designated Nonattainment for 2 NAAQS Pollutants
County Designated Nonattainment for 1 NAAQS Pollutant
Guam - Piti and Tanguisson Counties are designated nonattainment for the SO2 NAAQS
* The National Ambient Air Quality Standards (NAAQS) are health standards for Carbon Monoxide, Lead (1978 and 2008), Nitrogen Dioxide, 8-hour Ozone (2008), Particulate Matter (PM-10 and PM-2.5 (1997, 2006 and 2012), and Sulfur Dioxide (1971 and 2010)
** Included in the counts are counties designated for NAAQS and revised NAAQS pollutants. Revoked 1-hour (1979) and 8-hour Ozone (1997) are excluded. Partial counties, those with part of the county designated nonattainment and part attainment, are shown as full counties on the map.
Minden-Tahoe Airport

Appendix C-2

Threatened and Endangered Species List

Douglas County, Nevada

Minden-Tahoe Airport
Airport Master Plan

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Reno Fish and Wildlife Office
1340 FINANCIAL BOULEVARD, SUITE 234
RENO, NV 89502
PHONE: (775)861-6300 FAX: (775)861-6301
URL: www.fws.gov/nevada/

Consultation Code: 08ENVD00-2016-SLI-0329 May 02, 2016
Event Code: 08ENVD00-2016-E-00360
Project Name: Minden-Tahoe Airport

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The attached species list indicates threatened, endangered, proposed, and candidate species and designated or proposed critical habitat that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act of 1973, as amended (ESA, 16 U.S.C. 1531 *et seq*.), for projects that are authorized, funded, or carried out by a Federal agency. Candidate species have no protection under the ESA but are included for consideration because they could be listed prior to the completion of your project. Consideration of these species during project planning may assist species conservation efforts and may prevent the need for future listing actions. For additional information regarding species that may be found in the proposed project area, visit http://www.fws.gov/nevada/es/ipac.html.

The purpose of the ESA is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the ESA and its implementing regulations (50 CFR 402 *et seq*.), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2) (c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment

be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Guidelines for preparing a Biological Assessment can be found at: http://www.fws.gov/midwest/endangered/section7/ba_guide.html.

If a Federal action agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species, and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this species list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally listed, proposed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the ESA, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally, as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation, for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the attached list.

The Nevada Fish and Wildlife Office (NFWO) no longer provides species of concern lists. Most of these species for which we have concern are also on the Animal and Plant At-Risk Tracking List for Nevada (At-Risk list) maintained by the State of Nevada's Natural Heritage Program (Heritage). Instead of maintaining our own list, we adopted Heritage's At-Risk list and are partnering with them to provide distribution data and information on the conservation needs for at-risk species to agencies or project proponents. The mission of Heritage is to continually evaluate the conservation priorities of native plants, animals, and their habitats, particularly those most vulnerable to extinction or in serious decline. In addition, in order to avoid future conflicts, we ask that you consider these at-risk species early in your project planning and explore management alternatives that provide for their long-term conservation.

For a list of at-risk species by county, visit Heritage's website (http://heritage.nv.gov). For a specific list of at-risk species that may occur in the project area, you can obtain a data request form from the website (http://heritage.nv.gov/get_data) or by contacting the Administrator of Heritage at 901 South Stewart Street, Suite 5002, Carson City, Nevada 89701-5245, (775) 684-2900. Please indicate on the form that your request is being obtained as part of your coordination with the Service under the ESA. During your project analysis, if you obtain new information or data for any Nevada sensitive species, we request that you provide the information to Heritage at the above address.

Furthermore, certain species of fish and wildlife are classified as protected by the State of Nevada (http://www.leg.state.nv.us/NAC/NAC-503.html). You must first obtain the appropriate license, permit, or written authorization from the Nevada Department of Wildlife (NDOW) to

take, or possess any parts of protected fish and wildlife species. Please visit http://www.ndow.org or contact NDOW in northern Nevada (775) 688-1500, in southern Nevada (702) 486-5127, or in eastern Nevada (775) 777-2300.

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq*.), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the Service's wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

The Service's Pacific Southwest Region developed the *Interim Guidelines for the Development of a Project Specific Avian and Bat Protection Plan for Wind Energy Facilities* (Interim Guidelines). This document provides energy facility developers with a tool for assessing the risk of potential impacts to wildlife resources and delineates how best to design and operate a bird- and bat-friendly wind facility. These Interim Guidelines are available upon request from the NFWO. The intent of a Bird and Bat Conservation Strategy is to conserve wildlife resources while supporting project developers through: (1) establishing project development in an adaptive management framework; (2) identifying proper siting and project design strategies; (3) designing and implementing pre-construction surveys; (4) implementing appropriate conservation measures for each development phase; (5) designing and implementing appropriate post-construction monitoring strategies; (6) using post-construction studies to better understand the dynamics of mortality reduction (*e.g.*, changes in blade cut-in speed, assessments of blade “feathering” success, and studies on the effects of visual and acoustic deterrents) including efforts tied into Before-After/Control-Impact analysis; and (7) conducting a thorough risk assessment and validation leading to adjustments in management and mitigation actions.

The template and recommendations set forth in the Interim Guidelines were based upon the Avian Powerline Interaction Committee's Avian Protection Plan template (http://www.aplic.org/) developed for electric utilities and modified accordingly to address the unique concerns of wind energy facilities. These recommendations are also consistent with the Service's wind energy guidelines. We recommend contacting us as early as possible in the planning process to discuss the need and process for developing a site-specific Bird and Bat Conservation Strategy.

The Service has also developed guidance regarding wind power development in relation to prairie grouse leks (sage-grouse are included in this). This document can be found at: http://www.fws.gov/southwest/es/Oklahoma/documents/te_species/wind%20power/prairie%20gr
.

Migratory Birds are a Service Trust Resource. Based on the Service's conservation responsibilities and management authority for migratory birds under the Migratory Bird Treaty Act of 1918, as amended (MBTA; 16 U.S.C. 703 *et seq*.), we recommend that any land clearing or other surface disturbance associated with proposed actions within the project area be timed to avoid potential destruction of bird nests or young, or birds that breed in the area. Such destruction may be in violation of the MBTA. Under the MBTA, nests with eggs or young of migratory birds may not be harmed, nor may migratory birds be killed. Therefore, we recommend land clearing be conducted outside the avian breeding season. If this is not feasible,

we recommend a qualified biologist survey the area prior to land clearing. If nests are located, or if other evidence of nesting (*i.e.*, mated pairs, territorial defense, carrying nesting material, transporting food) is observed, a protective buffer (the size depending on the habitat requirements of the species) should be delineated and the entire area avoided to prevent destruction or disturbance to nests until they are no longer active.

Guidance for minimizing impacts to migratory birds for projects involving communications towers (*e.g.*, cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

If wetlands, springs, or streams are are known to occur in the project area or are present in the vicinity of the project area, we ask that you be aware of potential impacts project activities may have on these habitats. Discharge of fill material into wetlands or waters of the United States is regulated by the U.S. Army Corps of Engineers (ACOE) pursuant to section 404 of the Clean Water Act of 1972, as amended. We recommend you contact the ACOE's Regulatory Section regarding the possible need for a permit. For projects located in northern Nevada (Carson City, Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, and Washoe Counties) contact the Reno Regulatory Office at 300 Booth Street, Room 3060, Reno, Nevada 89509, (775) 784-5304; in southern Nevada (Clark, Lincoln, Nye, and White Pine Counties) contact the St. George Regulatory Office at 321 North Mall Drive, Suite L-101, St. George, Utah 84790-7314, (435) 986-3979; or in California along the eastern Sierra contact the Sacramento Regulatory Office at 650 Capitol Mall, Suite 5-200, Sacramento, California 95814, (916) 557-5250.

We appreciate your concern for threatened and endangered species. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

The table below outlines lead FWS field offices by county and land ownership/project type. Please refer to this table when you are ready to coordinate (including requests for section 7 consultation) with the field office corresponding to your project, and send any documentation regarding your project to that corresponding office. Therefore, the lead FWS field office may not be the office listed above in the letterhead.

Lead FWS offices by County and Ownership/Program

County	Ownership/Program	Species	Office Lead*
Alameda	Tidal wetlands/marsh adjacent to Bays	Salt marsh species, delta smelt	BDFWO
Alameda	All ownerships but tidal/estuarine	All	SFWO

Alpine	Humboldt Toiyabe National Forest	All	RFWO
Alpine	Lake Tahoe Basin Management Unit	All	RFWO
Alpine	Stanislaus National Forest	All	SFWO
Alpine	El Dorado National Forest	All	SFWO
Colusa	Mendocino National Forest	All	AFWO
Colusa	Other	All	By jurisdiction (see map)
Contra Costa	Legal Delta (Excluding ECCHCP)	All	BDFWO
Contra Costa	Antioch Dunes NWR	All	BDFWO
Contra Costa	Tidal wetlands/marsh adjacent to Bays	Salt marsh species, delta smelt	BDFWO
Contra Costa	All ownerships but tidal/estuarine	All	SFWO
Del Norte	All	All	AFWO
El Dorado	El Dorado National Forest	All	SFWO
El Dorado	LakeTahoe Basin Management Unit		RFWO
Glenn	Mendocino National Forest	All	AFWO

Glenn	Other	All	By jurisdiction (see map)
Humboldt	All except Shasta Trinity National Forest	All	AFWO
Humboldt	Shasta Trinity National Forest	All	YFWO
Lake	Mendocino National Forest	All	AFWO
Lake	Other	All	By jurisdiction (see map)
Lassen	Modoc National Forest	All	KFWO
Lassen	Lassen National Forest	All	SFWO
Lassen	Toiyabe National Forest	All	RFWO
Lassen	BLM Surprise and Eagle Lake Resource Areas	All	RFWO
Lassen	BLM Alturas Resource Area	All	KFWO
Lassen	Lassen Volcanic National Park	All (includes Eagle Lake trout on all ownerships)	SFWO
Lassen	All other ownerships	All	By jurisdiction (see map)
Marin	Tidal wetlands/marsh adjacent to	Salt marsh species, delta	BDFWO

	Bays	smelt	
Marin	All ownerships but tidal/estuarine	All	SFWO
Mendocino	Russian River watershed	All	SFWO
Mendocino	All except Russian River watershed	All	AFWO
Modoc	Modoc National Forest	All	KFWO
Modoc	BLM Alturas Resource Area	All	KFWO
Modoc	Klamath Basin National Wildlife Refuge Complex	All	KFWO
Modoc	BLM Surprise and Eagle Lake Resource Areas	All	RFWO
Modoc	All other ownerships	All	By jurisdiction (See map)
Mono	Inyo National Forest	All	RFWO
Mono	Humboldt Toiyabe National Forest	All	RFWO
Napa	All ownerships but tidal/estuarine	All	SFWO
Napa	Tidal wetlands/marsh adjacent to San Pablo Bay	Salt marsh species, delta smelt	BDFWO
Nevada	Humboldt Toiyabe National Forest	All	RFWO

Nevada	All other ownerships	All	By jurisdiction (See map)
Placer	Lake Tahoe Basin Management Unit	All	RFWO
Placer	All other ownerships	All	SFWO
Sacramento	Legal Delta	Delta Smelt	BDFWO
Sacramento	Other	All	By jurisdiction (see map)
San Francisco	Tidal wetlands/marsh adjacent to San Francisco Bay	Salt marsh species, delta smelt	BDFWO
San Francisco	All ownerships but tidal/estuarine	All	SFWO
San Mateo	Tidal wetlands/marsh adjacent to San Francisco Bay	Salt marsh species, delta smelt	BDFWO
San Mateo	All ownerships but tidal/estuarine	All	SFWO
San Joaquin	Legal Delta excluding San Joaquin HCP	All	BDFWO
San Joaquin	Other	All	SFWO
Santa Clara	Tidal wetlands/marsh adjacent to San Francisco Bay	Salt marsh species, delta smelt	BDFWO
Santa Clara	All ownerships but tidal/estuarine	All	SFWO

Shasta	Shasta Trinity National Forest except Hat Creek Ranger District (administered by Lassen National Forest)	All	YFWO
Shasta	Hat Creek Ranger District	All	SFWO
Shasta	Bureau of Reclamation (Central Valley Project)	All	BDFWO
Shasta	Whiskeytown National Recreation Area	All	YFWO
Shasta	BLM Alturas Resource Area	All	KFWO
Shasta	Caltrans	By jurisdiction	SFWO/AFWO
Shasta	Ahjumawi Lava Springs State Park	Shasta crayfish	SFWO
Shasta	All other ownerships	All	By jurisdiction (see map)
Shasta	Natural Resource Damage Assessment, all lands	All	SFWO/BDFWO
Sierra	Humboldt Toiyabe National Forest	All	RFWO
Sierra	All other ownerships	All	SFWO
Siskiyou	Klamath National Forest (except Ukonom District)	All	YFWO
	Six Rivers National Forest and		

Siskiyou	Ukonom District	All	AFWO
Siskiyou	Shasta Trinity National Forest	All	YFWO
Siskiyou	Lassen National Forest	All	SFWO
Siskiyou	Modoc National Forest	All	KFWO
Siskiyou	Lava Beds National Volcanic Monument	All	KFWO
Siskiyou	BLM Alturas Resource Area	All	KFWO
Siskiyou	Klamath Basin National Wildlife Refuge Complex	All	KFWO
Siskiyou	All other ownerships	All	By jurisdiction (see map)
Solano	Suisun Marsh	All	BDFWO
Solano	Tidal wetlands/marsh adjacent to San Pablo Bay	Salt marsh species, delta smelt	BDFWO
Solano	All ownerships but tidal/estuarine	All	SFWO
Solano	Other	All	By jurisdiction (see map)
Sonoma	Tidal wetlands/marsh adjacent to San Pablo Bay	Salt marsh species, delta smelt	BDFWO

Sonoma	All ownerships but tidal/estuarine	All	SFWO
Tehama	Mendocino National Forest	All	AFWO
Tehama	Shasta Trinity National Forest except Hat Creek Ranger District (administered by Lassen National Forest)	All	YFWO
Tehama	All other ownerships	All	By jurisdiction (see map)
Trinity	BLM	All	AFWO
Trinity	Six Rivers National Forest	All	AFWO
Trinity	Shasta Trinity National Forest	All	YFWO
Trinity	Mendocino National Forest	All	AFWO
Trinity	BIA (Tribal Trust Lands)	All	AFWO
Trinity	County Government	All	AFWO
Trinity	All other ownerships	All	By jurisdiction (See map)
Yolo	Yolo Bypass	All	BDFWO
Yolo	Other	All	By jurisdiction (see map)
All	FERC-ESA	All	By jurisdiction (see map)

All	FERC-ESA	Shasta crayfish	SFWO
All	FERC-Relicensing (non-ESA)	All	BDFWO
***Office Leads:**			
AFWO=Arcata Fish and Wildlife Office			
BDFWO=Bay Delta Fish and Wildlife Office			
KFWO=Klamath Falls Fish and Wildlife Office			
RFWO=Reno Fish and Wildlife Office			
YFWO=Yreka Fish and Wildlife Office			

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Minden-Tahoe Airport

Official Species List

Provided by:

Reno Fish and Wildlife Office
1340 FINANCIAL BOULEVARD, SUITE 234
RENO, NV 89502
(775) 861-6300
http://www.fws.gov/nevada/

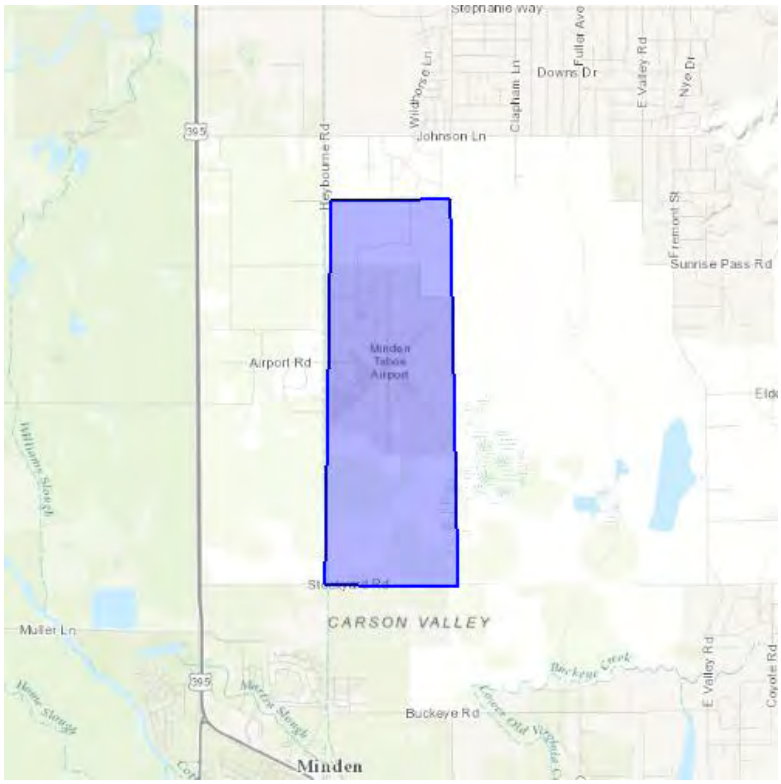
Consultation Code: 08ENVD00-2016-SLI-0329
Event Code: 08ENVD00-2016-E-00360

Project Type: TRANSPORTATION

Project Name: Minden-Tahoe Airport

Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.

Project Location Map:



Project Coordinates: MULTIPOLYGON (((-119.74170684814453 38.97569177946737, -119.76110458374022 38.97582523110808, -119.76024627685547 39.01951711392499, -119.74265098571776 39.019650482938175, -119.74170684814453 38.97569177946737)))

Project Counties: Douglas, NV

Endangered Species Act Species List

There are a total of 2 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Fishes	Status	Has Critical Habitat	Condition(s)
Lahontan cutthroat trout *(Oncorhynchus clarkii henshawi)* Population: Entire	Threatened		
Insects			
Carson wandering skipper *(Pseudocopaeodes eunus obscurus)* Population: Entire	Endangered		

Critical habitats that lie within your project area

There are no critical habitats within your project area.

Appendix A: FWS National Wildlife Refuges and Fish Hatcheries

There are no refuges or fish hatcheries within your project area.

United States Department of Interior
Fish and Wildlife Service

Project name: Minden-Tahoe Airport

Appendix B: FWS Migratory Birds

The protection of birds is regulated by the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA). Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). The MBTA has no otherwise lawful activities. For more information regarding these Acts see:
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/migratory-bird-treaty-act.php
http://www.fws.gov/birds/policies-and-regulations/laws-legislations/bald-and-golden-eagle-protection-act.php

All project proponents are responsible for complying with the appropriate regulations protecting birds when planning and developing a project. To meet these conservation obligations, proponents should identify potential or existing project-related impacts to migratory birds and their habitat and develop and implement conservation measures that avoid, minimize, or compensate for these impacts. The Service's Birds of Conservation Concern (2008) report identifies species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become listed under the Endangered Species Act as amended (16 U.S.C 1531 et seq.).

For information about Birds of Conservation Concern, go to:
http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php

For information about conservation measures that help avoid or minimize impacts to birds, please visit:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php

To search and view summaries of year-round bird occurrence data within your project area, go to the Avian Knowledge Network Histogram Tools at:
http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/akn-histogram-tools.php

Migratory birds of concern that may be affected by your project:
There are 24 birds on your Migratory birds of concern list.

Species Name	Bird of Conservation Concern (BCC)	Seasonal Occurrence in Project Area
Bald eagle *(Haliaeetus leucocephalus)*	Yes	Year-round

Black Rosy-Finch *(Leucosticte atrata)*	Yes	Year-round
Brewer's Sparrow *(Spizella breweri)*	Yes	Breeding
Burrowing Owl *(Athene cunicularia)*	Yes	Breeding
Calliope Hummingbird *(Stellula calliope)*	Yes	Breeding
Eared Grebe *(Podiceps nigricollis)*	Yes	Breeding
Flammulated owl *(Otus flammeolus)*	Yes	Breeding
Fox Sparrow *(Passerella liaca)*	Yes	Year-round
Greater sage-grouse *(Centrocercus urophasianus)*	Yes	Year-round
Green-tailed Towhee *(Pipilo chlorurus)*	Yes	Breeding
Loggerhead Shrike *(Lanius ludovicianus)*	Yes	Year-round
Long-Billed curlew *(Numenius americanus)*	Yes	Breeding
Olive-Sided flycatcher *(Contopus cooperi)*	Yes	Breeding
Peregrine Falcon *(Falco peregrinus)*	Yes	Year-round
Pinyon Jay *(Gymnorhinus*	Yes	Year-round

cyanocephalus)		
Sage Thrasher *(Oreoscoptes montanus)*	Yes	Breeding
Short-eared Owl *(Asio flammeus)*	Yes	Year-round
Snowy Plover *(Charadrius alexandrinus)*	Yes	Breeding
Swainson's hawk *(Buteo swainsoni)*	Yes	Breeding
tricolored blackbird *(Agelaius tricolor)*	Yes	Breeding
Virginia's Warbler *(Vermivora virginiae)*	Yes	Breeding
Western grebe *(aechmophorus occidentalis)*	Yes	Year-round
White-headed Woodpecker *(Picoides albolarvatus)*	Yes	Year-round
Williamson's Sapsucker *(Sphyrapicus thyroideus)*	Yes	Year-round

Appendix C: NWI Wetlands

The U.S. Fish and Wildlife Service is the principal Federal agency that provides information on the extent and status of wetlands in the U.S., via the National Wetlands Inventory Program (NWI). In addition to impacts to wetlands within your immediate project area, wetlands outside of your project area may need to be considered in any evaluation of project impacts, due to the hydrologic nature of wetlands (for example, project activities may affect local hydrology within, and outside of, your immediate project area). It may be helpful to refer to the USFWS National Wetland Inventory website. The designated FWS office can also assist you. Impacts to wetlands and other aquatic habitats from your project may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal Statutes. Project Proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery and/or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Exclusions - Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Precautions - Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of

this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

The following NWI Wetland types intersect your project area in one or more locations. To understand the NWI Classification Code, see http://wetlandsfws.usgs.gov/Data/interpreters/wetlands.aspx.

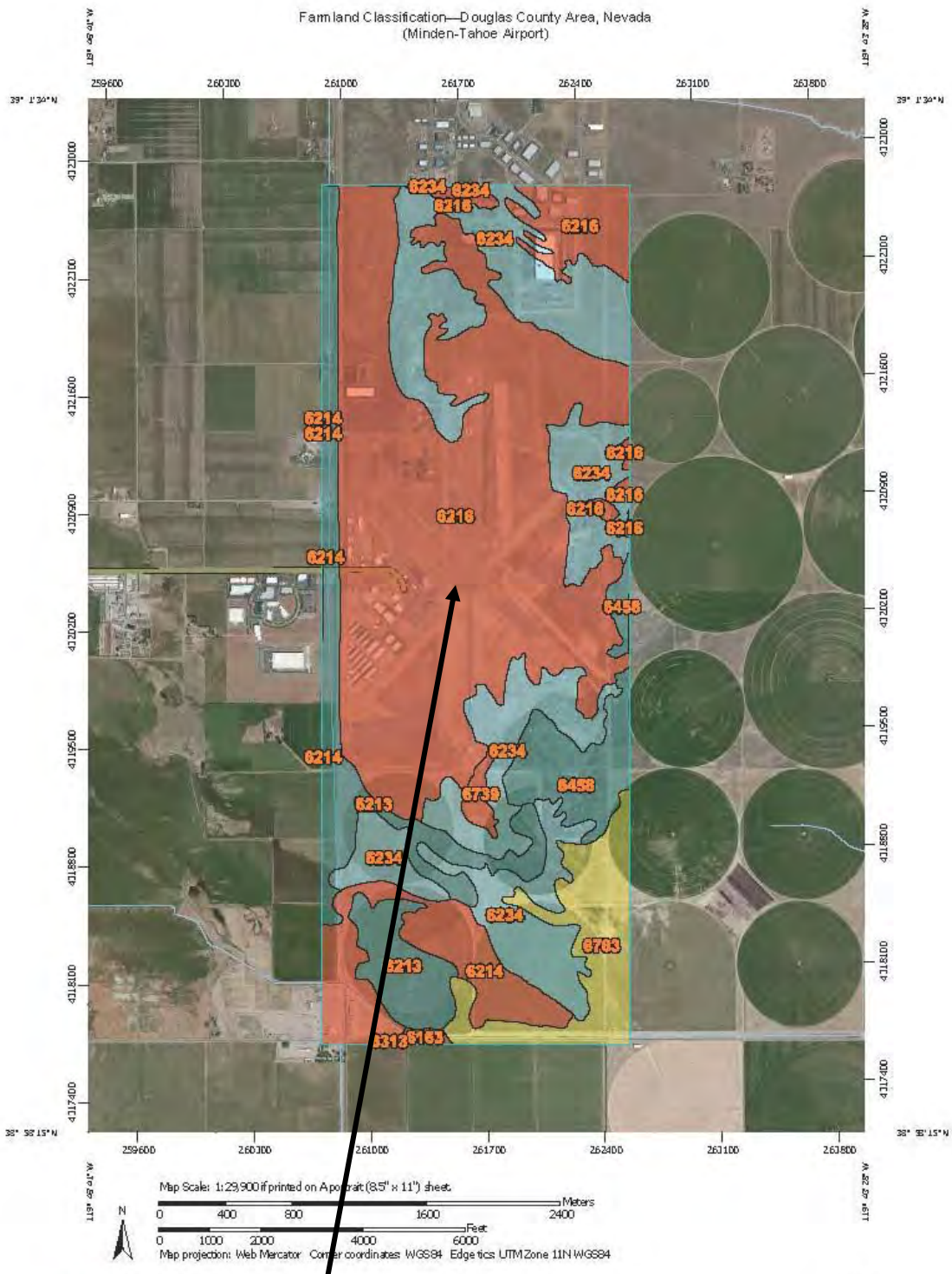
Wetland Types	NWI Classification Code	Total Acres
Freshwater Emergent Wetland	PEM1A	14.4
Freshwater Emergent Wetland	PEM1Cx	1.41
Freshwater Emergent Wetland	PEM	232.0

Appendix C-3

Farmland Map

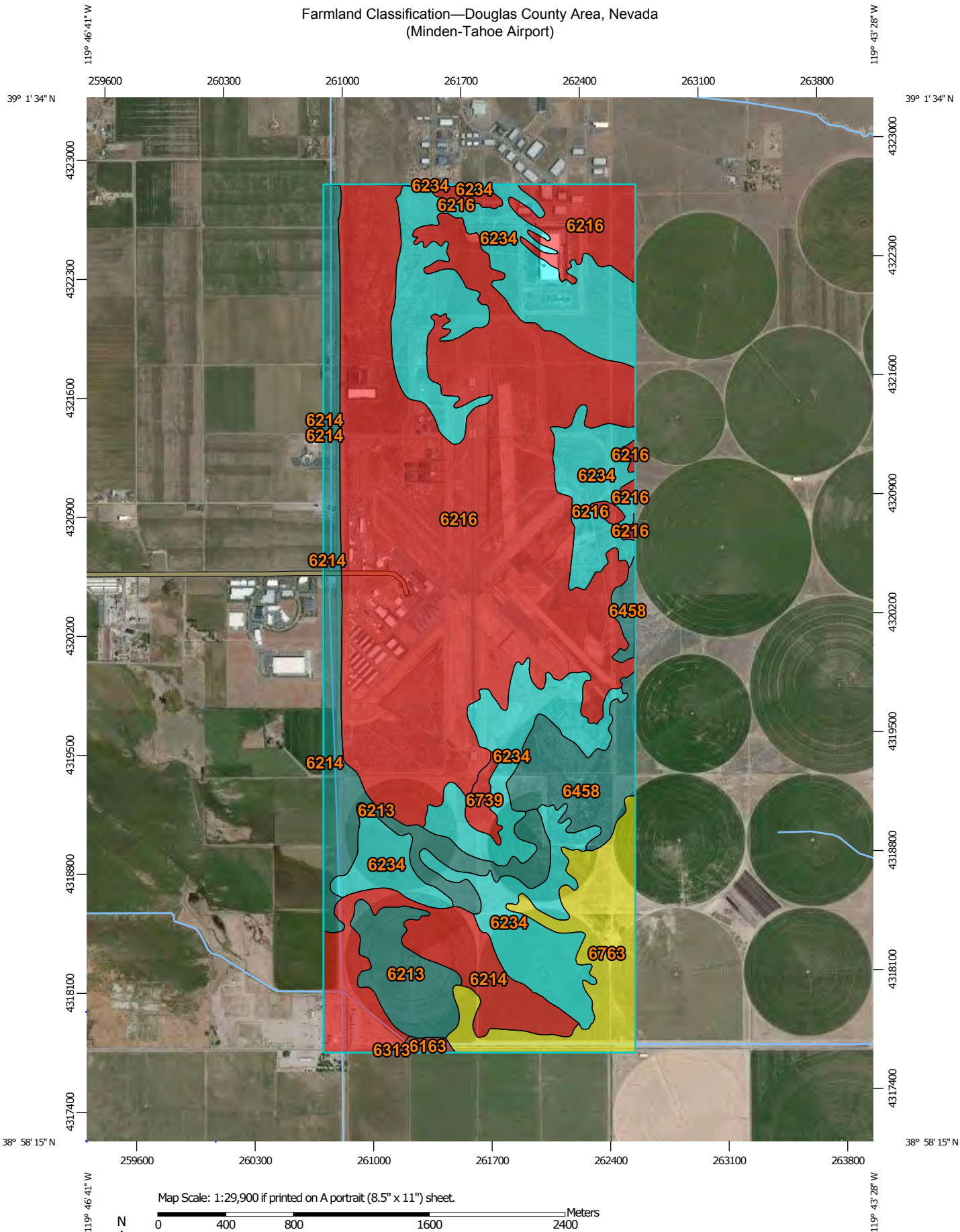
Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG



Minden-Tahoe Airport

Farmland Classification—Douglas County Area, Nevada
(Minden-Tahoe Airport)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Lines

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Soil Rating Points

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Water Features

MAP INFORMATION

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Douglas County Area, Nevada
Survey Area Data: Version 8, Aug 28, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 1, 2010—Apr 29, 2012

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Douglas County Area, Nevada (NV773)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
6163	East Fork clay loam, 0 to 2 percent slopes	Prime farmland if irrigated and drained	6.2	0.3%
6213	Milkiway clay, 0 to 2 percent slopes	Prime farmland if irrigated and reclaimed of excess salts and sodium	252.1	10.8%
6214	Milkiway clay loam, 0 to 2 percent slopes	Not prime farmland	147.3	6.3%
6216	Gardnerville clay loam, 0 to 2 percent slopes	Not prime farmland	1,087.6	46.6%
6234	Gurdugee fine sandy loam, 0 to 2 percent slopes	Farmland of statewide importance	570.3	24.4%
6313	Hussman clay, 0 to 2 percent slopes	Prime farmland if irrigated and drained	0.4	0.0%
6458	Mimentor fine sandy loam, 0 to 2 percent slopes	Prime farmland if irrigated and reclaimed of excess salts and sodium	108.5	4.7%
6739	Toll sand, clayey substratum, 0 to 2 percent slopes	Not prime farmland	14.0	0.6%
6763	Turria silty clay loam, 0 to 2 percent slopes	Prime farmland if irrigated	146.4	6.3%
Totals for Area of Interest			**2,332.8**	**100.0%**

Description

Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Appendix C-4

Pending Floodplain Maps

Minden-Tahoe Airport
Airport Master Plan

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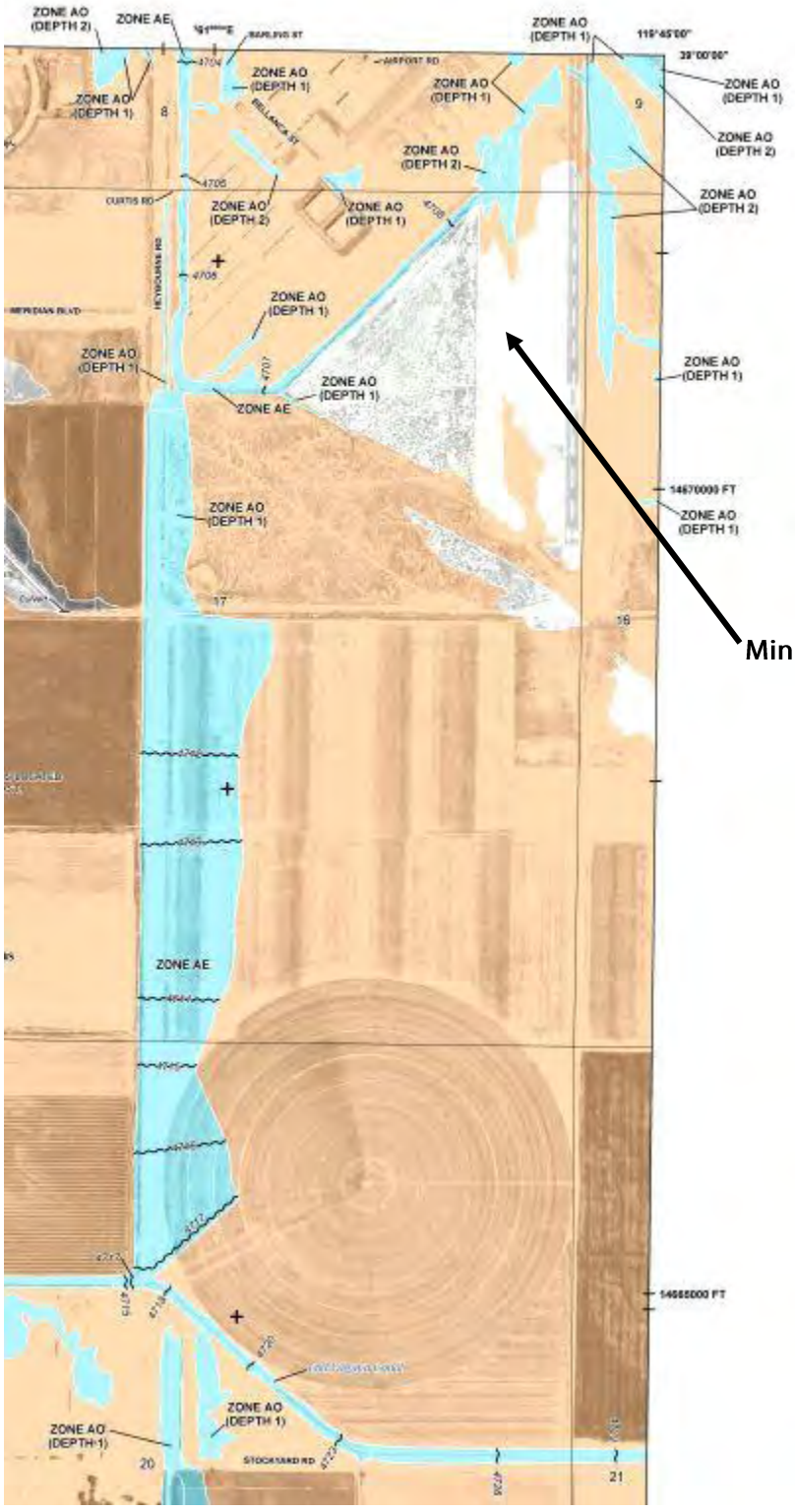
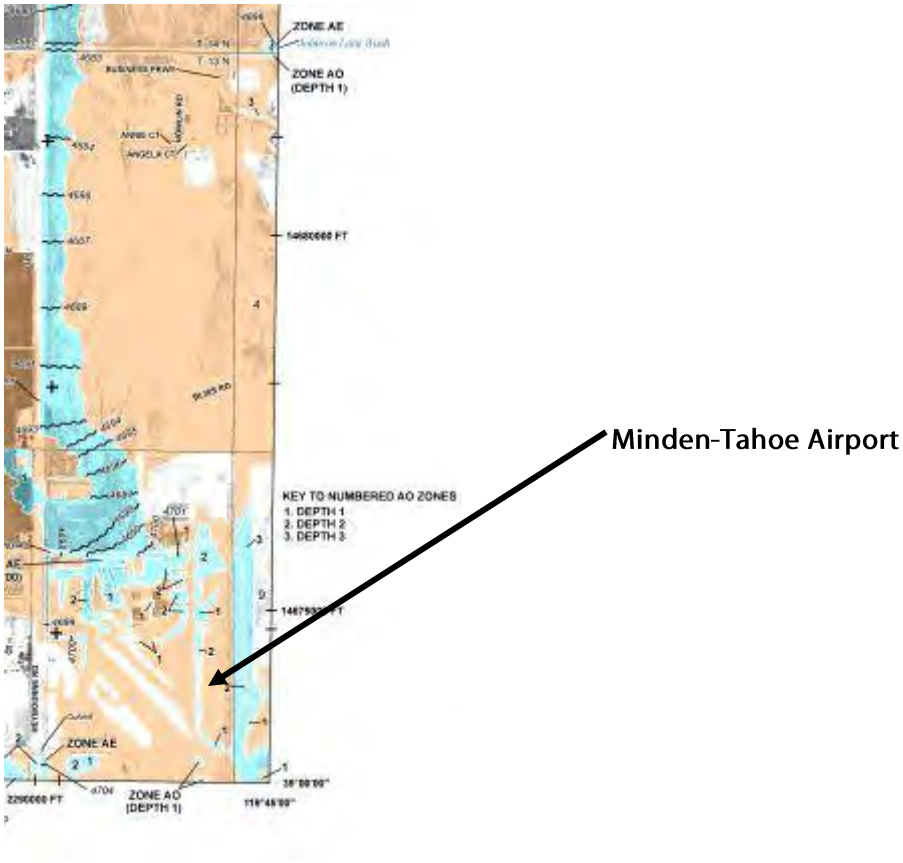
Pending FEMA Floodplain Map

Version	Panel Number	Date	Location
2.3.3.0	32005C0232H	June 15, 2016	SW Corner of Airport



Pending FEMA Floodplain Map

Version	Panel Number	Date	Location
2.3.3.0	32005C0070H	June 15, 2016	NW Corner of Airport

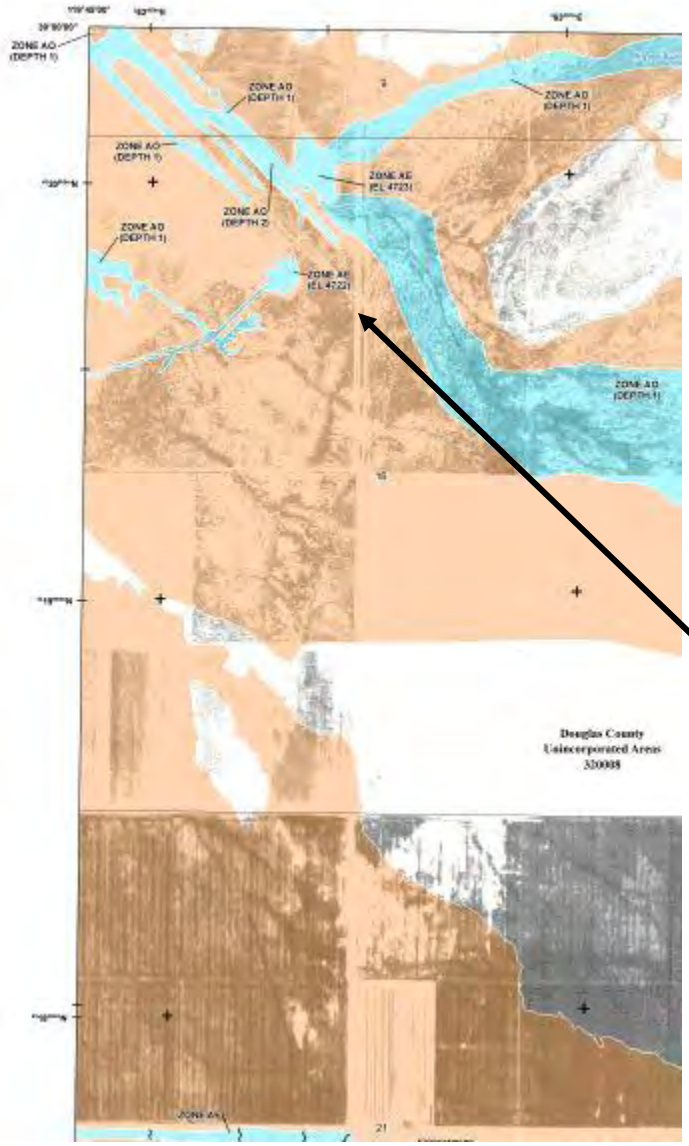


Pending FEMA Floodplain Map

Version	Panel Number	Date	Location
2.3.3.0	32005C0090H	June 15, 2016	NE Corner of Airport

Pending FEMA Floodplain Map

Version	Panel Number	Date	Location
2.3.3.0	32005C0521H	June 15, 2016	SE Corner of Airport



Minden-Tahoe Airport

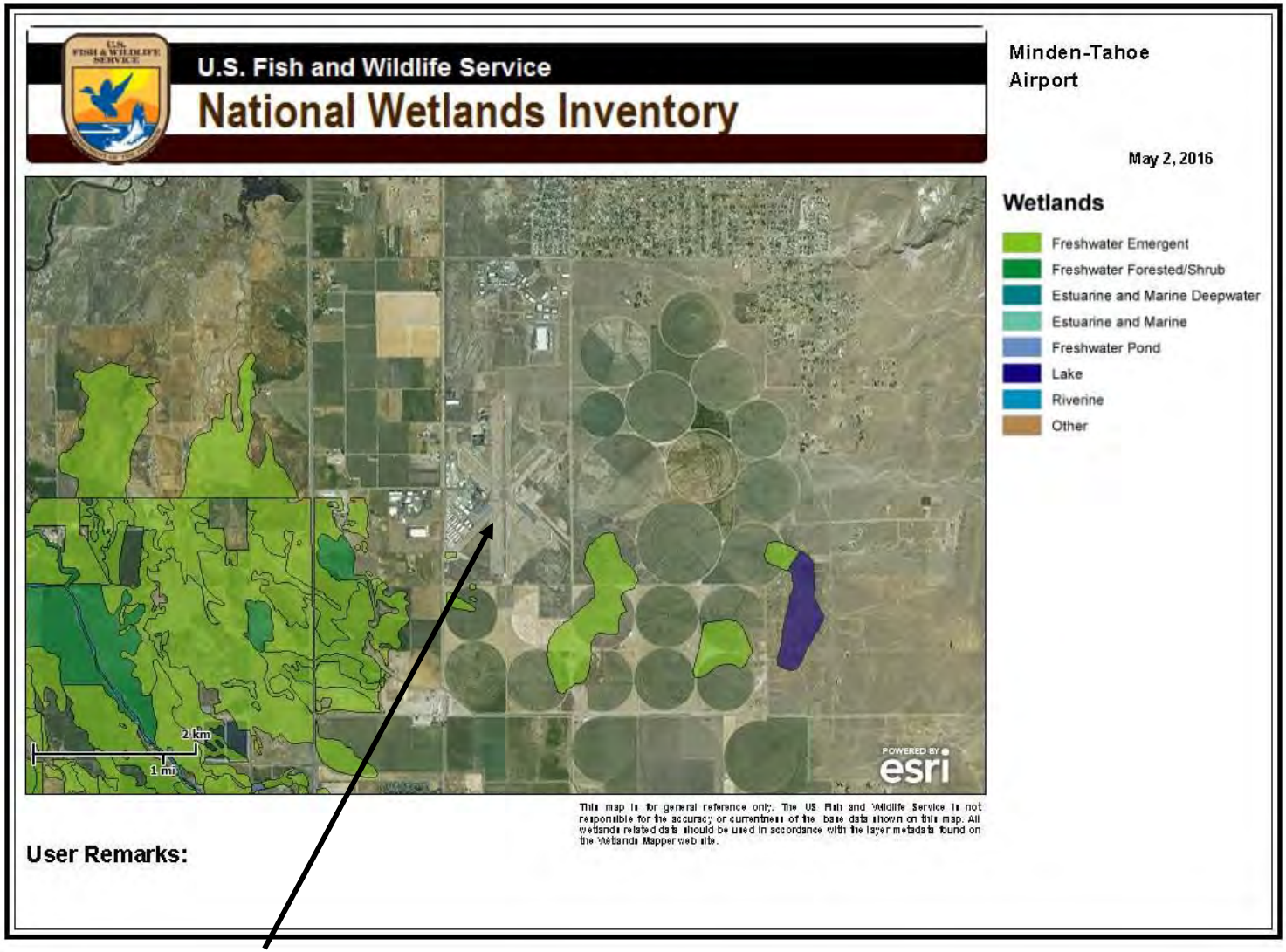
Appendix C-5

Wetlands Map

MINDEN-TAHOE AIRPORT
DOUGLAS COUNTY NEVADA

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG


U.S. Fish and Wildlife Service
National Wetlands Inventory
Minden-Tahoe Airport
May 2, 2016
Wetlands
Freshwater Emergent
Freshwater Forested/Shrub
Estuarine and Marine Deepwater
Estuarine and Marine
Freshwater Pond
Lake
Riverine
Other
2 km
1 mi
POWERED BY esri
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.
User Remarks:
Minden-Tahoe Airport

Appendix D

Public Involvement Records

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

ARMSTRONG

MINDEN-TAHOE AIRPORT
AIRPORT MASTER PLAN

TECHNICAL ADVISORY COMMITTEE KICK-OFF MEETING

November 20, 2015
1:00 P.M. – 3:30 P.M.
Douglas County Building Conference Room

MEETING SUMMARY

Purpose: Present the Airport Master Planning process to the Minden-Tahoe Airport Technical Advisory Committee and garner feedback pertaining to the schedule, process, public involvement and expected deliverables.

Attendees:

Bobbi Thompson, Airport Manager
Carl Ruschmeyer, Douglas County
Kurt Haukohl, Nevada Department of Transportation
Laurie Harden, SoaringNV
Bill Henderson, Airport Advisory Committee
Howard Charney, Airport Tenant
Justin Pietz, Armstrong Consultants
Chris Johnson, Airport Operations Supervisor
Jim Nichols, Douglas County
Tim Mueller, Nevada Department of Transportation
Rodney Aiglstorfer, Sierra Skyport
Mike Bradford, Airport Tenant
Rob Anderson, R.O. Anderson Engineering
John Rostas, Armstrong Consultants

A Technical Advisory Committee (TAC) kickoff meeting was held on November 19, 2015 to present the Airport Master Planning (AMP) process to the TAC. Attendance at the meeting comprised of five individuals, including representatives from Airport Management, Douglas County, Nevada Department of Transportation, Airport Advisory Committee, airport businesses, airport tenants, R.O. Anderson Engineering and Armstrong Consultants, Inc (ACI).

The purpose of the meeting was to discuss the following:

- **AMP Objectives**
  The objectives of an AMP and the purpose the document serves for the airport's future development. The AMP is shown to be a document which provides a twenty year plan of development and Airport Layout Plan (ALP) drawings which would serve as a graphical depiction of the existing and future layout of the airport. Additionally, the document discusses the overall goals of Minden-Tahoe Airport and the overall community. Among these objectives are: determination of future aviation demand, evaluation of complying with Federal Aviation Administration (FAA) design standards, prioritizing future airside and landside development and ensuring the airport complements local/regional development.

- **AMP Project Progress**
  At the time of the meeting, Working Paper #1 was released to the TAC for review. This included the Airport Master Plan Overview, Inventory of Airport Assets and Forecasts of Aviation Demand Chapters. Initially, these Chapters were to be split into two separate Working Papers, but were consolidated. The project is currently on schedule.

- **Technical Advisory Committee Role**
  The role of the TAC is to establish the level of involvement required to ensure the AMP meets the expectations of the airport's stakeholders and achieves the aforementioned objectives. The scope of involvement for the TAC includes: assisting the consultant team with plan development, communicating issues or concerns, serving as a liaison to the local community and providing feedback on the report and overall planning process.

- **Technical Aspects of the AMP**
  The technical aspects of the AMP such as design standards, types of aircraft, approach categories and design dimensions were explained. FAA guidance generally requires 250 takeoffs and 250 landings per year of the aircraft within a particular aircraft group in order to assign the Runway Design Code (RDC). The three components of RDC were explained as: (1) Aircraft Approach Category (AAC), (2) Aircraft Design Group (ADG) and (3) visibility minimums. The AAC is denoted as a letter and describes aircraft approach speed. AAC B indicates an aircraft with approach speeds greater than 91 knots but less than 121 knots. AAC C indicates an aircraft with approach speeds greater than 121 knots but less than 141 knots. The ADG is expressed in a numerical value and describes the aircraft wingspan and tail height in feet. Group I indicates aircraft with a wingspan less than 49 feet and a tail height less than 20 feet. Group II indicates aircraft with a wingspan 49 feet or greater but less than 79 feet and a tail height 20 feet or greater but less than 30 feet. Group III indicates aircraft with a wingspan 79 feet or greater but less than 118 feet and a tail height 30 feet or greater but less than 45 feet. Visibility minimums indicate the lowest visibility requirements in feet for runways with an Instrument Approach Procedure (IAP). Visual approaches are expressed in the RDC as "VIS".

  The current RDC for Runway 16-34 is C-III-VIS and that includes types of aircraft such as single-engine piston, multi-engine piston, turbo-prop and larger corporate jet aircraft. The current RDC for Runway 12-30 is B-II-VIS and that includes types of aircraft such as single-engine piston, multi-engine piston, turbo-prop and small corporate jet aircraft. The current RDC for Runway 30G is B-I (small)-VIS and that includes types of aircraft such as single-engine piston and multi-engine piston aircraft. The Airport Reference Code (ARC) is the highest RDC available, which is C-III-VIS.

  The design standards associated with each RDC provide various areas and zones surrounding each runway which must be protected for to safely accommodate airport operations. Minden-Tahoe Airport's ability to meet existing and forecasted design standards will be further evaluated in the Facility Requirements and Development Alternatives Chapter.

  The FAA also provides guidelines for airfield layout geometries which includes but is not limited to: (1) elimination of direct apron to runway access and (2) no more than three nodes at an intersection. The existing and proposed airfield configuration will be further evaluated in the Facility Requirements and Development Alternatives Chapter.

  The Airport's existing facilities and instrument approach minimums were also discussed.

- **Total Annual Operations and Based Aircraft**
  It was determined through Airport Management records there were 90,000 total annual operations and 355 based aircraft at the Airport. Further evaluation of the operations will be undertaken to factor for fixed-wing glider tow aircraft. This data will be used as the base year figures for the Forecast of Aviation Demand.

- **Factors to be Taken into Consideration for the AMP**
  Focus would be given to: (1) local, regional and national trends affecting aviation demand and the impact on the Airport, (2) unique operations at the Airport (i.e. glider and air tanker operations) (3) the ability of the landside development to accommodate current and forecasted demand, (4) future locations and sizes of hangars, (5) airside and landside necessities, (6) the use of an air traffic control tower to effectively control area traffic and enforce noise abatement procedures to benefit the surrounding areas and (7) development of aeronautical and non-aeronautical revenue generation sources.

- **AMP Public Involvement Process**
  A public meeting will be held once the Draft AMP has been completed. Further planning for this event will be conducted closer to the completion of the Draft AMP. Additionally, the Douglas County Board of County Commissioners will consider the approval of the Final ALP at the conclusion of the project.

- **Next Steps**
  The FAA/NDOT/TAC will review and comment on Working Paper #1. These changes will be reflected in the Draft AMP. Armstrong Consultants is currently in progress of completing Working Paper #2, the Facility Requirements Chapter and will be released for review and comment during December 2015.

ARMSTRONG

MINDEN-TAHOE AIRPORT
AIRPORT MASTER PLAN

DEVELOPMENT ALTERNATIVES MEETING

March 16, 2016
2:00 P.M. – 3:30 P.M.
Douglas County Building Conference Room

MEETING SUMMARY

Purpose: Present the Airport Master Plan's (AMP) development alternatives to the Minden-Tahoe Airport Technical Advisory Committee and garner feedback pertaining to the recommended development.

Attendees:
Bobbi Thompson, Airport Manager
Carl Ruschmeyer, Douglas County
Mimi Moss, Douglas County
Kurt Haukohl, NV Department of Transportation
Bill Henderson, Airport Advisory Committee
Howard Charney, Airport Tenant
Justin Pietz, Armstrong Consultants
Chris Nocks, Armstrong Consultants
Chris Johnson, Airport Operations Supervisor
Larry Werner, Douglas County
Joe Carlini, Federal Aviation Administration
Tim Mueller, NV Department of Transportation
Mike Bradford, Airport Tenant
Rob Anderson, R.O. Anderson Engineering
John Rostas, Armstrong Consultants

A Technical Advisory Committee (TAC) development alternatives meeting was held on March 16, 2016 to determine the recommended development to be carried forward onto the Airport Layout Plan (ALP). Attendance at the meeting comprised of 15 individuals, including representatives from Airport Management, Douglas County, Federal Aviation Administration, Nevada Department of Transportation, Airport Advisory Committee, airport tenants, R.O. Anderson Engineering and Armstrong Consultants, Inc (ACI).

The purpose of the meeting was to discuss the following:

- **AMP Overview**
  A brief overview of the AMP objectives was provided. These topics were discussed at length in the November 2015 TAC meeting. The objectives of an AMP and the purpose the document serves for the airport's future development. The AMP is shown to be a document which provides a twenty year plan of development and ALP drawings which would serve as a graphical depiction of the existing and future layout of the airport. Additionally, the document discusses the overall goals of Minden-Tahoe Airport and the overall community. Among these objectives are: determination of future aviation demand, evaluation of complying with Federal Aviation Administration (FAA) design standards, prioritizing future airside and landside development and ensuring the airport complements local/regional development.

- **AMP Project Status**
  The majority of the AMP analysis and evaluation of the existing and future airport facility needs has been completed. As a result of the discussions of this meeting, the ALP can be produced with input from the TAC. Cost estimates and a phasing plan will be developed for the recommended development and presented as a standalone Working Paper. All comments on the previous working

papers would be combined into a Draft AMP Report with the ALP. Additional comments will be solicited and the Draft AMP Report and ALP will be revised into the Final Report.

- **Forecast of Aviation Activity Overview**
  The forecasted based aircraft and total annual operations from 2015 to 2035 were presented. The forecast for 2035 include 393 based aircraft and 118,559 total annual operations. The forecast developed was a cohort of growth trends in aviation for the State of Nevada with national trends in general aviation. The forecast does not anticipate any changes in types of airport users. The forecasted operations for 2035 do not trigger any capacity related recommendations such as additional runways. The Airport Reference Code would not change as a result of this forecast.

  The November 2015 meeting had discussed methods of obtaining higher accuracy aircraft operation figures. A request has been placed with the FAA to obtain radar tracking data for the Minden-Tahoe Airport. Other methods of counting aircraft at a non-controlled airport include game cameras and acoustical monitoring equipment. Game cameras were not utilized to their inability to capture 100 percent of operations at the airport. Acoustical monitoring equipment was not utilized due to the high number of glider operations and minimal auditory presence they produce. Furthermore, obtaining this data would add one full year to the AMP project schedule. The accuracy of the airport management reported records were determined to be acceptable.

- **Runway Design Standards**
  A brief overview of the existing Runway Design Standards which provide various areas and zones surrounding each runway which must be protected in order to safely accommodate airport operations was provided. Only one design standard would change as a result of the recommended development. The Runway Protection Zone would increase in size to accommodate a precision instrument approach procedure.

- **Recommended Development**
  The recommended development proposed as a part of the AMP is done to accomplish the following: (1) update airfield configuration to meet current FAA design guidelines; (2) provide efficient airfield layout; (3) avoid or minimize impacts to surrounding communities; and (4) protects for recommended airside/landside improvements. The recommended development does not require development to occur or provide environmental clearance for the proposed development. It was reiterated that the recommended development shown in the final ALP is not absolute, would only occur if documented demand exists and is flexible to meet the needs and desires of the community.

  The following are the recommendations and points of discussion regarding the accommodation existing and forecasted demand at the Minden-Tahoe Airport:

  - Airside:
    - Extend and strengthen Runway 16-34
      - Alternatives were provided to protect for future runway development.
      - A future extension to a length of 8,820 feet with an ultimate extension to a length of 10,130 feet.
      - Could be completed in a phased approach or all at once.
      - This would not occur unless there was documented demand by a user who stated their aircraft needs the necessary runway length.
      - Further discussion was provided as to why not widen Runway 16-34. The FAA indicated the widening of Runway 16-34 would not be justified unless there were over 500 total annual operations of C-III aircraft weighing greater than 150,000 pounds. The forecast of aviation demand does not project over 500 total annual operations of this aircraft type. However, it was suggested to show and protect for a widening to 150 feet if and when it is ever needed.

        - It was noted that changes to the Runway would likely need to be approved by citizen vote per Douglas County Ordinances.
    - Construct parallel taxiway east of Runway 16-34
        - Would provide access for aircraft to proposed East Side Development Area.
        - Cost would vary depending on selected runway alternative.
    - Update taxiway geometries
        - Would provide a safe and efficient airfield layout.
        - Would be undertaken once the pavements are in need of a full-depth reconstruction.
    - Expand glider staging and storage areas
        - Provides centralized area for glider operations adjacent to Runway 12-30 and Runway 30G.
        - Segregates powered and non-powered aircraft movement areas.
        - Eliminates the need for gliders to be towed across Runway 16-34.
    - Construct helicopter parking pads
        - Provides designated area for helicopters to park without bearing weight on asphalt surfaces.
        - Would be situated to provide direct access to/from Taxiway A which would eliminate the need to hover-taxi over the fixed-wing aircraft parking apron.
    - Implement precision Instrument Approach Procedure
        - Procedure was recommended for Runway 34 end.
        - A precision approach for the Runway 16 end will be evaluated per the request of the TAC.
    - Protect East Side Development Area
        - Provides a generalized layout for future facilities to be located at the Airport.
        - Layout is flexible to accommodate the individual user needs.
    - Improve airfield lighting, signage and visual aids
        - The precision instrument approach procedure would require an approach lighting system and High Intensity Runway Edge Lights on Runway 16-34.
        - Recommendations for replacing airfield lighting, signage and visual aids at the end of their useful life were also made.
- Landside:
    - Protect for Air Traffic Control Tower (ATCT)
        - The AMP recommends that a benefit-cost analysis be conducted for the development of an ATCT based on the existing volume and unique characteristics of aircraft operations at the Airport.
        - Also noted was the ATCT would be used to reduce airport noise impacts on the surrounding community by implementing noise abatement procedures for aircraft within Minden-Tahoe Airport's airspace.
        - The ATCT would not change the forecasted fleet mix at Minden-Tahoe Airport.
        - A recommended site was presented along the east as there are no suitable locations along the west that would provide adequate access and line of sight.
    - Develop General Aviation Services Building
        - Provides basic pilot facilities such as lounge areas, weather briefing facilities and restrooms.
        - Would be located near proposed fixed-wing aircraft parking apron.
    - Increase vehicle parking
        - Would be included with other airport development projects, as they occur.
    - Construct Snow Removal Equipment Storage Building
        - Would be utilized to extend the useful life of snow removal equipment.

- Identify revenue generation parcels
    - Would occur in areas which have been identified as not-optimal for airside development.
    - Development within the area would be subject to Douglas County Ordinance.
- Improve terminal area and perimeter fencing
    - Would improve airfield safety by reducing inadvertent wildlife access.

- **Development Alternatives**
  Four alternatives were presented to accommodate the Runway 16-34 extension: (1) extend Runway 16-34 to the south; (2) extend Runway 16-34 to the north; (3) extend Runway 16-34 to the north and south; and (4) do not extend Runway 16-34. It was emphasized that an extension would only occur if there were documented demand from an aircraft user who conducts over 500 total annual operations and requires greater than the existing 7,100 foot runway length. The TAC agreed the most sensible extension of Runway 16-34 would be to the south, which will be carried forward into the ALP.

- **Next Steps**
  The FAA/NDOT/TAC will review and comment on Working Paper #3 and #4, as they are released. These changes will be reflected in the Draft AMP and ALP. Final comments regarding the Draft AMP and ALP will be solicited and included into the Final Report.

APPROVED NOVEMBER 3, 2016

The Regular Meeting of the Douglas County Board of County Commissioners was held on October 6, 2016 in the meeting room of the County Administration Building, 1616 8th Street, Minden, NV, beginning at 1:00 PM.

Call to Order

Commissioners Present:
Doug N. Johnson, Chairman
Nancy McDermid, Vice-Chairwoman
Greg Lynn, Board Member
Barry Penzel, Board Member
Steve Thaler, Board Member

Staff Present:
Bobbi Thompson, Airport Manager
Christine Vuletich, Assistant County Manager/CFO
Doug Ritchie, Chief Civil Deputy District Attorney
Kathy Lewis, Clerk-Treasurer
Laure Penny, Clerk to the Board

INVOCATION

The invocation was led by Janis Redden with Christian Science Church.

PLEDGE OF ALLEGIANCE

Kathy Lewis led the Pledge of Allegiance.

PUBLIC COMMENT (No Action)

Volker Soffel commented on the current situation of short time rentals in Douglas County. He stated he had spoken with county staff and any rental in a private home shorter than 28 days is considered a vacation rental. Vacation rentals, by homeowners have seen an enormous boom. However, Douglas County only allows it in the Tahoe Township. Mr. Soffel believes the rest of the county should be allowed the same consideration.

Vice Chairwoman McDermid let everybody know that Christine Vuletich, Assistant County Manager/CFO was leaving the county. Vice Chairwoman McDermid provided all Ms. Vuletich's accomplishments while she's been with Douglas County.

Commissioner Thaler provided information on the new picture hanging in the Chambers.

Chairman Johnson wanted to thank all the responders on the fire last Sunday. They did an amazing job.

Public comment closed.

DOUGLAS COUNTY BOARD OF COMMISSIONERS
MEETING OF OCTOBER 6, 2016

APPROVAL OF AGENDA

MOTION to approve the agenda; carried

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	Greg Lynn, Board Member
SECONDER:	Nancy McDermid, Vice-Chairwoman
AYES:	Johnson, McDermid, Lynn, Penzel, Thaler

APPROVAL OF PREVIOUS MINUTES

Board of County Commissioners - Regular Meeting - Sep 1, 2016 1:00 PM

MOTION to approve the minutes of September 1, 2016; carried

RESULT:	**APPROVED [4 TO 0]**
MOVER:	Greg Lynn, Board Member
SECONDER:	Nancy McDermid, Vice-Chairwoman
AYES:	McDermid, Lynn, Penzel, Thaler
ABSTAIN:	Johnson

Board of County Commissioners - Regular Meeting - Sep 15, 2016 1:30 PM

MOTION to approve the minutes of September 15, 2016; carried

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	Barry Penzel, Board Member
SECONDER:	Nancy McDermid, Vice-Chairwoman
AYES:	Johnson, McDermid, Lynn, Penzel, Thaler

DOUGLAS COUNTY AWARD PRESENTATIONS

Ceremonial presentation to Deputy Chief Tim Soule for receiving the National Fire Academy's Executive Fire Officer Certification. (Chief Carlini)

Tod Carlini, East Fork Fire Chief wanted to recognize Deputy Chief Tim Soule, who received his Executive Fire Officer Certification. Only five people in East Fork have achieved this and Deputy Chief Soule had the highest score out of the five. Chief Carlini stated Deputy Chief Soule was leaving to become a Captain in Twin Falls, Idaho. Congratulations to Deputy Chief Soule.

Deputy Chief Soule thanked everybody for the opportunities and the learning experience.

Commissioner Penzel stated Deputy Chief Soule was the President of the Suicide Prevention Board and he will be sorely missed.

RESULT:	**FOR PRESENTATION ONLY.**

DOUGLAS COUNTY BOARD OF COMMISSIONERS
MEETING OF OCTOBER 6, 2016

Ceremonial presentation of employee service awards to Tamara Morris from Juvenile Probation for 15 years of continuous service and Kai Weaver from the Sheriff's Department for 25 years of continuous service.

Kai Weaver was unable to attend the meeting.

Tamara Morris received a service award for 15 years of continuous service. Mike Torres, Chief Deputy of Juvenile Probation stated he appreciates Ms. Morris' service and she is valued in the department. Ms. Morris commented she loves her job and her co-workers make it a great place to work.

RESULT:	**FOR PRESENTATION ONLY.**

Ceremonial presentation of Proclamation 2016P-053 proclaiming October 2016 as National Domestic Violence Awareness Month in Douglas County. (Jen Forzani, Steve Decker, Veronica LaChance)

Vice Chairwoman McDermid reads the Proclamation into the record.

Steve Decker, Executive Director of the Family Support Council explained grant money cannot be used for prevention. We need to come together as community to help prevent domestic violence.

Veronica LaChance, Program Director from the Family Support Council provided information about the Candle Light Vigil that would be held tonight from 6:00-7:30 p.m. at the Carson Valley Museum and Cultural Center. Please stop by.

RESULT:	**FOR PRESENTATION ONLY.**

CONSENT CALENDAR

FINANCE

A. For possible action. Discussion to approve receipt of report on general ledger cash balances through September 19, 2016 per Nevada Revised Statute (NRS) 251.030. (Vicki Moore)

MOTION to approve;

CLERK-TREASURER

B. For possible action. Discussion to approve receipt and filing of cumulative voucher sheets for checks issued for the 9/2/16 Payroll, 9/16/16 Payroll, 9/2/16 Payables, 9/9/16 Payables, 9/14/16 Payables, 9/16/16 Payables and the 9/23/16 Payables. (Kathy Lewis)

MOTION to approve;

DOUGLAS COUNTY BOARD OF COMMISSIONERS
MEETING OF OCTOBER 6, 2016

DOUGLAS COUNTY LIQUOR BOARD

C. For possible action. Discussion to approve the addition of James W. Thorpe, EVP/Chief Merchandising Officer, replacing William C. Bass, VP of Store Operations, for Dolgen Midwest, LLC dba Dollar General to their existing Packaged Retail Liquor License. James W. Thorpe has signed a Waiver of Notice of Hearing. Dollar General is located at 1257 Pit Road, Gardnerville, NV 89460. (Sergeant Bernadette Smith)

MOTION to approve;

D. For possible action. Discussion to approve the Special Event Entertainment Endorsement Application for The Pink House, represented by owner/operator Lois Wray. The Pink House is having its One-Year Anniversary Celebration on Sunday, October 16, 2016, from 2:00 pm until 5:00 pm with live music, guest speakers, appetizers, wine and beer. The anticipated attendance for the One-Year Anniversary Celebration is 50-75 people. (Sgt. Bernadette Smith)

MOTION to approve;

E. For possible action. Discussion to approve the Packaged Retail Liquor License for Jaswinder Kaur, representing SAAHJ LLC dba Sierra Market. Ms. Kaur has signed a Waiver of Notice of Hearing. Sierra Market is located at 1532 U.S. Hwy 395 N. Ste. 8, Gardnerville, Nevada. (Sergeant Bernadette Smith)

MOTION to approve;

PUBLIC WORKS

F. For possible action. Discussion to award a Contract for Professional Services for the Lake Tahoe Administration Building HVAC Upgrades to Paul Cavin Architect, LLC, in the amount of $132,500, and authorize the Public Works Director to approve contract amendments up to 10% of the contract amount. (Chris Oakden)

MOTION to approve;

G. For possible action. Discussion to award a Contract for Professional Services for the Judicial and Law Enforcement Center Emergency Power Upgrades to Dinter Engineering Company in the amount of $62,700 and authorize the Public Works Director to approve contract amendments up to 10% of the contract amount. (Chris Oakden)

MOTION to approve;

H. For possible action. Discussion to approve the purchase of a Portable Air Compressor from Cashman Power Solutions for $16,819 for Road Maintenance Operations. (Chris Oakden)

MOTION to approve;

DOUGLAS COUNTY BOARD OF COMMISSIONERS
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I. For possible action. Discussion to award a Contract for Janitorial Services of Douglas County Facilities to Myers Enterprises, Inc., in the amount of $188,232 annually for a two-year period from December 1, 2016 through November 30, 2018, and authorize the Public Works Director to approve contract amendments up to 10% of the contract amount. (Chris Oakden)

MOTION to approve;

EAST FORK FIRE

J. For possible action. Discussion to approve the receipt and filing of the list of checks issued for the 8/19/16 and 09/02/16 Payrolls, 8/16/16 to 09/16/16 Payables, and automatic withdrawals from 08/01/16 to 08/31/16. (Joseph Langkilde)

MOTION to approve;

K. For possible action. Discussion to accept the report on general ledger cash balances through August 31, 2016. (Joseph Langkilde)

MOTION to approve;

L. For possible action. Discussion to approve the August 31, 2016, Report of Fees and Revenues from the East Fork Fire Protection District. (Joseph Langkilde)

MOTION to approve;

EMERGENCY MANAGEMENT

M. For possible action. Discussion to accept a State of Nevada, Department of Public Safety grant in the amount of $18,000 for the maintenance and support of the Douglas County Citizen Emergency Response Team and to authorize the District Fire Chief to sign all documents related to the management of the grant. There are no matching funds required. (Tim Soule)

MOTION to approve;

REPORT OF FEES

N. For possible action. Discussion to approve the receipt of the Douglas County Clerk's report of fees for the month of August 2016. (Kathy Lewis)

MOTION to approve;

O. For possible action. Discussion to approve the August 31, 2016, Report of Fees from the Douglas County Recorder's Office. (Karen Ellison)

MOTION to approve;

MOTION to approve to consent agenda; carried

DOUGLAS COUNTY BOARD OF COMMISSIONERS
MEETING OF OCTOBER 6, 2016

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	Nancy McDermid, Vice-Chairwoman
SECONDER:	Greg Lynn, Board Member
AYES:	Johnson, McDermid, Lynn, Penzel, Thaler

ADMINISTRATIVE AGENDA

CONSENT CALENDAR ITEMS PULLED FOR FURTHER DISCUSSION

No consent items were pulled.

AIRPORT

1. For presentation only. Armstrong Consultants will be providing an overview of the updated Airport Master plan for Minden-Tahoe Airport, which was last completed in 2008. No action is required. (Armstrong Consultants)

Bobbi Thompson, Airport Manager introduced Armstrong Consultants the engineering firm that worked on the Master Plan with them.

Justin Petes, Planning Manager at Armstrong Consultants provided a presentation on the Draft Master Plan; what an Airport Master Plan is and the recommended development.

John Rostas, Airport Planner provided information on the recommended development overview; pictures of draft layout plans; and the next steps.

Commissioner Penzel commented he would like to see the Airport's Master Plan coordinate with the County's Master Plan Revision. There is some land acquisition in the Airport's Master Plan that involves the County's Master Plan. Ms. Thompson responded she has met with Candice and Candice is aware of the situation. Commissioner Penzel wanted them to look at the art of the possible. He believes the East side should be finished first; they need to discuss the weather more; and look at lengthening the 3012 runway first. Going beyond boundaries won't be easy. Ms. Thompson explained the timelines. Commissioner Penzel also believes they should be addressing drone operations. Ms. Thompson responded Chris Johnson has done an excellent job on staying on that. Commissioner Penzel commented the last thing to consider is the tower. The FAA continually revises and makes them bigger and it causes problems. Ms. Thompson responded there is an Ordinance in place and they would need to go through a process along with the benefit cost analysis to see if the tower would be eligible for FAA funding. If it was eligible then it would need to be voted on by the people.

Mr. Rostas commented in Section 2.10.2, of the Inventory Airport Assets, it addresses the weather.

Vice Chairwoman McDermid commented it is good to recognize it's a Draft Master Plan; just because it's in a Plan doesn't mean it is going to happen.

RESULT:	**FOR PRESENTATION ONLY.**

DISTRICT ATTORNEY

2. For possible action. Discussion to approve a proposed Settlement Agreement and Mutual Release dismissing Job's Peak Ranch Community Association, Inc.'s legal claims against Douglas County and Five Creek, LLC. (Doug Ritchie)

Doug Ritchie, Chief Civil Deputy District Attorney discussed the background and history on this settlement. He believes they have reached a good resolution.

Owen Mackaden, Five Creek, LLC encourages the Board to approve the settlement.

PUBLIC COMMENT

Jim Slade believes the County violated its own policies by adopting a bad water company. He is glad to see this item on the Administrative Agenda and that the background information was corrected. Mr. Slade encourages approval.

Public comment closed.

MOTION to approve a Settlement Agreement and Mutual Release dismissing Job's Peak Ranch Community Association, Inc.'s legal claims against Douglas County and Five Creek, LLC; carried

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	Nancy McDermid, Vice-Chairwoman
SECONDER:	Greg Lynn, Board Member
AYES:	Johnson, McDermid, Lynn, Penzel, Thaler

3. For possible action. Discussion on the First Amendment to the Grant of Conservation Easement between Douglas County and the Wass Family/ Michael McAllister Trusts in order to increase the amount, and adjust the boundaries, of the real property subject to the conservation easement located on a portion of 261 Sierra Country Circle within Sierra Country Estates Modified Planned Development and to authorize Chairman Johnson to execute all necessary documents. (Doug Ritchie)

Doug Ritchie, Chief Civil Deputy District Attorney provided information on the amendment. He explained it is an amendment to the Conservation Easement. The boundary is being changed; there are two parcels that will be zoned Public Facilities for the County's two wells. He explained it's been a lengthy process to

reach a reasonable accommodation so that the County can build the infrastructure it needs for the water system it acquired.

Commissioner Lynn refers to the map showing the amended Conservation Easement. He stated it came up as an issue with the adjacent homeowners because the Conservation Easement does not meet the property lines. Mr. Ritchie responded for most of the Conservation Easement boundaries it does but not all. From the County's perspective we are getting what we need.

No public comment.

MOTION to approve the First Amendment to the Grant of Conservation Easement between Douglas County and the Wass Family/ Michael McAllister Trusts and to authorize Chairman Johnson to sign the First Amendment and all other related documents necessary to finalize the transaction; carried

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	Greg Lynn, Board Member
SECONDER:	Nancy McDermid, Vice-Chairwoman
AYES:	Johnson, McDermid, Lynn, Penzel, Thaler

COUNTY MANAGER

4. For presentation only. Reports/updates from County Commission members concerning the various boards and/or commissions that they may be a member of or a liaison to or meetings/functions they have attended. These boards/commissions/meetings include but are not limited to the: Nevada Association of Counties; Carson Water Subconservancy District; Lake Tahoe Visitors Authority; Tahoe Regional Planning Agency; Law Library; NevadaWorks; Carson Valley Chamber of Commerce, Carson Valley Visitors Authority; Tahoe Douglas Visitors Authority; Lake Tahoe South Shore Chamber of Commerce; Western Nevada Development District; Regional Transportation Commission; Nevada Tahoe Conservation District; Nevada V & T Railroad Commission; Joint Powers/Waste Management; Tahoe Transportation District, and the Debt Management Commission. There will be no discussion or action taken on these reports/updates.

Chairman Johnson wanted to let the public know that the November 17, 2016 meeting is being cancelled because three Board Members will be at the NACo. Conference.

Vice Chairwoman McDermid wanted to share that NDOT has completed the extension of the Cave Rock Tunnel and the water quality improvement project on Hwy. 50 and they finished five months ahead of schedule.

DOUGLAS COUNTY BOARD OF COMMISSIONERS
MEETING OF OCTOBER 6, 2016

CLOSING PUBLIC COMMENT (No Action)

Jim Slade stated people need to be identified by first and last name and where they work. He urged the Chairman and Deputy District Attorney to make sure people are fully identified.

ADJOURNMENT

Motion to adjourn; carried

RESULT:	**APPROVED [UNANIMOUS]**
MOVER:	Greg Lynn, Board Member
SECONDER:	Nancy McDermid, Vice-Chairwoman
AYES:	Johnson, McDermid, Lynn, Penzel, Thaler

There being no further business to come before the Board, the meeting adjourned at 2:09 p.m.

Respectfully submitted:

_____
Doug N. Johnson, Chairman
Douglas County Board of Commissioners

ATTEST:

_____
Kathy Lewis, Clerk-Treasurer

Appendix E

Acronyms

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

COMMONLY USED ACRONYMS

AC	Advisory Circular
AD	Airport Design
ADG	Airplane Design Group
AGL	Above Ground Level
AIP	Airport Improvement Program
ALP	Airport Layout Plan
ALS	Approach Lighting System
ARC	Airport Reference Code
ARP	Airport Reference Point
ARTCC	Air Route Traffic Control Center
ASDA	Accelerate Stop Distance
ASR	Airport Surveillance Radar
ASV	Annual Service Volume
ATC	Air Traffic Control
ATCT	Airport Traffic Control Tower
AWOS	Automated Weather Observation system
BRL	Building Restriction Line
CAT	Category
CFR	Code of Federal Regulations
CWY	Clearway
CY	Calendar Year
DME	Distance Measuring Equipment
EL	Elevation
EMT	Emergency Medical Technician
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FBO	Fixed Base Operator
FSS	Flight Service System
FY	Fiscal Year
GA	General Aviation
GPS	Global Positioning System
HIRL	High Intensity Runway Lights
IEMT	Intermediate Emergency Medical Technician
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
LDA	Landing Distance Available
LOC	Localizer
MALS	Medium Intensity Approach Lighting System
MALSF	Medium Intensity Approach Lighting System with Sequenced Flashers
MALSR	Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights
ME	Multi-Engine
MIRL	Medium Intensity Runway Lights
MITL	Medium Intensity Taxiway Lights
MLS	Microwave Landing System
MOA	Military Operating Area
MSL	Mean Sea Level
NAVAID	Navigational Aid
NDB	Nondirectional Beacon
NM	Nautical Mile
NPIAS	National Plan of Integrated Airport Systems
ODALS	Onmnidirectional Approach Lighting System
OFA	Object Free Area
OFZ	Obstacle Free Zone
PAPI	Precision Approach Path Indicator
PAR	Precision Approach Radar
RAIL	Runway Alignment Indicator Lights
RDC	Runway Design Code
REIL	Runway End Identifier Lights
ROFA	Runway Object Free Area
RPZ	Runway Protection Zone
RSA	Runway Safety Area
RVR	Runway Visual Range
RW	Runway
SWY	Stopway
TDG	Taxiway Design Group
TH	Threshold
TL	Taxilane
TODA	Takeoff Distance Available
TOFA	Taxiway Object Free Area
TORA	Takeoff Run Available
TSA	Taxiway Safety Area
TVOR	Very High Frequency Omni range on an Airport
TW	Taxiway
USGS	United States Geological Society
VASI	Visual Approach Slope Indicator
VFR	Visual Flight Rules
VOR	Very High Frequency Omni range

Appendix F

Glossary of Terms

Minden-Tahoe Airport
Airport Master Plan

ARMSTRONG

GLOSSARY OF TERMS

Above Ground Level (AGL)	A height above ground as opposed to MSL (height above Mean Sea Level).
Advisory Circular (AC)	Publications issued by the FAA to provide a systematic means of providing non-regulator guidance and information in a variety of subject areas.
Airport Improvement Program (AIP)	The AIP of the Airport and Airways Improvement Act of 1982 as amended. Under this program, the FAA provides funding assistance for the design and development of airports and airport facilities.
Aircraft Mix	The number of aircraft movements categorized by capacity group or operational group and specified as a percentage of the total aircraft movements.
Aircraft Operation	An aircraft takeoff or landing.
Airport	An area of land or water used or intended to be used for landing and takeoff of aircraft includes buildings and facilities, if any.
Airport Elevation	The highest point of an airport's useable runways, measured in feet above mean sea level.
Airport Land Use Regulations	Are designed to preserve existing and/or establish new compatible land uses around airports, to allow land use not associated with high population concentration, to minimize exposure of residential uses to critical aircraft noise areas, to avoid danger from aircraft crashes, to discourage traffic congestion and encourage compatibility with non-motorized traffic from development around airports, to discourage expansion of demand for governmental services beyond reasonable capacity to provide services and regulate the area around the airport to minimize danger to public health, safety, or property from the operation of the airport, to prevent obstruction to air navigation and to aid in realizing the policies of a County Comprehensive Plan and Airport Master Plan.
Airport Layout Plan (ALP)	A graphic presentation, to scale, of existing and proposed airport facilities, their location on the airport and the pertinent applicable standards. To be eligible for AIP funding assistance, an airport must have an FAA-approved ALP.
Airport Master Record, Form 5010	The official FAA document, which lists basic airport data for reference and inspection purposes.
Airport Reference Code (ARC)	The ARC is a coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.

Airport Reference Point (ARP)	The latitude and longitude of the approximate center of the airport.
Airspace	Space above the ground in which aircraft travel; divided into corridors, routes and restricted zones.
Air Traffic	Aircraft operating in the air or on an airport surface, excluding loading ramps and parking areas.
Approach Surface	A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end.
Automated Weather Observing System (AWOS)	This equipment automatically gathers weather data from various locations on the airport and transmits the information directly to pilots by means of computer generated voice messages over a discrete frequency.
Based aircraft	An aircraft permanently stationed at an airport.
Building Restriction Line (BRL)	A line, which identifies suitable building area locations on airports.
Ceiling	The height above the earth's surface of the lowest layer of clouds or other phenomena which obscure vision.
Conical Surfaces	A surface extending outward and upward form the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.
Controlled Airspace	Airspace in which some or all aircraft may be subject to air traffic control to promote safe and expeditious flow of air traffic.
Critical/Design Aircraft	In airport design, the aircraft which controls one or more design items such as runway length, pavement strength, lateral separation, etc., for a particular airport. The same aircraft need not be critical for all design items.
Day Night Level (DNL)	24-hour average sound level, including a 10 decibel penalty for sound occurring between 10:00 PM and 7:00 AM.
Decibel	Measuring unit for sound based on the pressure level.
Design Type	The design type classification for an airport refers to the type of runway that the airport has based upon runway dimensions and pavement strength.
Federal Aviation Administration (FAA)	The federal agency responsible for the safety and efficiency of the national airspace and air transportation system.
FAR Part 77	A definition of the protected airspace required for the safe navigation of aircraft.

Fixed Base Operator (FBO)	An individual or company located at an airport and providing commercial general aviation services.
Fuel Flowage Fees	A fee charged by the airport owner based upon the gallons of fuel either delivered to the airport or pump at the airport.
General Aviation (GA)	All aviation activity in the United States, which is neither military nor conducted by major, national or regional airlines.
Glider	A heavier-than-air aircraft that is supported in flight by the dynamic reaction of the air against its lifting surfaces and whose free flight does not depend principally on an engine (FAR Part 1).
Global Positioning System (GPS)	The global positioning system is a space based navigation system, which has the capability to provide highly accurate three-dimensional position, velocity and time to an infinite number of equipped users anywhere on or near the Earth. The typical GPS integrated system will provide: position, velocity, time, altitude, groundspeed and ground track error, heading and variation. The GPS measures distance, which it uses to fix position, by timing a radio signal that starts at the satellite and ends at the GPS receiver. The signal carries with it, data that discloses satellite position and time of transmission and synchronizes the aircraft GPS system with satellite clocks.
Hazard to Air Navigation	An object which, as a result of an aeronautical study, the FAA determines will have a substantial adverse effect upon the safe and efficient use of navigable airspace by aircraft, operation of air navigation facilities or existing or potential airport capacity.
Horizontal Surface	A horizontal plane 150 feet above the established airport elevation, the perimeter which is constructed by swinging arcs of specified radii form the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs.
Imaginary Surfaces	Surfaces established in relation to the end of each runway or designated takeoff and landing areas, as defined in paragraphs 77.25, 77.28 and 77.29 of FAR Part 77, *Objects Affecting Navigable Airspace*. Such surfaces include the approach, horizontal, conical, transitional, primary and othersurfaces.
Itinerant Operations	All operations at an airport, which are not local operations.
Jet Noise	The noise generated externally to a jet engine in the turbulent jet exhaust.
Knots	Nautical miles per hour, equal 1.15 statute miles per hour.
Large Airplane	An airplane of more than 12,500 pounds maximum certified takeoff weight.

Local Operations	Operations by aircraft flying in the traffic pattern or within sight of the control tower, aircraft known to be arriving or departing from flight in local practice areas, or aircraft executing practice instrument approaches at the airport.
Location Identifier	A three-letter or other code, suggesting where practicable, the location name that it represents.
Maneuvering Area	That part of an airport to be used for the takeoff and landing of aircraft and for the movement of aircraft associated with takeoff and landing, excluding aprons.
Master Plan	A planning document prepared for an airport, which outlines directions and developments in detail for 5 years and less specifically for 20 years. The primary component of which is the Airport Layout Plan.
Mean/Maximum Temperature	The average of all the maximum temperatures usually for a given period of time.
Mean Sea Level (MSL)	Height above sea level.
Medium Intensity Runway Lights (MIRL)	For use on VFR runways or runway showing a nonprecision instrument flight rule (IFR) procedure for either circling or straight-in approach.
Minimum Altitude	That designated altitude below which an IFR pilot is not allowed to fly unless arriving or departing an airport or for specific allowable flight operations.
National Airspace System	The common network of United States airspace, navigation aids, communications facilities and equipment, air traffic control equipment and facilities, aeronautical charts and information, rules, regulations, procedures, technical information and FAA manpower and material.
National Plan of Integrated Airport Systems (NPIAS)	A plan prepared annually by the FAA which identifies, for the public, the composition of a national system of airports together with the airport development necessary to anticipate and meet the present and future needs of civil aeronautics, to meet requirements in support of the national defense and to meet the special needs of the Postal Service. The plan includes both new and qualitative improvements to existing airports to increase their capacity, safety, technological capability, etc.
NAVAID	A ground based visual or electronic device used to provide course or altitude information to pilots.
Noise	Defined subjectively as unwanted sound. The measurement of noise involves understanding three characteristics of sound: intensity, frequency and duration.
Noise Contours	Lines drawn about a noise source indicating constant energy levels of noise exposure. DNL is the measure used to describe community exposure to noise.

Noise Exposure Level	The integrated value, over a given period of time of a number of different events of equal or different noise levels and durations.
Non-Precision Instrument	A runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance for which a straight-in nonprecision instrument approach procedure has been approved.
Notice to Airmen (NOTAM)	A notice containing information (not known sufficiently in advance to publicize by other means concerning the establishment, condition or change in any component (facility, service, or procedure) of or hazard in the National Airspace System, the timely knowledge of which is essential to personnel concerned with flight operations.
Object	Includes, but is not limited to, above ground structures, NAVAIDs, people, equipment, vehicles, natural growth, terrain and parked aircraft.
Object Free Area (OFA)	A two-dimensional ground area-surrounding runways, taxiways and taxilanes which is clear of objects except for object whose location is fixed by function.
Obstacle Free Zone (OFZ)	The airspace defined by the runway OFZ and, as appropriate, the inner-approach OFZ and the inner-transitional OFZ, which is clear of object penetrations other than frangible NAVAIDs.
Obstruction	An object which penetrates an imaginary surface described in the FAA's Federal Aviation Regulations (FAR), Part 77.
Parking Apron	An apron intended to accommodate parked aircraft.
Pattern	The configuration or form of a flight path flown by an aircraft or prescribed to be flown, as in making an approach to a landing.
Precision Approach Path Indicators (PAPI)	The visual approach slope indicator system furnishes the pilot visual slope information to provide safe descent guidance. It provides vertical visual guidance to aircraft during approach and landing by radiating a directional pattern of high intensity red and white focused light beams which indicate to the pilot that they are "on path" if they see red/white, "above path" if they see white/white and "below path" if they see red/red.
Primary Surface	A surface longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway, but when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway.
Rotating Beacon	A visual navaid operated at many airports. At civil airports, alternating white and green flashes indicate the location of the airport.
Runway	A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of airplanes.

Runway Design Code (RDC)	A code signifying the design standards to which the runway is to be built.
Runway End Identifier Lights (REIL)	REILs are flashing strobe lights which aid the pilot in identifying the runway end at night or in bad weather conditions.
Runway Gradient	The average gradient consisting of the difference in elevation of the two ends of the runway divided by the runway length may be used provided that no intervening point on the runway profile lies more than five feet above or below a straight line joining the two ends of the runway. In excess of five feet the runway profile will be segmented and aircraft data will be applied for each segment separately.
Runway Lighting System	A system of lights running the length of a system that may be either high intensity (HIRL), medium intensity (MIRL), or low intensity (LIRL).
Runway Orientation	The magnetic bearing of the centerline of the runway.
Runway Protection Zone (RPZ)	An area off the runway end used to enhance the protection of people and property on the ground.
Runway Safety Area (RSA)	A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion form the runway.
Segmented Circle	A basic marking device used to aid pilots in locating airports and which provides a central location for such indicators and signal devices as may be required.
Small Aircraft	An airplane of 12,500 pounds or less maximum certified takeoff weight.
Taxiway	A defined path established for the taxiing of aircraft from one part of an airport to another.
Taxiway Design Group (TDG)	A classification of airplanes based on outer to outer Main Gear Width (MGW) and Cockpit to Main Gear distance (CMG).
Terminal Area	The area used or intended to be used for such facilities as terminal and cargo buildings, gates, hangars, shops and other service buildings, automobile parking, airport motels, restaurants, garages and automobile services and a specific geographical area within which control of air traffic is exercised.
Threshold	The beginning of that portion of the runway available for landing.
Touch and Go Operations	Practice flight performed by a landing touchdown and continuous takeoff without stopping.
Traffic Pattern	The traffic flow that is prescribed for aircraft landing at, taxiing on or taking off form an airport. The usual components are the departure, crosswind, downwind, and base legs; and the final approach.

Transitional Surface	These surfaces extend outward and upward at right angles to runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces.
Universal Communications (UNICOM)	A private aeronautical advisory communications facility for purpose other than air traffic control. Only one such station is authorized in any landing area. Service available are advisory in nature primarily concerning the airport services and airport utilization. Locations and frequencies of UNICOMs are listed on aeronautical charts and publications.
Visual Flight Rules (VFR)	Rules that govern flight procedures under visual conditions.
Visual Runway	A runway intended for visual approaches only with no straight- in instrument approach procedure either existing or planned for that runway.