DESTINATION 2025
TRUCKEE TAHOE AIRPORT
A MASTER PLAN PILOTED BY THE COMMUNITY

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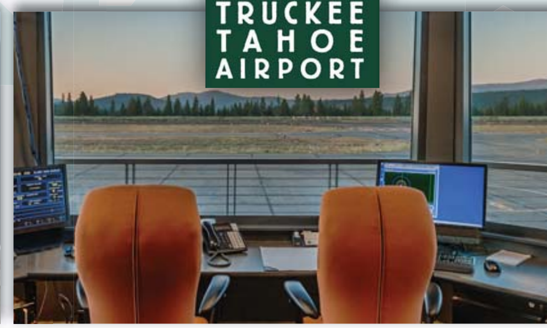
JULY 2015



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MASTER PLAN

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Acronyms

AC Advisory Circular

ACRP Airport Cooperative Research Program

ADG Airplane Design Group

ADO Airports District Office

AGL Above Ground Level

AIP Airport Improvement Program

AIRS Aerometric Information Retrieval System

ALP Airport Layout Plan

ALS Approach Lighting System

AMSL Above Mean Sea Level

AOC Airport Operating Certificate

AOPA Aircraft Owners and Pilots Association

APV Approach Procedure with Vertical Guidance

ARC Airport Reference Code

ARFF Aircraft Rescue and Firefighting Facility

ARTCC Air Route Traffic Control Center

ASV Annual Service Volume

ATC Air Traffic Control

ATCT Airport Traffic Control Tower

AVGAS Aviation Gasoline

BCA Benefit Cost Analysis

BMP Best Management Practice

CAP Civil Air Patrol

CBD Central Business District

CFR Code of Federal Regulations

CIP Capital Improvement Program

CTAF Common Traffic Advisory Frequency

dB Decibel

DNL Day-Night Noise Level

EPA Environmental Protection Agency

FAA Federal Aviation Administration

FAR Federal Aviation Regulations

FBO Fixed Base Operator

FCT FAA Contract Tower

GA General Aviation

GDP Gross Domestic Product

GMA Growth Management Act

GQS Glidepath Qualification Surface

GPS Global Positioning System

HIRL High Intensity Runway Lights

IAP Instrument Approach Procedure

IFR Instrument Flight Rules

ILS Instrument Landing System

IMC Instrument Meteorological Conditions

INM Integrated Noise Model

LIRL Low Intensity Runway Lights

LITL Low Intensity Taxiway Lights

LOI Letter Of Intent

LOS Level of Service or Line of Sight

LPV Localizer Performance with Vertical Guidance

MALS Medium Intensity Approach Lighting System

MALSR Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights

MAS Missed Approach Segment

MIRL Medium Intensity Runway Lights

MITL Medium Intensity Taxiway Lights

MTOW Maximum Takeoff Weight

NAAQS National Ambient Air Quality Standards

NAS National Airspace System

NASA National Aeronautics and Space Administration

NAVAIDS Navigational Aids

NCDC National Climatic Data Center

NDB Non-Directional Beacon

NEPA National Environmental Policy Act

NHPA National Historic Preservation Act

NM Nautical Mile

NOAA National Oceanic and Atmospheric Administration

NPIAS National Plan of Integrated Airport Systems

NRCS National Resources Conservation Service

NRHP National Register of Historic Places

OCS Obstacle Clearance Surface

ODALS Omnidirectional Approach Lighting System

OPBA Operation Per Based Aircraft

PAPI Precision Approach Path Indicator

PCA Permit Compliance System

PVC Poor Visibility and Ceiling

RCL Runway Centerline Lighting

REIL Runway End Identifier Lights

RNAV Area Navigation

RNP Required Navigation Procedure

ROFA Runway Object Free Area

RPZ Runway Protection Zone

RSA Runway Safety Area

RTR Remote Transmitter/Receiver

RVR Runway Visual Range

SEL Sound Exposure Level

TACAN Tactical Air Navigation

TAF Terminal Area Forecasts

TDZ Touchdown Zone

TERPS United States Standard for Terminal Instrument Approach Procedures

TOFA Taxiway Object Free Area

TRACON Terminal Radar Approach Control

TSA Transportation Security Administration

TSS Threshold Siting Surface

UNICOM Universal Communications

USDA United States Department of Agriculture

USFWS United States Fish and Wildlife Service

VFR Visual Flight Rules

VLJ Very Light Jet

VMC Visual Meteorological Conditions

VOR Very High Frequency Omnidirectional Range

VOR/DME Very High Frequency Omnidirectional Range with Distance Measuring Equipment

VORTAC Very High Frequency Omnidirectional Range/Tactical Air Navigation

Glossary

Above Mean Sea Level. The elevation of an object above the average sea level.

Air Carrier. A commercial airline with published schedules operating at least five round trips per week.

Aircraft Operation. An aircraft arrival (landing) or an aircraft departure (takeoff) represents one aircraft operation.

Aircraft Rescue and Firefighting Facility. A facility housing specifically trained personnel and equipment in response, firefighting, hazard mitigation, evacuation, and rescue of passengers and crew of an aircraft involved in a ground emergency.

Airport Layout Plan. The official, FAA approved drawing of an airport's existing and proposed facilities.

Airport Reference Code. An FAA design criteria based upon the approach speed (represented by a capital letter) and wingspan (represented by a roman numeral) of an aircraft that produces a minimum annual itinerant operations per year at an airport.

Airport Traffic Control Tower. A central operations tower in the terminal air traffic control system with an associated IFR room if radar equipped, using air to ground communications and/or radar, visual signaling, and other devices to provide the safe and expeditious movement of air traffic.

Air Route Traffic Control Center. A facility providing air traffic control to aircraft on an IFR flight plan within controlled airspace and principally during the enroute phase of flight.

Air Traffic Control. The control of aircraft traffic in the vicinity of airports from control towers, and in the airways between airports from control centers.

Annual Service Volume. A reasonable estimated of an airport's annual capacity (i.e., the level of annual aircraft operations that will result in an average annual aircraft delay of approximately one to four minutes).

Approach Lighting System. Radiating light beams guiding pilots to the extended runway centerline on final approach and landing.

Area Navigation. A method of navigation that permits aircraft operation on any desired course within the coverage of station-referenced navigation signals or within the limits of a self-contained system capability, or a combination of these.

Boarding Load Factor. The ratio of aircraft seats available for passenger boarding compared to the number of passengers actually boarding.

Common Traffic Advisory Frequency. The name given to a VHF radio frequency used at U.S., Canadian, and Australian airports that do not have an active or on-site control tower.

Community Noise Equivalent Level (CNEL). While DNL is the primary metric FAA uses to determine noise impacts. FAA accepts the CNEL when a state requires that metric to assess noise effects. Only California requires use of CNEL; Like DNL, CNEL adds a 10 dB penalty to each aircraft operation between 10:00 PM and 7:00 AM, but CNEL also adds a 5 dB penalty for each aircraft operation during evening hours (7:00 PM to 10:00 PM).

Decibel. A measurement used to quantify sound levels referencing a scale from the threshold of human hearing, 0 dB, upward toward the threshold of pain, about 120-140 dB.

Distance Measuring Equipment. Equipment used to measure, in nautical miles, the distance of an aircraft from the broadcasting facility.

Day-Night Noise Level. The daily average noise metric in which noise occurring between 10:00 p.m. and 7:00 a.m. is penalized by 10 db. DNL is often expressed as annual average noise levels.

Federal Aviation Regulations. The rules and regulations that govern the operation of aircraft, airways, airmen, and airports.

Fixed Based Operator. A facility on an airport providing various services for aircraft such as maintenance, fuel, storage, etc.

Fleet Mix. The mix or differing aircraft types operated at a particular airport or by an airline.

Flight Plan. Specific information related to the intended flight of an aircraft, filed with a Flight Service Station or Air Traffic Control facility.

General Aviation. Civil aviation excluding air carriers, commercial operations, and military aircraft.

Glide Slope. An angle of approach to a runway established by means of airborne instruments during instrument approaches, or visual ground aids for the visual portion of an instrument approach and landing.

Global Positioning System. A satellite-based radio positioning, navigation, and time-transfer system.

High Intensity Runway Lights. High intensity light fixtures delineating the limits of a runway served by a precision instrument approach procedure.

Instrument Approach. A series of predetermined maneuvers developed for the orderly transfer of aircraft under instrument flight conditions, from the beginning of the initial approach to a landing, or to a point from which a landing may be made visually.

Instrument Flight Procedure. Procedures developed by the FAA to guide aircraft to airports including distance, topography, elevation, coordinates, angle of approach, and missed approach procedures.

Instrument Flight Rules. Rules specified by the FAA for the flight under weather conditions in which visual reference cannot be made to the ground and the pilot must rely on instruments to fly and navigate.

Instrument Landing System. A precision instrument approach system that normally consists of a localizer antenna, glide slope antenna, outer marker, middle marker, and ad approach lighting system.

Instrument Meteorological Conditions. Weather conditions that require that pilots rely primarily on instrumentation for navigation under IFR, rather than by visual reference and VFR.

Integrated Noise Model (INM). FAA's computer model used by the civilian aviation community for evaluating aircraft noise impacts near airports. The INM uses a standard database of aircraft characteristics and applies them to an airport's average operational day to produce noise contours.

Itinerant Operation. An aircraft landing or takeoff that originates at one airport and terminates at another (place-to-place).

Knots. A measure of speed used in navigation. One knot is equal to one nautical mile per hour (1.15 knots – 1 mile per hour).

Landing Minimums. Prescribed altitudes and visibility distances that the pilot uses to make a decision as to whether or not it is safe to land on a particular runway.

Local Operation. An aircraft landing or takeoff that remains in the local traffic pattern (i.e. training or touch-and-go operation).

Level of Service. A measure that determines the quality of service provided by transportation devices, or transportation infrastructure, and is generally linked to time and speed of the vehicles.

Low Intensity Runway Lights. Low intensity light fixtures delineating the limits of a runway having no instrument approach procedures.

Load Factor. The percentage of seats occupied on an aircraft by passengers.

Medium Intensity Approach Lighting System with Runway Alignment Indicator Lights. A medium intensity approach lighting system providing a visual lighting path for landing pilots, consisting of nine light bars with five steady burning white fixtures, five sequential flashing white fixtures, and a threshold bar of 18 steady burning green fixtures.

Medium Intensity Runway Lights. Medium intensity light fixtures delineating the limits of a runway supplied with a non-precision instrument approach procedure.

Middle Marker. A beacon that defines a point along the glide slope of an Instrument Landing System, normally located at or near the point of decision height.

Missed Approach. An instrument approach not completed by a landing. This may be due to visual contact not established at authorized minimums or instructions from air traffic control, or other reasons.

National Ambient Air Quality Standards. Standards established by the United States Environmental Protection Agency for six outdoor air pollutants considered harmful to the public health and the environment.

National Airspace System. The common network of U.S. airspace, air navigation facilities, equipment and services, airports or landing areas, aeronautical charts, information and services, rules, regulations and procedures, technical information, manpower, and material.

National Plan of Integrated Airport Systems. Established by the Airport and Airway Improvement Act of 1982, it is the identification of national airport system needs including short- and long-term development costs.

Nautical Mile. A measure of distance used in air and sea navigation. One nautical mile is equal to the length of one minute of latitude along the Earth's equator, officially set as 6,076.115 feet.

Navaid. Any facility providing assistance or aid to pilots for navigating through the air.

Noise Contour. The "map" of noise exposure around an airport, computed by the Integrated Noise Model. The FAA defines significant noise exposure as any area within the 65 DNL contour, which is the area within an annual average noise exposure of 65 decibels or higher.

Non-Directional Beacon. A navaid providing signals that can be read by pilots of aircraft equipped with direction finding equipment, used to determine bearing and can "home" in or track to or from the desired point.

Non-Precision Approach. A standard instrument approach procedure in which no vertical guidance is provided.

Omnidirectional Approach Lighting System. An approach lighting system consisting of five sequential flashing omnidirectional lights extended along the runway centerline and two located on either side of the runway threshold.

Outer Marker. A navigational facility within the terminal area navigational system located four to seven miles from the runway threshold on the extended centerline indicating the beginning of the final approach.

Precision Approach Path Indicator. A visual navigational aid providing guidance information to help pilots acquire and maintain the correct approach (in the vertical plane) to a runway.

Runway. A strip of pavement, land, or water used by aircraft for takeoff or landing.

Runway Object Free Area. A defined two-dimensional surface centered on a runway providing enhanced safety for aircraft operations by having the area free of objects protruding above the runway safety area edge elevation, except for objects that need to be located within the area for air navigation or aircraft ground maneuvering purposes.

Runway Safety Area. A defined surface surrounding a runway prepared or suitable for reducing the risk or damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

Runway Visual Range. Facilities providing a measurement of horizontal visibility located adjacent to instrument runways.

Single Event. Noise generated by a single aircraft overflight.

Tactical Air Navigation. An enroute navaid combining azimuth and distance measuring equipment into one unit and operated in the ultra-high frequency band.

Taxiway. A designated area that connects runways with aprons, providing the ability to move aircraft on the ground so they will not interfere with takeoffs or landings.

TAXILANE: The portion of the aircraft parking area used for access between taxiways, aircraft parking positions, hangars, storage facilities, etc.

Terminal Airspace. The airspace controlled by a terminal radar approach control facility.
Terminal Area. A general term used to describe airspace in which approach control service or airport traffic control service is provided.

Terminal Radar Approach Control. An FAA air traffic control service to aircraft arriving, departing, or transiting airspace controlled the facility.

Transient Aircraft. An aircraft that is not based at the airport in which it is currently located.

Very High Frequency Omnidirectional Range. A ground based electronic navigation aid transmitting navigation signals for 360° oriented from magnetic north.

Very High Frequency Omnidirectional Range/Tactical Air Navigation. A ground based electronic navigation aid providing VOR azimuth, TACAN azimuth, and TACAN distance measuring equipment at a single site.

Visual Approach. An aircraft approach conducted under IFR, which authorizes the pilot to proceed visually and clear of clouds to the airport. The pilot must, at all times, have either the airport or the preceding aircraft in sight.

Visual Flight Rules. Rules that govern the procedures for conducting flight under visual meteorological conditions.

Visual Meteorological Conditions. Weather conditions under which pilots have the ability to visually see and avoid stationary objects and other aircraft and fly without the use of instrumentation, under VFR.

Executive Summary

The Truckee Tahoe Airport District (TTAD) elected to prepare this update to the 2000 Master Plan to identify/define/map the best approach to guide the Airport's operation and development through 2025. The plan development process emphasized inclusion of the community in shaping this plan: 'a plan piloted by the community'. The goal of the TTAD Board was to use broad public input to define how the Airport can best serve the region now and into the future. The input process was highly interactive with the goal of collecting as many ideas as possible; a comprehensive outreach program was conducted throughout the master plan process. Eight community workshops were held in the preliminary stages of this report's development to gather the ideas and preferences of area residents. A project website was also created to provide another means for the public to comment on this plan.

Many comments, concepts, and ideas were received, considered, and incorporated into this master plan. However this master plan is not inclusive of all 3,300 comments received from the master plan workshops, Godbe survey, and online surveys. Community input is summarized in the Master Plan Community Outreach Summary Report and is included in Appendix A of this master plan.

The TTAD values all of the comments received and is committed to utilizing these ideas in implementing the new plan. Many of the ideas not depicted in the master plan may be found in the Airport District's Strategic Plan, Capital Facility Plans, Forest Management Plans, Trails Master Plan, and other guiding TTAD documents. These documents can be found on the Airport District's website at www.truckeetahoeairport.com or by contacting TTAD staff directly.

The ultimate goal of this plan is to recommend development plans and policies that best fit the needs of the Airport and community while protecting those living nearby. Report content closely follows FAA guidance contained in Advisory Circular 150/5070-6B, *Airport Master Plans*. The three primary focus areas of the report are as follows:

- **Exploring options to expand annoyance mitigation programs**
- **Managed growth of aviation facilities**
- **Enhancement of community-related functions**

This master plan should be viewed as a planning tool and does not mandate action by the TTAD Board of Directors. An airport master plan provides a road map for efficiently meeting aviation demand through the foreseeable future while preserving the flexibility necessary to respond to changing industry conditions. The Truckee Tahoe Airport Master Plan is organized into the following chapters:

- **Inventory of Existing Conditions**
- **Aviation Forecasts**
- **Facility Requirements**
- **Alternatives Analysis**
- **Adoption and Implementation**

MASTER PLAN

Chapter 1

Inventory of Existing Conditions

MASTER PLAN

CHAPTER 1

Inventory of Existing Conditions

1. INTRODUCTION

This paper summarizes a variety of background information about Truckee Tahoe Airport (TRK) and its environs. This information provides much of the factual foundation for the airport master plan study. Included is data regarding the community in which the airport is located, the Truckee Tahoe Airport District (TTAD) and its policies, and the airport facilities and operations.

2. TRUCKEE AND NORTH LAKE TAHOE COMMUNITY PROFILE

Truckee Tahoe Airport is a regional general aviation airport serving the Town of Truckee, communities along the northern side of Lake Tahoe, and other nearby areas in the central Sierra Nevada mountain range of California. The Town of Truckee, the only incorporated place in the region, lies directly to the northwest with the town boundary wrapping around the west and north sides of the airport property. The airport property straddles the county line between Nevada County on the north and Placer County to the south. Airport facilities are predominantly in Nevada County, but the southern ends of the runways and about a third of the contiguous airport property lies in Placer County. The Nevada state line lies 7 miles to the east.

The topography of the airport environs is mountainous. While the airport itself sits on the relatively level floor of the Martis Valley at an elevation of 5,900 feet, surrounding peaks reach elevations of 9,000 to nearly 11,000 feet. Donner Pass to the west has an elevation of 7,239 feet. Flowing from Lake Tahoe to Reno and ultimately discharging into Pyramid Lake, the Truckee River runs north of the airport through the center of Truckee. The primary highway access to the Truckee area is provided by Interstate 80 (1-80). Running through Donner Pass, 1-80 connects the local area with Sacramento, California, 90 miles to the southwest, Reno, Nevada, 24 miles northeast, and other points from coast to coast. State Highways 89 and 267 extend southward from Truckee to the shores of Lake Tahoe. Following the same east/west corridor as the Interstate is the Union Pacific Railroad main line, part of the transcontinental railroad system. Extensive freight traffic passes through Truckee and the town is served by Amtrak passenger service. The Truckee Transit system of buses also operate throughout the area transporting passengers to and from the airport, downtown, recreation center, and ski resorts.

The economy of the Truckee and Lake Tahoe region is heavily dependent on recreation. Numerous ski resorts are situated in the nearby mountains and hiking and other outdoor activities are popular during the summer. The recreational character of the region results in population that varies greatly from season to season. The year-round population of Truckee, as measured by the 2010 U.S. census, is 16,180. Approximately 10,000 full-time residents live in the communities of north Lake Tahoe and elsewhere nearby in Placer County[1]. Additionally, with some 65% of the housing stock consisting of second homes,[2] a much larger population has a residential connection to the community. Additional information about the Truckee Tahoe Airport environs is summarized in **Table 1-1**.

3. AIRPORT ENVIRONS LAND USES AND PLANNING

The environs of TRK consist of a variety of uses common to small towns. Residential neighborhoods exist adjacent or within 2,500 feet of airport property in most directions. Only to the east is there very little development. The major uses in that direction are the town's wastewater treatment plant and a quarry and gravel plant facility. Low-rise lodging and commercial uses are found along the airport's western side as well as in the Truckee town center a mile to the northwest.

The responsibility for land use planning in the airport area rests with the Town of Truckee and the two counties, Nevada and Placer. Completion of the Highway 267 bypass in 2004 has led to new construction along the western side of the airport and there are plans for future development. New development within the downtown area, particularly at the old railyard site, is planned. Lands along the airport's north side are designated for more industrial uses under the Town's *2025 General Plan*, adopted in 2006. The 1996 *Nevada County General Plan* calls for new planned-development residential uses east of the airport. The *Martis Valley Community Plan*, adopted by Placer County in 2003, anticipates further residential development south of the airport around the Lahontan and Northstar resorts and on the east side of Highway 267.

Also influencing land use planning in the airport environs is the *Truckee Tahoe Airport Land Use Compatibility Plan (ALUCP)*. The *ALUCP* was adopted in 2004 by the Foothill Airport Land Use Commission (ALUC), which at the time served as the ALUC for the airport. That function now resides with a new Truckee Tahoe ALUC staffed by the Nevada County Transportation Commission (NCTC). The *ALUCP* is based upon the 2000 *Truckee Tahoe Airport Master Plan* and provides criteria for evaluating whether new development in the airport vicinity will be compatible with the noise and safety impacts of the airport.

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1 Source: Placer County website

2 Source: *Tahoe Daily Tribune*, July 4, 2010. The percentage cited is with reference to homes around Lake Tahoe and is presumed here to also be valid for second homes in the TTAD. Also, the Tahoe Regional Planning Agency *2011 Threshold Evaluation Report*, Appendix A, Socioeconomic Setting, lists the rate of secondary/seasonally used home ownership at 58% within the region.

Table 1-1 TRUCKEE COMMUNITY PROFILE

GEOGRAPHY

Location

On boundary between Nevada and Placer Counties

Two miles southeast Truckee town center; 24 miles southwest of Reno, Nevada, 90 miles northeast of Sacramento

Land Use Jurisdictions

County of Nevada:

Northern two-thirds of airport property within unincorporated Nevada County

County of Placer:

Southern third of airport property within County limits

Town of Truckee:

Portion of building area on west airfield within Town limits

EXISTING AIRPORT AREA LAND USES

General Character

Urban area of Truckee west and northwest of airport

Residential areas to west and in hills to south

Generally open land near airport; mountainsides more forested

Open space/evergreen forest associated with Tahoe National Forest to south and east

Rising Terrain to the east, south, and west; surrounding peaks reach 9,000' to 11,000'; Donner Pass to west has elevation of 7,239'

Runway Approaches

Northwest (Rwy 11): Residential areas to each side of runway centerline within 0.5 mile of runway end; Hwy 267 (0.4 mi.); Truckee wastewater treatment ponds, Union Pacific rail line (0.7 mi.); Interstate 80 (1.5 mi.); downtown Truckee (1.6 mi. WNW)

Southeast (Rwy 29): Martis Creek Lake National Recreational Area borders airport; rising terrain beyond

Southwest (Rwy 2): Rangelands, wetlands beyond runway end; Hwy 267 (0.2 mi.); Lahontan resort area 1.0 mile distant and 100 to 200 feet above runway end

Northeast (Rwy 20): Largely open, undeveloped lands; Glenshire/Devonshire 2.0 miles distant

POPULATION AND ECONOMY

Current/Historical Population

	1990	*2000*	*2010*	*2012*
Nevada County	78,510	92,033	98,764	98,202
Placer County	172,796	248,399	348,432	360,680
Town of Truckee	11,000	13,864	16,180	15,918

(Source: California Department of Finance)

Projected Population

	2015	*2020*	*2030*
Nevada County	98,596	104,343	109,325
Placer County	371,536	391,682	415,027

(Source: California Department of Finance, Jan 2013)

Basis of Economy

Economy historically based on tourism to the Lake Tahoe area and ski resorts in the winter months.

Major employment by industry in two-county area:

Government	24%
Trade, Transportation, Utilities	19%
Education, Health Services	11%
Agriculture	11%
Leisure, Hospitality	8%
Manufacturing	8%

(Source: California Economic Development Department)

SURFACE TRANSPORTATION

Highways

Two state highways serve the Truckee area:

Hwy 267: Adjacent to the south edge of Airport boundary; connects Lake Tahoe area near Kings Beach to Interstate 80

Hwy 89: North-south thoroughfare on the west side of Lake Tahoe, through Squaw Valley, intersecting Interstate 80 and continuing north into Sierra Co.

Interstate highways:

I-80: 2 miles NW; connects local area with Sacramento to west and Reno to east

Public Transportation

Truckee Transit operates throughout area:

Buses serve the Truckee-Tahoe Airport, Recreation Center, Pioneer Commerce Center, and Downtown plus ski resorts in the winter months.

CLIMATE

Period of Record Monthly Climate Summary	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUAL
Average Maximum Temperature (F)	39.2	41.9	46.7	53.7	63.0	72.9	82.3	81.2	74.4	63.4	49.5	40.8	59.1
Average Minimum Temperature (F)	14.6	16.7	21.0	26.2	32.3	37.4	41.7	40.3	35.8	29.0	22.3	16.1	27.8
Average Total Precipitation (in.)	5.79	5.02	4.28	1.96	1.31	0.59	0.35	0.35	0.63	1.52	3.25	5.11	30.15
Average Total Snow Fall (in.)	48.3	41.9	37.4	15.3	4.1	0.4	0.0	0.0	0.4	2.8	16.2	34.9	201.8
Average Snow Depth (in.)	21	28	22	9	1	0	0	0	0	0	2	11	8

Source: Weather Regional Climate Center; Period of Record: 9/01/1904 – 12/08/2011

4. TRUCKEE TAHOE AIRPORT DISTRICT

Figure 1-1 depicts the Truckee Tahoe Airport District's Boundary.

Figure 1-2 identifies the neighborhoods around the airport.

Table 1-2 presents a table summary of policies and supporting information particularly relevant to the Airport Master Plan study.

Truckee Tahoe Airport is rare among airports in California in that it is owned by a special district rather than by a county, city, or private enterprise. The Truckee Tahoe Airport District (TTAD or District) was created by vote of the District electorate in 1958 in accordance with the California Airport Districts Act.[3] The District covers an area of approximately 485 square miles in eastern Nevada and Placer counties. It is governed by a five-member Board of Directors directly elected by residents of the District. Making recommendations to the Board is an Airport Community Advisory Team (ACAT) comprised of three pilots and three non-pilots from the community. The ACAT delves into a wide range of topics focused mainly on noise and annoyance. The responsibility for carrying out Board directions and administering day-to-day operations of the airport rests with the General Manager and other staff.

Over the years, the District has adopted various policies to guide its operations and use of funds. Most fundamental among the internal guiding documents is the District's *Strategic Plan* completed in March 2011. The *Strategic Plan* "…is a blueprint for how the District will respond to future challenges and changing priorities and give direction on how to achieve future success." It addresses airport facilities and services, the airport's relationship to the community, finances, and governance.

Two other types of guiding documents serve as input to and output from the *Strategic Plan*. Feeding into and serving to set the *Strategic Plan* tone has been a series of public surveys that the District has authorized. Conducted by Godbe Research, these surveys have explored the awareness, use, and perceptions of the airport among local residents and pilots. The original 2005 survey was updated in 2009 and a third iteration is planned for mid-2013.

Implementation of the *Strategic Plan* largely takes place via a set of detailed operating policies and the District's annual budget. The detailed Policy Instructions cover topics ranging from staff medical insurance to hot air balloon operations. Policies of particular relevance to the master planning process are noted in **Exhibit 3**. The District's budget spells out the anticipated sources of revenue and how the money will be spent each year. Property tax, at a rate of $0.28 per $1,000 of assessed value, is the major source of District revenue. For 2013-14, the District is expected to collect approximately $4.36 million in property taxes, roughly half of the total operating and capital budget of just over $8.0 million.[4]

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[3] Public Utilities Code Section 22001 *et seq.*
[4] Source: Truckee Tahoe Airport website

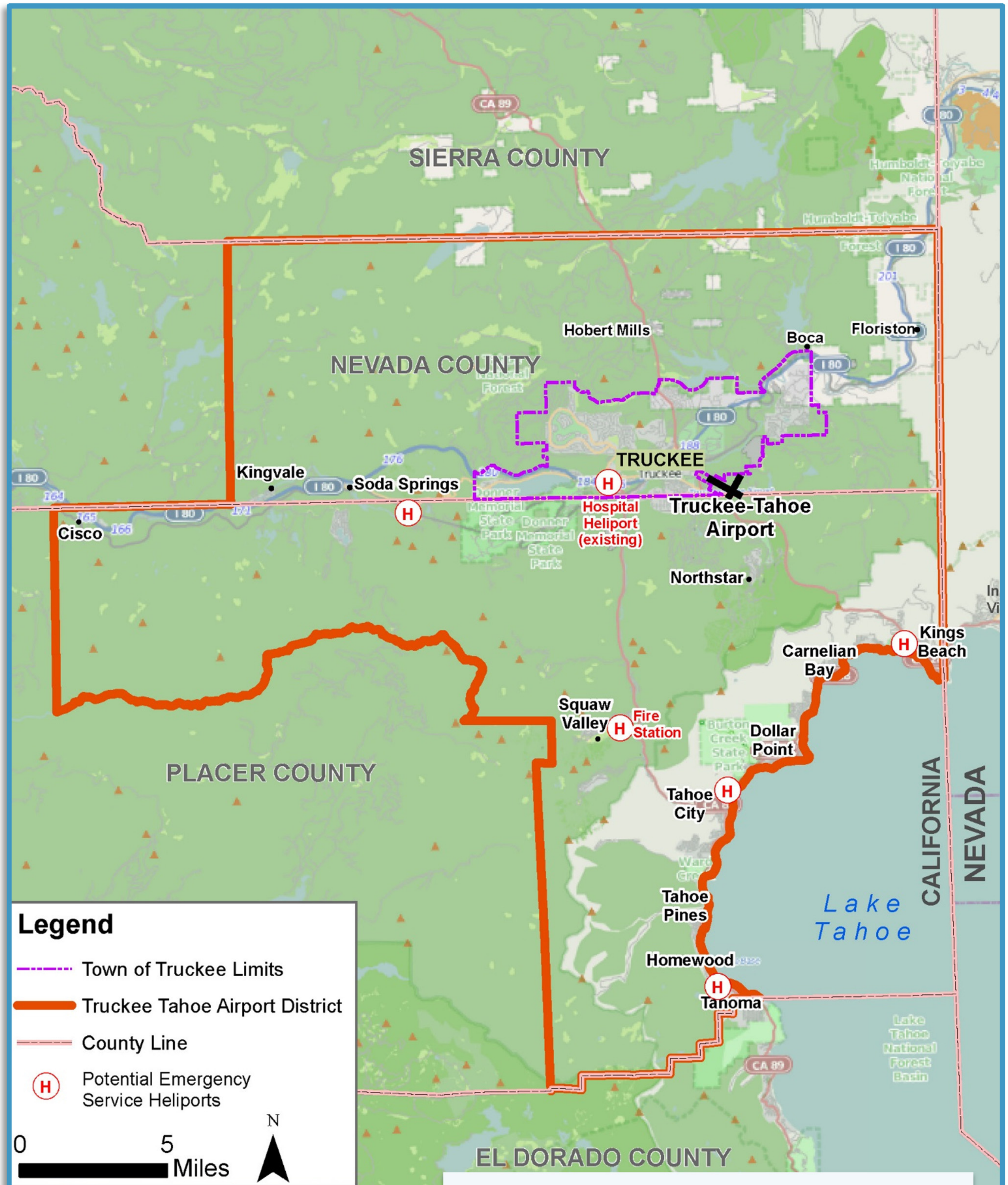


Figure 1-1 TRUCKEE TAHOE AIRPORT DISTRICT BOUNDARY

Table 1-2 TRUCKEE TAHOE AIRPORT DISTRICT GUIDING DOCUMENTS AND POLICIES

STRATEGIC PLAN

Approved by the TTAD Board July 28, 2011

"… is a blueprint for how the District will respond to future challenges and changing priorities and give direction on how to achieve future success."

Mission: "The Truckee Tahoe Airport is a community airport that provides high-quality aviation facilities and services to meet local needs. We strive for low impact on our neighbors while enhancing the benefit to the community-at-large."

Outlines TTAD objectives within each of six strategy areas:

- 1. Site and Facilities
- 2. Standards of Service
- 3. Community Benefit
- 4. Communication and Community Outreach
- 5. District Finances
- 6. Board Governance

Among objectives of particular relevance to Airport Master Plan are:

- 1.1.2: If necessary, aggressively seek and utilize State and Federal funding to facilitate appropriate airport improvements. Improvements will be based on capital project programming and District needs rather than solely on FAA or other public funding availability.
- 1.1.3: Constituent airport users and community members shall create the demand for new facility and airfield improvements within the capacities and mission of the District.
- 1.1.5: The District will consider and anticipate community and stakeholder concerns, workforce and technology trends, and current trends in general aviation as part of the planning and improvement programming process.
- 1.2.1: Keep all pavement in appropriate condition for the specific use of each pavement section.
- 1.3.1: Education and technology shall be areas of dual focus. The District is open to exploring and considering the latest technology from the FAA and aircraft instrumentation vendors to broaden the set of technologies which can assist pilots with safe takeoffs and landings at the airport. We will educate pilots on these technologies, as well as local flying conditions.
- 1.3.2: While safety improvements are encouraged and welcomed, the District will be sensitive to the effects of new aviation enhancement technologies and their impact on the community…
- 2.3.1: Board of Directors, staff, and airport users will work together to define appropriate and necessary aviation services.
- 3.1.1: If not required for maintenance of District assets, a portion of tax revenue will be budgeted each year for possible open space acquisition participation…
- 3.3.1: Work closely with the airport users, pilot community, and the residents of the District to improve on Fly Quiet program. Use specified programs and non-traditional approaches to encourage observance of annoyance mitigation programs…
- 3.4.3: Property acquisitions will consider community enhancement benefits and value to District constituents as opportunities are reviewed.
- 4.1.2: Inform users on airport issues to improve understanding of issues and decisions…

Property tax revenues are to be allocated for various purposes in accordance with these target percentages:

Operations	20%
TTAD Portion of Grants	10%
Annoyance Reduction and Community Outreach Projects	25%
Other Capital Projects	15%
Land Purchase and Management	30%

COMMUNITY SURVEY

Conducted by Godbe Research in 2005, 2009 and 2013

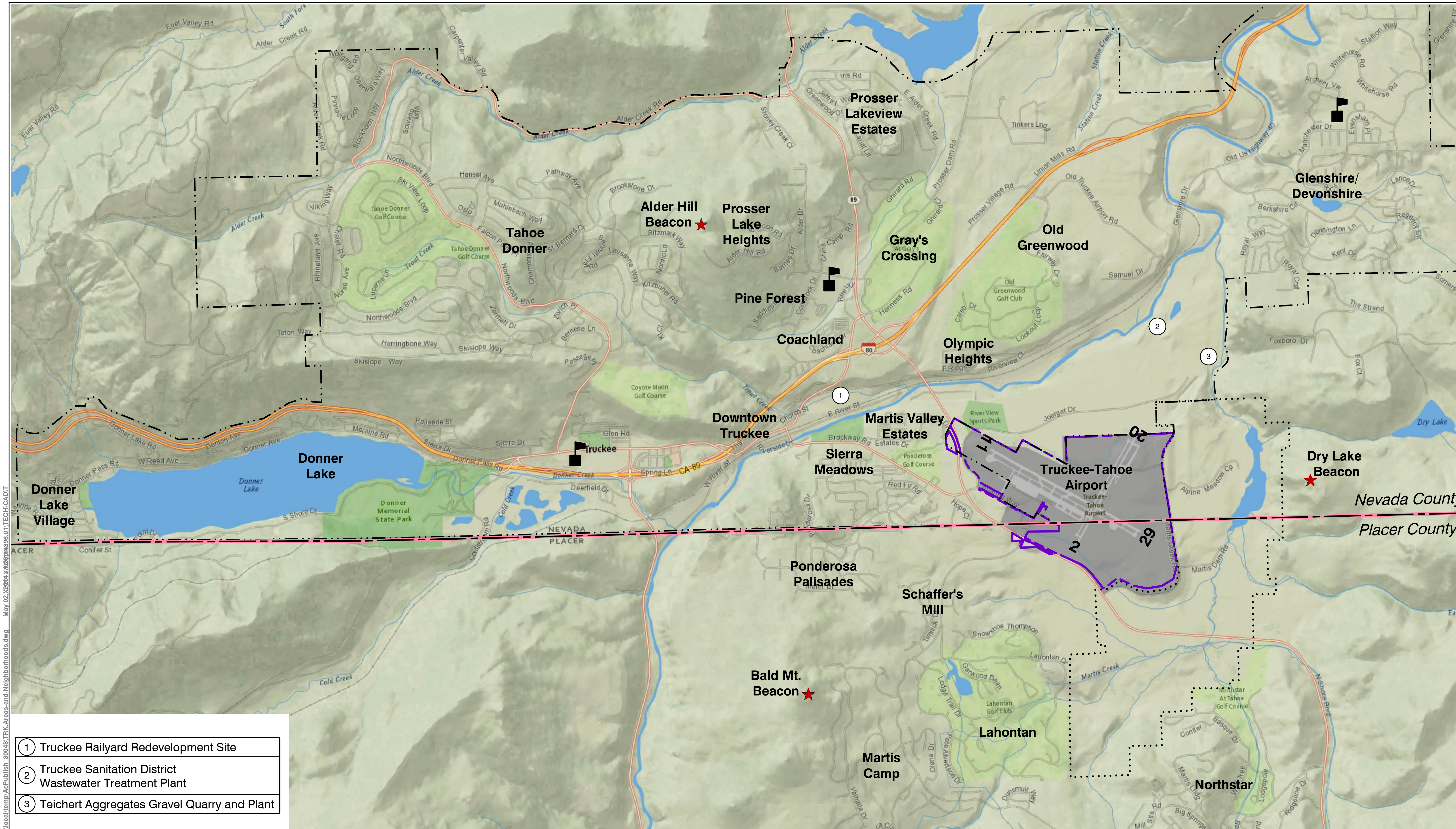
500 local residents and 65 local pilots surveyed by telephone in 2013. Highlights of the 2013 survey include:

"Residents and pilots largely have a common opinion and vision of the airport. At the same time, these two groups differ in their attitudes toward airport regulations and limitations, particularly concerning an imposed curfew. As such, communications on these issues should carefully consider their divergent perspectives and opinions."

- Residents have a high awareness of the airport
- Residents' opinions of the airport improved from 2005 and 2009 to 2013
- Positive opinions are particularly high among pilots (9 out of 10)
- Residents and pilots consider different airport services and capabilities to be a priority
- The residents and pilots rated emergency services and preservation of open space to be the most important services of the airport.
- Residents largely consider regulation of noise and low-flying aircraft to be a role of the airport
- 89% of residents, and 76% of pilots, agreed that "The airport should manage the growth of operations to be consistent with community needs"

Among other findings of the survey:

- Noise is primary unfavorable factor
- Residents would like to see mandatory 2200-0700 curfew; most not aware of current voluntary curfew
- Need to continue efforts to minimize noise and low-flying aircraft
- Emergency services most important service
- Airport dining attracts nonaviation users
- Residents mostly learn about airport through Sierra Sun
- Preservation of open space also highly rated capability
- Hangar improvements – new/upgraded – most important need identified by pilots



LEGEND

- Airfield Property Boundary
- Truckee Town Limits
- County Line
- Martis Creek Lake National Recreation Area
- School
- Navigation Beacon

0 2,000 Feet 4,000

N

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DESTINATION 2025 TRUCKEE TAHOE AIRPORT A MASTER PLAN PILOTED BY THE COMMUNITY

Figure 1-2

Area Features and Neighborhoods

Truckee-Tahoe Airport

Fig 1-2 (11x17)
Reverse Side

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5. AIRPORT FACILITIES

With local financial support plus Federal Aviation Administration and California Department of Transportation grants, land was acquired for the airport in the early 1960s and construction began soon after. The airport opened in 1964 on 200 acres of land and having a single 5,000-foot runway oriented northwest/southeast.[5] Since that time, extensive additional land acquisition has been accomplished, the primary runway has been extended, a crosswind runway constructed, and aprons, hangars, an administration building and support facilities have been built.

Table 1-3 lists data about major facilities on the airport and **Figure 1-3** illustrates the locations of these facilities. Overall, the facilities are in good to excellent condition. The primary runway, recently renumbered as Runway 2-20, is 7,000 feet long and the secondary runway (11-29) is 4,650 feet in length. Apron space is available for parking approximately 192 aircraft and hangar storage accommodates another 219 aircraft.

Only approximately 35% (328 acres) of the contiguous airport property is presently occupied by aviation facilities, non-aviation facilities, or is required to remain open for aeronautical purposes. To the extent determined to be needed, expansion of aviation facilities has top priority for future use of airport property. The remaining land is potentially available for non-aviation development.

Previous studies included master plans completed in 1980 and 2000. The 2000 *Airport Master Plan* included proposals for construction of two additional runways. One would be parallel to the primary runway and intended for flight training and to enable better separation between business jets and propeller aircraft. The second would be a turf runway parallel to the crosswind runway. Its use would be to facilitate sailplane activity. Enhanced instrument approach capabilities and land acquisition for additional hangar facilities were also proposed in the 2000 plan. All of the proposals in the prior plan are being reevaluated as part of the present study.

Today, the airport property occupies approximately 926 acres of land. Additionally, the District has interest in another ±1,717 acres, which was acquired to help preserve compatible land uses and enable aviation-related services in other parts of the district. **Figure 1-4** shows the locations of property the District has interest in—either through fee simple or easements with third parties.

6. AIRPORT ACTIVITY

The principal measure of airport activity at general aviation airports is the number of aircraft operations (takeoffs and landings) that take place annually. The airport staff counts most of the operations using various technological applications and estimates the remainder. In 2012, the total count was approximately 20,000 operations. As with most general aviation airports nationally, the current activity at TRK is down considerably over the past decade as a result of the nationwide economic slowdown. The historical high activity level at the airport was approximately 58,300 operations in 1993. A summary of data regarding airport operations, based aircraft, and other aspects of airport activity is provided in **Table 1-4**.

Physical and meteorological conditions also affect activity levels at the airport. Being situated in a recreational community, TRK is greatly affected by recreational travel peaks. Being the only recreational airport in the area, TRK captures most of the general aviation activity for the region. Reno Tahoe Airport, 40 minutes' drive northeast in good weather, is the major alternative airport as well as the nearest airport offering airline service.

---

[5] Source: *Truckee-Tahoe Airport Master Plan 1980/2000*

Table 1-3 AIRPORT FEATURES SUMMARY

GENERAL INFORMATION
- Airport Ownership: Truckee Tahoe Airport District
- Year Opened: 1964
- Airport Property: 946 acres
  - Open Space Land: owned in fee, ±1,529 acres; majority east of Airport
  - Conservation Easements: ±141 acres; majority east of Airport (held by third party)
- NPIAS Airport Classification: Regional General Aviation
- Airport Elevation: 5,904.5ft. MSL

RUNWAY/TAXIWAY DESIGN
Runway 11-29
- Dimensions: 7,000 ft. long, 100 ft. wide
- Pavement Strength (main landing gear configuration)
  - 50,000 lbs (single wheel)
  - 80,000 lbs (dual wheel)
- Average Gradient: 0.1% (rising to northwest)
- Runway Lighting: Medium-intensity edge lights
- Primary Taxiways: Full-length parallel (A) on southwest

Runway 2-20
- Dimensions: 4,650 ft. long, 75 ft. wide
  - Runway 20 threshold displaced 115 ft.
- Pavement Strength (main landing gear configuration)
  - 35,000 lbs (single wheel)
  - 50,000 lbs (dual wheel)
- Average Gradient: 0.0%
- Runway Lighting: Medium-intensity edge lights
- Primary Taxiways: Full-length parallel (G) on northwest

BUILDING AREA
- Location: West quadrant of airport
- Aircraft Parking Capacity
  - 219 hangar spaces
  - 192± tiedowns
- Other Major Facilities
  - Administration Building
  - Car rental
- Services
  - Fuel: Jet-A, 100LL (from truck; 7 a.m. to 7 p.m.)
  - Aircraft rental and charter; flight instruction; airframe and avionics repair
  - Sailplane rides

AIRPORT PLANNING DOCUMENTS
- Airport Master Plan
  - Adopted by TTAD Board of Directors, Oct. 2000
  - Amended December 2001
- Airport Layout Plan Drawing
  - Approved by FAA, March 2007

TRAFFIC PATTERNS AND APPROACH PROCEDURES
- Airplane Traffic Patterns
  - Runway 20: Right traffic; sailplanes, left traffic
  - Runways 2, 11, 29: Left traffic
  - Pattern altitude: 1,100 ft. AGL (7,000 ft. MSL) light aircraft; 1,600 ft. AGL (7,500 ft. MSL) heavy aircraft
- Instrument Approach Procedures (lowest minimums)
  - Runway 20 GPS
    - Straight-in: 1¼ mile vis., 1,446 ft. AGL descent ht.
    - Circling: 1¼ mile vis., 1,440 ft. AGL descent ht.
  - VOR / DME RNAV or GPS-A (circling only)
- Standard Inst. Departure Procedures (initial course)
  - Rwy 2: Right turn to 320˚ heading
  - Rwy 29: Left turn to 275˚ heading
- Visual Approach Aids
  - Airport: Rotating beacon, sgmnt. circle, wind cone
  - Runway 11: REIL
  - Runway 20: VASI 2-L (3.5°)
- Operational Restrictions / Noise Abatement Procedures
  - Rwy 29 departures: “Bypass departure” Turn right to 300° to Highway 267 bypass then turn over I-80 corridor. No turns before RR tracks.
  - Rwy 20 departures: All low powered aircraft requested to turn left to 300° then join ‘bypass departure’
  - Rwy 2 departures: Fly direct to I-80 scales then follow I-80 corridor
  - Rwy 20 and 29 arrivals: From Gateway checkpoint join Hwy 267 for left downwind for Rwy 29 or enter Rwy 20 right downwind.
  - Voluntary curfew on arrivals and departures 11 p.m. to 6:30 a.m.

APPROACH PROTECTION
- Runway Protection Zones (RPZs)
  - Rwys 11 & 29: 1,000-ft. long; all on airport property
  - Runway 2: 1,000-ft. long; 76% on airport property
  - Runway 20: 1,000-ft. long; 13% on airport property
- Approach Obstacles
  - Runway 11: Tree 1,470 ft. from rwy end (clear 23:1)
  - Runway 2: Tree 4,800 ft. from rwy end (clear 20:1)

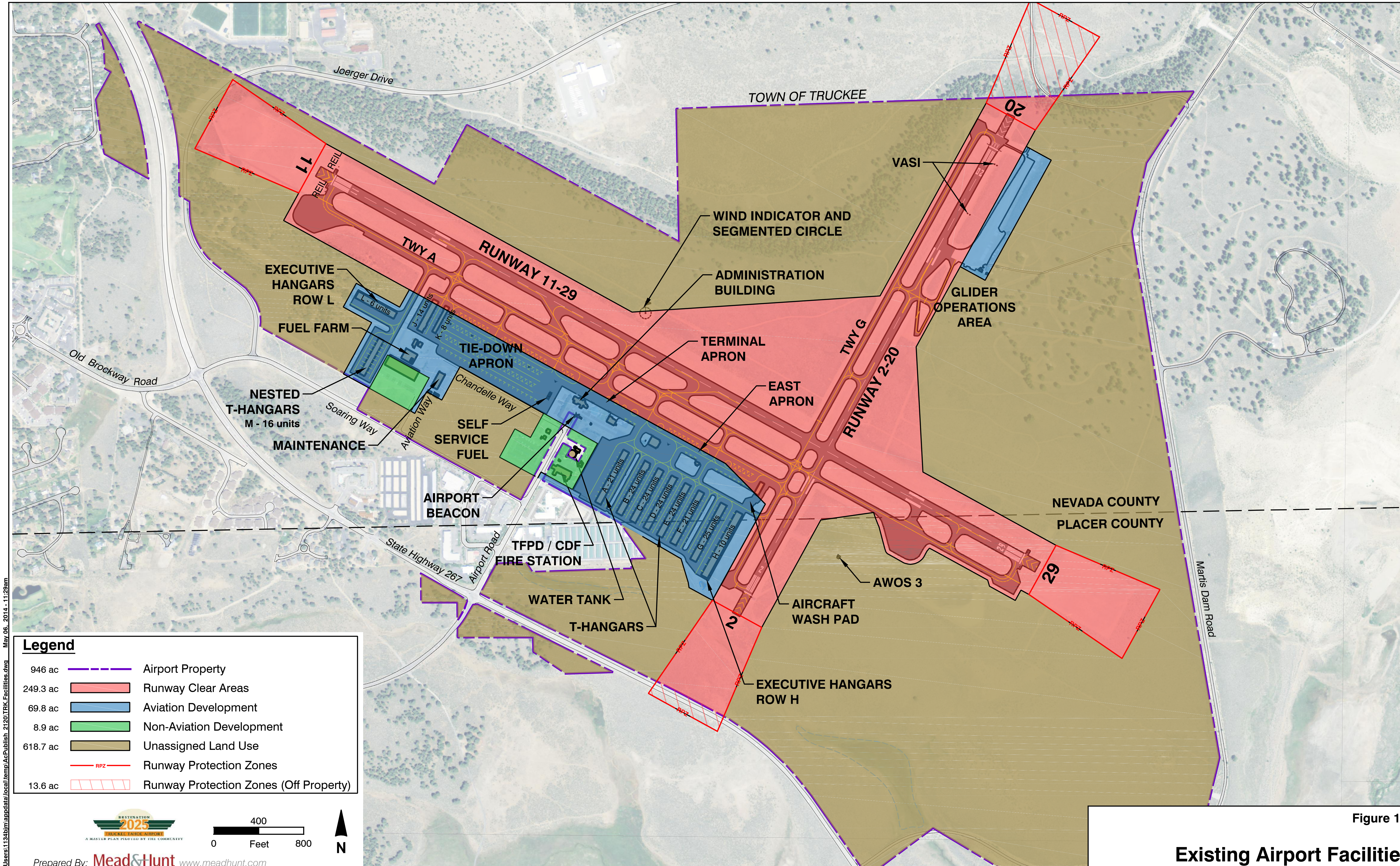

Figure 1-3

Existing Airport Facilities

Truckee-Tahoe Airport

Fig 1-3 (11x17)
Reverse Side

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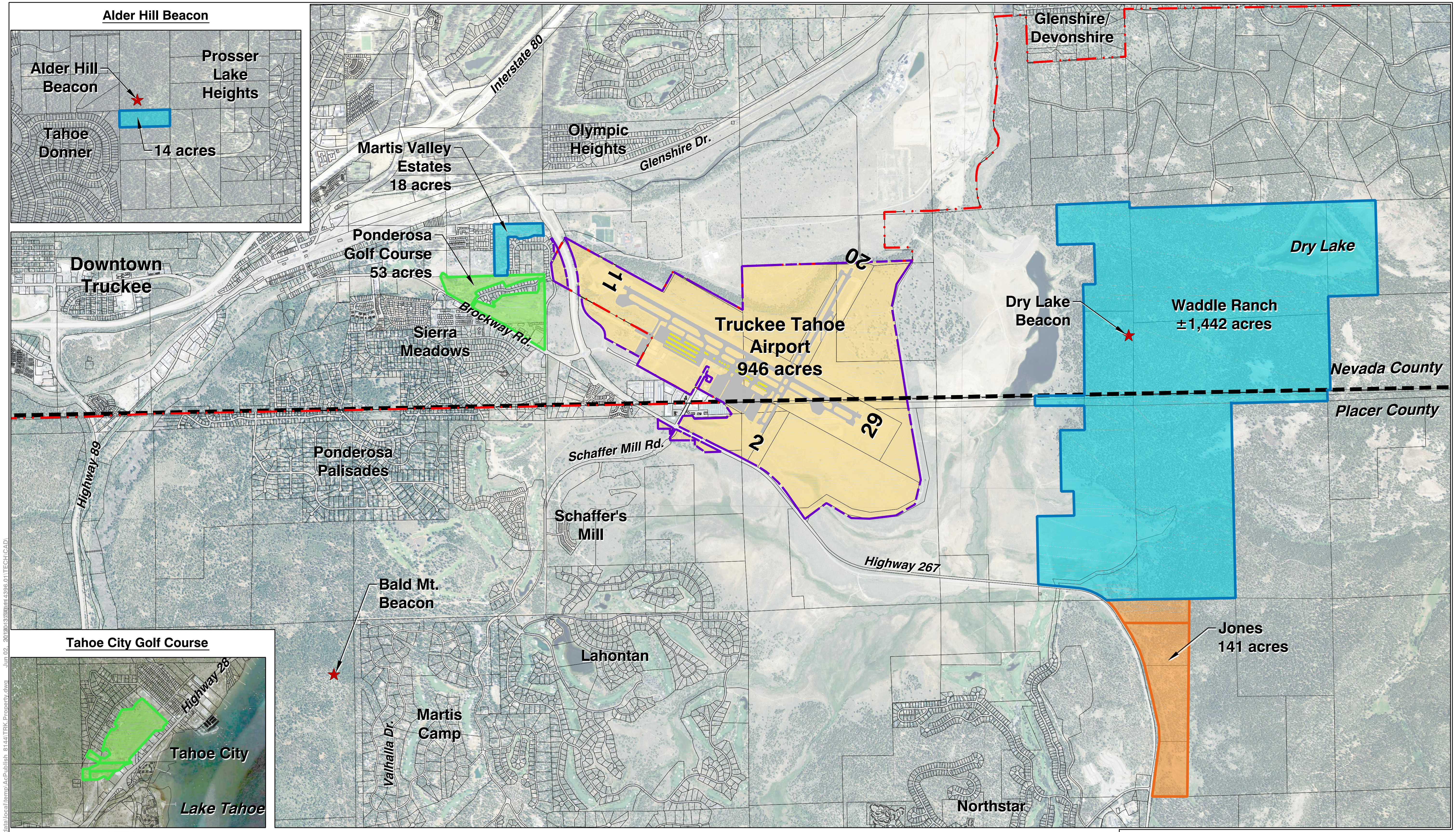

LEGEND

- Airport Property Boundary: Owned in Fee
- Open Space - Owned in Fee
- Open Space - Conservation Easement
- Open Space - Recreation
- County Line
- Town of Truckee Limits
- Navigation Beacon

0 — 1,250 — 2,500 Feet

N

DESTINATION 2025 TRUCKEE TAHOE AIRPORT — A MASTER PLAN PILOTED BY THE COMMUNITY

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Figure 1-4

TTAD Property Interests

Truckee Tahoe Airport

Fig 1-4 (11x17)
Reverse Side

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Table 1-4 AIRPORT ACTIVITY DATA SUMMARY

BASED AIRCRAFT

	Current [a] 2013 data
Aircraft Type [b]	
Piston, Single-Engine	155
Piston, Multi-Engine	12
Turboprop	19
Business Jets	10
Helicopters	6
Total Aircraft	202

AIRCRAFT OPERATIONS

	Current [a] 2013 data
Total	
Annual	26,470
Average Day, Annual	73
Average Day, Peak Season	164
Distribution by Aircraft Type	
Single-Engine Piston	52%
Twin-Engine Piston	5%
Turboprop	11%
Jet	
<12,499 lbs.	2%
12,499 – 19,999 lbs.	2%
>20,000 lbs.	2%
Helicopter	6%
Glider (Including Tow-Plane)	20%
Distribution by Type of Operation	
Local (incl. touch-and-goes)	44%
Itinerant	56%

TIME OF DAY DISTRIBUTION

	Current [a]
Piston Airplanes – Takeoff & Landing	
Day (7:00 a.m. – 7:00 p.m.)	95%
Evening (7:00 – 10:00 p.m.)	4%
Night (10:00 p.m. – 7:00 a.m.)	1%
Turbo Props – Takeoff & Landing	
Day	92%
Evening	7%
Night	1%
Other Jets – Takeoff & Landing	
Day	95%
Evening	4%
Night	1%

RUNWAY USE DISTRIBUTION

Piston Aircraft – Day/Evening/Night	
Runway 11 (arrivals & departures)	4%
Runway 29 (arrivals)	66%
Runway 29 (departures)	77%
Runway 2 (arrivals & departures)	8%
Runway 20 (arrivals)	22%
Runway 20 (departures)	11%
Turboprops	
Runway 11 (arrivals & departures)	4%
Runway 29 (arrivals)	82%
Runway 29 (departures)	88%
Runway 2 (arrivals & departures)	2%
Runway 20 (arrivals)	12%
Runway 20 (departures)	6%
Business Jets – Day/Evening/Night*	
Runway 11 (arrivals & departures)	3%
Runway 29 (arrivals)	94%
Runway 29 (departures)	96%
Runway 2 (arrivals)	1%
Runway 2 (departures)	>1%
Runway 20 (arrivals)	2%
Runway 20 (departures)	>1%

*No nighttime jet operations on Runway 20

FLIGHT TRACK USAGE [a]
(Current)

Takeoffs, Runway 29 – Propeller Aircraft
- 80%–90% to Donner Pass
- 5%–20% to TRUCK Intersection
- 2%–3% to Tahoe

Takeoffs, Runway 29 – Business Jets
- 15% to Donner Pass
- 85% to TRUCK Intersection

Takeoffs, Runway 20 – Light Aircraft (excluding touch-and-go operations)
- 100% 225° left turn

Landings, Runway 29 – All Aircraft
- 100% left traffic pattern
- Landings, Runway 20 – All Aircraft
- 100% right traffic pattern

Notes

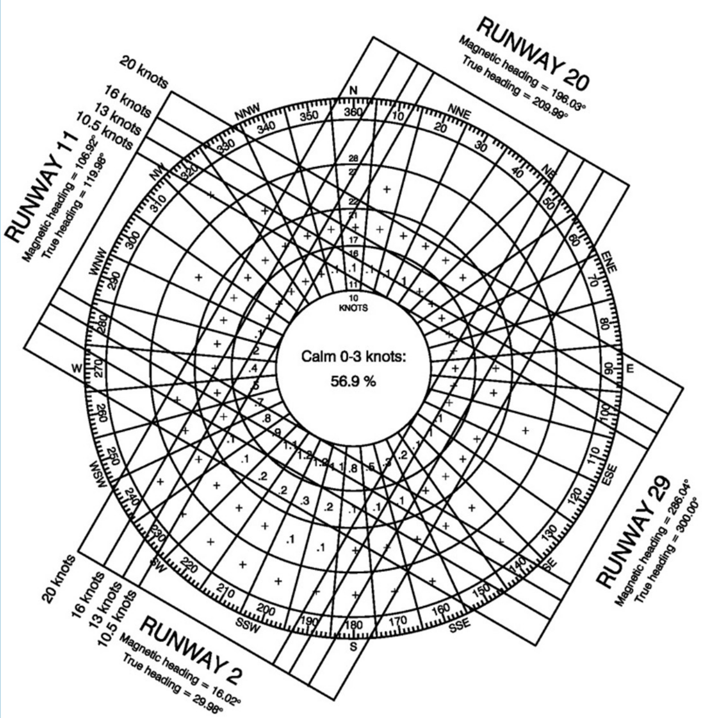
a. Source: Truckee Tahoe Airport records

b. Based aircraft includes permanently and seasonally based aircraft.

Terrain and weather are other factors affecting activity at TRK. The high airport elevation and surrounding mountains make flying more challenging than at flatland airports. The paths aircraft may take to and from the airport are affected by the mountain terrain. Aircraft will make use of the valleys and passes around the airport. Pilots must take extra precautions because of the high altitude and low air density, which increases runway length and reduces climb performance, especially in warm weather. Because mountain weather can change rapidly, weather monitoring, reporting, and aircraft surveillance are very important. During winter weather, snow and ice on the runway plus ice buildup on aircraft also increase landing length required. Because the high volume of recreational flight activity, operations virtually cease at night and reduce significantly as weather conditions worsen. Average monthly weather conditions for the area are shown above in **Table 1-1**.

Surface winds vary significantly which is common in mountain areas where the surrounding terrain channels the wind. Truckee Tahoe Airport has two runways to help minimize the effect of crosswinds so aircraft may have a higher opportunity to arrive and depart into a headwind. Runway 2-20 has better overall wind coverage, but its shorter length is a constraint for many turbine-powered aircraft. Wind coverage data is illustrated on **Figure 1-5.** One other factor significantly affecting flight routes to and from the airport is the nearby residential areas. Safety permitting, pilots are asked to fly noise-abatement flight routes that minimize overflight of homes. **Figure 1-6** depicts the preferred arrival and departure flight routes.

ALL WEATHER WIND ROSE



ALL WEATHER WIND COVERAGE

RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
2-20	97.68 %	99.07 %	99.83 %	99.97 %
11-29	90.22 %	94.21 %	98.16 %	99.45 %
Combined	99.38 %	99.85 %	99.96 %	99.99 %
Number of Observations:	74,107			

VFR WIND COVERAGE

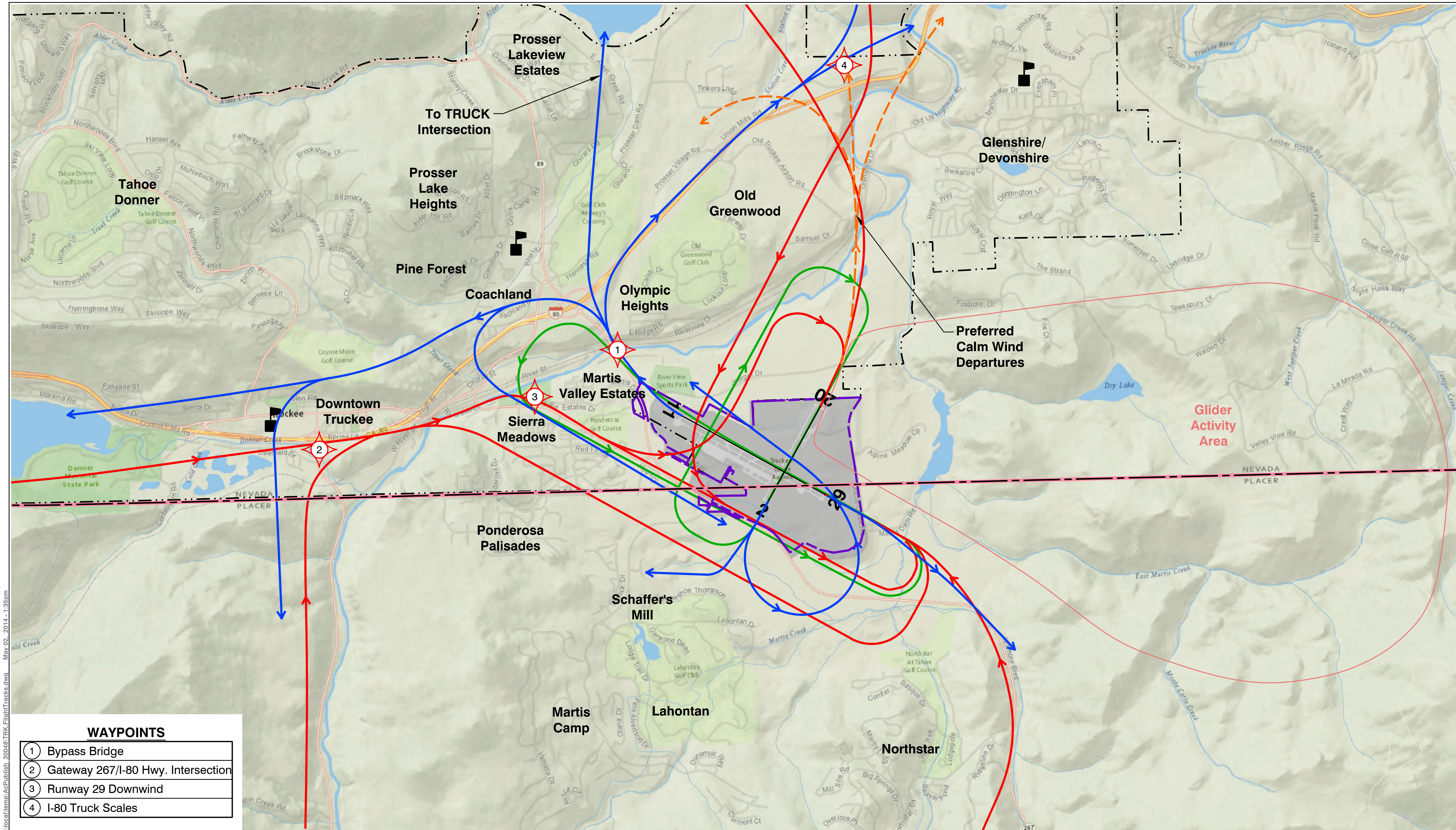
RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
2-20	97.64 %	99.07 %	99.84 %	99.97 %
11-29	90.20 %	94.27 %	98.27 %	99.50 %
Combined	99.41 %	99.86 %	99.97 %	100.0 %
Number of Observations:	68,631			

IFR WIND COVERAGE

RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
2-20	97.60 %	98.89 %	99.63 %	99.91 %
11-29	87.21 %	91.42 %	96.14 %	98.55 %
Combined	98.65 %	99.56 %	99.86 %	99.96 %
Number of Observations:	2,913			

Wind Data Source: NOAA Weather Station 72584, Truckee, California
Period of Time: Jan. 1, 2000 - Dec. 31, 2009
Note: Windrose compass headings are true north.

Figure 1-5 RUNWAY WIND COVERAGE



LEGEND

- Airfield Property Boundary
- Truckee Town Limits
- County Line
- School
- Arrival Track
- Departure Track
- Preferred Departure Track (Clam Wind)
- Touch-and-Go Track

0 2,000 Feet 4,000

N

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Figure 1-6

Preferred Flight Tracks

Truckee-Tahoe Airport

Fig 1-6 (11x17)
Reverse Side

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TRUCKEE TAHOE AIRPORT

MASTER PLAN

Chapter 2 Aviation Forecasts

MASTER PLAN

CHAPTER 2 Aviation Forecasts

1. OVERVIEW

The forecasts contained in this chapter establish the potential need for and approximate timing of demand-driven airport facilities such as hangars, apron, and vehicle parking. Likewise, the forecasts also form the basis for estimating and assessing changes to aircraft-community noise exposure. This chapter, which presents aviation activity over a 13-year period through 2025, is organized as follows:

- **Review of Previous Aviation Forecasts**
- **Regional Analysis**
- **Airport Role**
- **Airport Service Area**
- **Recent Activity and Trends**
- **Demand Influences**
- **Aviation Forecasts**
- **Peaking Characteristics**
- **Forecast Summary**

2. REVIEW OF PREVIOUS AVIATION FORECASTS

A review of previous forecasts can provide important information about the underlying assumptions used in their development for comparison with changed conditions and current outlook. A summary of previously published forecasts follows.

2.1 *FAA Aerospace Forecasts: Fiscal Years 2013 – 2033*

The Federal Aviation Administration (FAA) Aerospace Forecasts provide a macro-level analysis of U.S. aviation activity. The forecasts are published annually and detail the underlying drivers of aviation demand. These forecasts correlate total aviation activity with economic activity. They also project changes to aircraft fleet mix, hours of operation by category of aircraft, and the number of active pilots. The information contained in the forecasts will apply primarily to changes to the based aircraft fleet and operating mix recommendations of this master plan. Major conclusions of the forecasts are summarized below. **Table 2-1** projects annual growth by aircraft category and hours flown. **Table 2-2** projects changes to the entire U.S. general aviation fleet as a percentage of the total general aviation fleet. The following points summarize the major trends identified by the FAA.

- **Aviation activity models correlate aviation activity with disposable personal income (DPI), which is income after taxes.**
- **The high/low forecast ranges of this forecast are heavily influenced by assumptions related to government (U.S. and foreign) actions (i.e., reduce debt, reduce spending, increase revenue, increase employment, etc.). The selected model assumes slow economic recovery and growth, improving housing market and employment outlook, low-stable inflation (1.4 – 2.0% per year), DPI 2-3% per year through 2016 then constant 2.4% through 2033, and oil prices declining to $81/barrel by 2015, then increasing slowly to $125/barrel by 2033.**
- **Turbo-jet activity, which was significantly affected by the downturn, is expected to return to robust growth. The increase is driven by increasing corporate profits and continued concerns about safety, security, and delays associated with commercial flight. The general aviation jet fleet is forecast to grow 3.5% per year while the number of operations flown per year is expected to grow 4.3%. As a percentage of the total general aviation fleet, jets will increase from 5.4% in 2012 to 10.0% in 2033.**
- **Single-engine piston airplanes are projected to decline approximately 0.2% per year while multi-engine piston airplanes will decline at an annual rate of 0.6%. Although single-engine deliveries have been increasing, new deliveries are not projected to overtake retirements until 2028. The piston engine forecasts include growth of a new sub-classification: light sport. Single-engine pistons certified as light sport are expected to increase at an annual rate of 2%. Operations by pistons are also projected to decline 0.2% per year.**
- **Different utilization rates between the different categories of airplanes is revealed by comparing the fleet mix with hours flown. For example, turbo-jets account for 5-8% of the general aviation fleet, but account for 15-24% of the hours flown. It should be noted that the majority of these hours are spent aloft and the forecasts do not include operations (i.e., landings and takeoffs).**
- **The number of active general aviation pilots is projected to increase 0.4% per year.**

Light sport airplanes have certification requirements that make them easy-to-fly and have maximum 2-person occupancy. In addition to single-engine pistons, light sport aircraft include: glider, lighter-than-air (airship or balloon), gyroplanes, powered parachute, and weight-shift control (Trikes).

Table 2-1 Average Annual Growth Rates through 2025			
Active GA Fleet	**2012-2015**	**2012-2020**	**2012-2025**
Airplane, Single Engine Piston	-0.54%	-0.46%	-0.38%
Airplane, Multi-Engine Piston	-0.05%	0.11%	-0.20%
Airplane, Turbo-Jet	3.22%	3.24%	3.29%
Airplane, Turbo-Prop	1.63%	1.64%	1.68%
Rotor, Piston	2.67%	2.52%	2.35%
Rotor, Turbine	3.41%	3.27%	3.10%
Other*	1.41%	1.23%	1.18%
General Aviation Fleet	0.23%	0.28%	0.33%
Hours Flown	**2012-2015**	**2012-2020**	**2012-2025**
Airplane, Single Engine Piston	-2.91%	-1.96%	-1.28%
Airplane, Multi-Engine Piston	-0.97%	-1.03%	-0.91%
Airplane, Turbo-Jet	5.42%	4.96%	4.49%
Airplane, Turbo-Prop	3.18%	2.88%	2.44%
Rotor, Piston	2.91%	2.76%	2.58%
Rotor, Turbine	2.41%	2.76%	2.75%
Other*	4.98%	3.70%	2.95%
General Aviation Fleet	0.50%	0.95%	1.16%

Source: FAA Aerospace Forecast 2013-2033
*- Other aircraft include experimental, sport aircraft, airships, balloons, and gliders.

Table 2-2 Fleet Mix as a Percentage of Total General Aviation			
By Aircraft Type	**2012**	**2020**	**2025**
Airplane, Single Engine Piston	61.60%	57.60%	55.34%
Airplane, Multi-Engine Piston	7.07%	6.64%	6.25%
Airplane, Turbo-Jet	5.39%	6.81%	7.87%
Airplane, Turbo-Prop	4.38%	4.89%	5.22%
Rotor, Piston	1.71%	2.04%	2.21%
Rotor, Turbine	3.13%	3.96%	4.45%
Other*	16.72%	18.06%	18.66%
By Hours Flown	**2012**	**2020**	**2025**
Airplane, Single Engine Piston	47.34%	37.45%	34.47%
Airplane, Multi-Engine Piston	7.14%	6.08%	5.46%
Airplane, Turbo-Jet	15.27%	20.85%	23.28%
Airplane, Turbo-Prop	9.58%	11.15%	11.30%
Rotor, Piston	3.28%	3.79%	3.94%
Rotor, Turbine	10.30%	11.88%	12.63%
Other*	7.09%	8.80%	8.92%

Source: FAA Aerospace Forecast 2013-2033
*- Other aircraft include experimental, sport aircraft, airships, balloons, and gliders.

The Aerospace forecasts also include projections for two emerging sectors: commercial space transportation and unmanned aircraft systems (UAS). This master plan does not identify any future operational role at Truckee Tahoe Airport (TRK) related to commercial space vehicle launch and/or recovery although it is conceivable that temporary flight restrictions could occur nearby as a result of such activity. Currently, only eight commercial spaceports have FAA launch operator licenses. In contrast, UAS activity is much more likely to occur at or near TRK by 2025.

UAS involve flight by aircraft with no onboard pilot/operator. UAS was developed initially as a military application (e.g., drone aircraft) but have great potential to cross into commercial and civilian markets. Among other roles, UAS is expected to be viable for search and rescue operations. The FAA is currently developing a plan to accelerate the integration of UAS into the National Airspace System, which involves the development of standards, airworthiness criteria, certification, and procedures for sense and avoid systems, and command control and communication system requirements. Although it is unclear when these standards and policies will ultimately be approved, the forecasts project near-term growth in small unmanned systems will include about 7,500 aircraft that would be operating within 5 years of authorization.

2.2 FAA Terminal Area Forecast: Fiscal Years 2012 – 2040

The FAA has established the Terminal Area Forecast (TAF) system for active airports included in its National Plan of Integrated Airport Systems (NPIAS). These forecasts are prepared to meet the budget and planning needs of the FAA and provide information for use by state and local authorities, the aviation industry, and the public. As such, the TAF represents the FAA's policy benchmark for federal review and approval of airport master plan forecasts. TAF projections are updated annually using federal fiscal year activity values, not calendar year.

An **operation** is defined as either the landing or the takeoff of an aircraft.

For non-towered airports such as TRK, the TAF projections are typically based on historic activity provided by the airport operator. The historic data included in the TAF indicates a decline in based aircraft from 164 in 1990 to 76 in 2011. Total aircraft operations also indicate a decline over the same period, from 58,300 to 35,000. Air taxi operations were estimated at 1,000 annually over the entire historic and forecast period. The split between itinerant and local operations remained relatively constant: 43.4%:56.6% (itinerant : local) in 1990 versus 40%:60% in 2011. The projections indicate no change in activity through 2040: 76 based aircraft, 1,000 air taxi operations, 35,000 total operations split 40:60 between itinerant and local. A summary of the current TAF is contained in **Table 2-3**

Table 2-3 2012 TAF TRK Forecasts

Year	Aircraft Operations				Based Aircraft
	Itn. Air Taxi	Itn. GA and Military	Local GA	Total	
2012	1,000	13,000	21,000	35,000	76
2020	1,000	13,000	21,000	35,000	76
2025	1,000	13,000	21,000	35,000	76
CAGR	0%	0%	0%	0%	0%

Source: FAA Terminal Area Forecasts (TRK FY 2012 – 2040)

Based on more accurate activity counts that the TTAD has obtained in recent years, it is generally believed that the historic activity estimates included in the TAF are overstated and that the method for counting based aircraft was inconsistent over the period. Total operations have likely remained comparatively flat with a slight growth trend while there has been a recent decline in based aircraft. The operations forecast value of 35,000 may be reasonable for master plan use, although it would more accurately reflect an increase of 10,000 annual operations from the present day. The based aircraft forecast of 76 is also held constant by the TAF and represents motorized aircraft only (i.e., not including sailplanes). There is a growing waiting list for executive hangar space at TRK and demand for T-hangar space has been declining.

2.3 *1998 Airport Master Plan*

The previous Airport Master Plan for TRK was completed in 1998. The 1998 plan included forecasts of aviation activity through 2020. The forecast methodologies used will be assessed and updated as part of the development of this plan. Several of the forecast trends identified in 1998 occurred, in particular, the based and operating mix of aircraft. Similar to the historic record included in the TAF, the historic operations (or estimates of operations) used by the 1998 master plan effort may have been overstated. The average number of aircraft operations per year did not increase and likely decreased between 1998 and 2012. It should be noted that the forecasts were prepared during a positive economic cycle as opposed to the current cycle of recovery. The 1998 based aircraft forecasts are presented in **Table 2-4** and forecasts for total operations in **Table 2-5.**

Table 2-4 1998 AMP Based Aircraft Mix Summary

Year	Piston, Airplane				Turbine, Airplane				Rotor		Other		Total
	Single		Multi		Prop		Jet						
	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	
1997	107	74	19	13	4	3	1	1	0	0	4	3	229
2000	109	75	19	13	4	3	1	1	1	0	4	3	233
2005	127	86	21	14	6	4	2	1	1	1	4	3	270
2010	140	94	23	16	8	5	3	2	2	1	4	3	301
2015	157	104	26	17	10	7	4	2	3	2	4	3	339
2020	167	109	30	19	12	8	6	4	5	3	4	3	370

Source: TRK 1998 AMP

Table 2-5 1998 AMP Operations Forecast Summary

Year	Aircraft Operations		
	Itinerant	Local	Total Operations
1996[1]	12,200	20,700	32,900
2000	13,800	20,700	34,500
2005	17,200	23,800	41,000
2010[2]	20,600	26,300	46,900
2012[3]	14,902	11,568	26,470
2015	24,800	29,200	54,000
2020	29,600	32,000	61,600

Source: TRK 1998 AMP

Notes:

1. Based aircraft include seasonal and permanent tenants.
2. Operation data from 2007 and after use the Airport's four-camera video system to record operations. Operation data after 2007 is believed to be more accurate than previous years.
3. 2012 estimated operations. Source: TTAD.

3. REGIONAL ANALYSIS

Activity at TRK is strongly influenced by a variety of local and regional factors. This section assesses the primary characteristics that are unique to the north side of Lake Tahoe. Combined with the physical facilities and services available at the airport, these regional factors include: visitor travel profile, area population, employment/income trends, educational profile, area property values, and other factors such as non-residential development.

3.1 Visitor Travel Profile

The Lake Tahoe region receives approximately 3 million visitors per year. The area is popular for its world-class ski resorts, outdoor recreation (i.e., fishing, biking, nature walks, etc.), gaming casinos, dining, spas, shopping, and history.

Visitor profile data for the region is usually found for the entire Lake Tahoe region. The last study available for the greater Truckee area was *North Lake Tahoe: Tourism and Community Investment Plan*, completed in 2004. This Plan stated that about 50% of visitors originate from California, 40% (20% of all visitors) of which are from the Bay Area. Most travelers arrive via personal vehicle although air travelers (using Reno Tahoe International Airport) have been increasing from Southern California and other states. The 2007 Reno-Tahoe Visitor Profile Study reports 48% of visitors to the region were from California, and 19% (of all visitors) were from the Bay Area. A more recent north Lake Tahoe Visitor Survey from 2012 also shows 52% of visitors are from California, of which, 38% are from Santa Clara, Alameda, Contra Costa, San Francisco, San Mateo, and Sonoma counties.

The greater Lake Tahoe region includes a high percentage of both transient residents and visitors. This pattern is expected to continue, but with an increasing percentage of visitors (and seasonal residents) originating from Southern California and other states. The increase in average travel distance will result in an increase air travel demand to the region. Although primary air travel demand will be accommodated by commercial airline service via Reno and Sacramento, demand for direct access through Truckee Tahoe Airport using chartered or private airplane should be expected to increase for the same underlying reasons.

Visitor lodging in the Truckee/Donner area includes about 2,240 rooms (Truckee Donner Chamber Visitor Guide); the Town of Truckee General Plan (GP) predicts the construction of 1,392 new rooms by 2025.

3.2 Area Population

In this section, the Town's GP is used as a source for population projections. This plan is believed to provide a barometer for the Truckee Tahoe Airport District (TTAD or District) area at large, since it includes data for a large planning area encompassing the Town limits. This includes high-end housing developments located south of TRK that is outside the Town of Truckee limits.

In 2010, the Town of Truckee comprised over 63% of the TTAD's population, which is presently estimated to be 29,000. According to the housing element of the Town's GP, Truckee experienced rapid growth in the 1990's (36% between 1990 and 2000). The population increased an additional 16.3% between 2000 and 2009. The 2010 census records the population of 18,451. The Truckee GP projects a 2025 population of 25,280 (37% higher than 2010). The housing element indicates that the Town will be approaching full build out shortly after the 2025 planning horizon. That said, the total population of the land area which comprises the TTAD increased less than 4% between 2000 and 2010. Population reductions have occurred in some areas as a result of the housing market collapse and the Great Recession.

Population data from Placer County was also considered since a large portion of the TTAD and the Airport's influence area is located in Placer County. Placer County experienced 31.2% total growth in population between 2002 and 2012. Projects indicate Placer County will increase in population by 10.3% from 2012 to 2017 and 20.6% from 2012 to 2022 (Placer County Economic and Demographic Profile, 2013).

This master plan assumes an outlook of recovery and moderate growth through 2025. While population growth will likely not be uniform throughout the TTAD, this plan assumes that the total district population will grow at about the same rate projected for the Town of Truckee, 2% annually.

3.3 Employment and Income Trends

Table 2-6 summarizes key employment data for select locations within the TTAD. With its mountain environment, recreational opportunities, and proximity to major transportation facilities, the North Lake is undoubtedly a desirable place to live and work. Although mining, construction, and government sector employment are prevalent sectors for the area, employment has historically been intertwined with seasonal recreation and tourism cycles: busy summers and winters; slow falls and springs. The cyclical trends pose a significant challenge to operating and staffing a year-round business and maintaining an employment base that can afford to live in the area. Many local government and business initiatives are predicated on stabilizing the cyclical patterns by attracting non-tourist higher pay/skilled businesses to the area, enhancing the local capture of visitor spending, and increasing off-season tourism.

Table 2-6 Median Household Income and Unemployment

Community	Year		Change	Unemployment (2012)
	2000	2009		
Truckee	$58,848	$67,398	14.53%	8.9%
Lake Tahoe	48,583	59,588	22.63%	9.3%
Tahoe Vista	51,958	65,022	25.14%	9.3%
Kings Beach	35,507	40,324	13.57%	9.3%
Nevada County	45,864	57,884	26.21%	8.9%
Placer County	57,535	70,568	22.65%	9.3%
California		58,931		10.4%

Source: California Department of Finance

Median household incomes for the communities filing returns within the District were between $60,000 and $67,000 during 2009 compared to $58,931 reported for California. The lowest household incomes were reported for Kings Beach ($40,324) and the highest was Truckee ($67,398). It should be noted that Truckee has the highest population of the various communities assessed. Furthermore, Truckee's average household income for 2009 was reported at $82,837, which indicates the presence of very high earners. Employment reported for Truckee includes approximately 9,500 jobs: 21.0% professional, 19.5% services, 17.2% management/business/ financial, 13.5% sales, 11.2% administrative support (Truckee Donner Chamber of Commerce). Incomes for second homes, which accounts for about 50% of area households, are often reported outside of the District. The second homes contribute significantly to the area's economy and may be indicative of higher discretionary spending than is discernable by reviewing the locally reported data. Unemployment for Truckee during 2012 was 8.9% compared to 10.4% for California.

Potentially changing the income reporting dynamic associated with the area's high volume of second-homes is the effect of cellular telephone, internet communication, and electronic data transfer systems is having on job locations and business models. Increasingly, remote connectivity is enabling individuals to select permanent residence based on personal preference instead of proximity to employment centers and sources of market demand. This trend combined with the successful efforts of local government to incentivize economic diversification can be expected to increase growth in non-recreational/tourist employment sectors, year-round population, and average incomes. Some of these changing trends can be discerned from **Table 2-7** for the Truckee-Grass Valley micropolitan statistical area.

Table 2-7 Truckee-Grass Valley µSA Top Five Industries by Number of Employees					
2000		2012		2025	
Retail	12.5%	Healthcare	12.6%	Prof/Tech Services	11.4%
Construction	11.7%	Prof/Tech Services	12.5%	Healthcare	11.1%
Healthcare	9.1%	Construction	8.9%	Retail	9.4%
Government	9.0%	Real Estate	8.5%	Construction	8.9%
Prof/Tech Services	8.1%	Retail	8.4%	Real Estate	8.6%
Total Employment	50,528	Total Employment	55,348	Total Employment	63,256
Source: Woods & Poole, Inc. 2012					

For purposes of this master plan, the economic outlook for the region is for moderate expansion comparable with past trends in terms of job and income growth. Specifically, total employment and median household income are expected to increase at 1.0% and 1.5%, respectively.

3.4 Educational Profile

The area's workforce is highly educated. 55% of Truckee residents have an associate degree or higher, compared to 37.7% for California. Of these, 33.1% have a bachelor degree compared to 19.2% for California. Although this master plan does not draw a specific correlation between education and demand for aviation services and support, the statistic is indicative of a sustainable skilled employment base, which indirectly translates to aviation activity.

3.5 Residential Property Values

As indicated in the FAA Aerospace Forecasts, demand for aviation activity broadly correlates with economic health. At the national level, the federal government typically evaluates the overall health of the economy using Gross Domestic Product (GDP). The FAA, however, correlates aviation demand more directly with changes in personal disposable income (income after taxes). For the Truckee-Tahoe area, incomes associated with second homeowners are usually reported elsewhere. By their nature, the proportion of second homes (about 50%) is perhaps most indicative of high incomes, discretionary spending capacity, and wealth. Such individuals have a much higher propensity to travel by airline, chartered flights, or corporately operated aircraft. Resort destinations with high levels of second homes are also more likely to operate personal aircraft for travel between primary and secondary residences and have seasonal vehicles stored near their second home.

Figure 2-1 provides a comparison of the area home values. The chart reveals that median home values for the North Lake are generally 20% higher than the State of California with some areas averaging over 60% higher. The difference is more significant between local values with those of Nevada and Placer counties. Values appear to have bottomed out and have begun to climb quickly, from 9% to 30% between January 2012 and June 2013. New home construction is expected to recover and increase 2% per year through 2025 (Town of Truckee, General Plan).

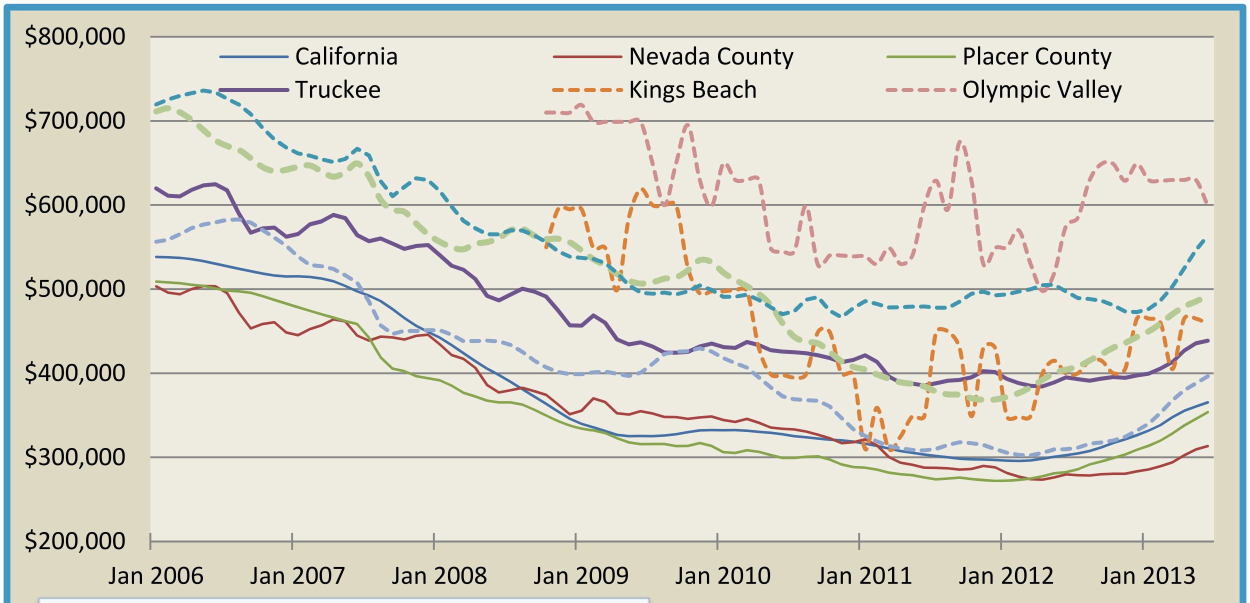


Figure 2-1 **HOME VALUE INDEX BY AREA**
Source: Zillow, July 2013

The Housing Element of the Truckee General Plan includes these guiding principles: provide an adequate number of housing sites, encourage a variety of housing types, and provide housing to meet the needs of residents especially those that work in the Town. Housing units were inventoried at 10,823 in 2004. The 2025 projection is for 17,800 housing units with a total build-out capacity of 19,901 units. This total includes primary and secondary residential units. The rate of growth experienced for housing from 2000–2005 was used as a baseline for projecting 2025 housing units.

One underlying factor will remain unchanged: the Lake Tahoe area will retain its strong locational appeal for homeowners. Relative to this master plan, the area is expected to grow and approach build-out just beyond that plan's 2025 timeframe (Town of Truckee: 2025 General Plan). Local efforts to increase affordable housing may increase price stability and increase employment diversity. This plan will assume that the housing market will recover and grow at a stable rate and maintain comparatively high valuations and related discretionary spending capacity. The area will remain influenced by high-income homeowners that will have a higher than average propensity to travel to and from the area on a regular basis using a variety of means, including: personal vehicle, scheduled airline, chartered aircraft, corporate-owned aircraft, and personal aircraft. Combining the 2% growth in housing units with an average value increase of 8.8% per year (i.e., the average experienced between 2000 and 2009) for the Truckee planning area, total valuations will increase to $34 billion in 2025 from approximately $9 billion today (Mead & Hunt calculation).

3.6 Other Development

Various local efforts are underway to incentivize commercial and light industrial development. The Truckee General Plan also predicts a significant increase in non-residential development, as measured in floor space, within its defined planning area. Non-residential development was inventoried in 2005 to be 2.8 million square feet. Non-residential development is expected to average 2.4% annually (to 5 million square feet by 2025). Totals for each development type are shown in Table 2-8 on the following page.

Table 2-8 2025 General Plan Non-Residential Build-out Projections	
Development Type	**2025 Square Feet**
Commercial	1,994,000
Office	952,000
Light Industrial / Warehouse	1,259,000
Religious	85,700
Lodging	(1,392 rooms) 700,000
Total Square Feet	5,000,000
Source: Town of Truckee 2025 General Plan, Table I-3	

Specific non-tourism related employment sectors being targeted include healthcare related industries and "new-economy" businesses, such as high-tech and information-based businesses.

4. AIRPORT ROLE

TRK is classified as a "General Aviation Airport" by the FAA National Plan of Integrated Airport Systems (NPIAS). The airport provides transportation access by year-round, second-homeowners, and both frequent and occasional visitors to the area. Individual flights include personal, business, training, recreational, and emergency service support. Commercial (i.e., for-profit) operations are limited to non-scheduled air taxi flights that carry fewer than 10 passengers. There are no scheduled commercial airline operations. A wide range of aircraft types use the airport including helicopters, single- and multi-engine propeller aircraft, gliders, and business jets. Majority of operations are by light piston airplanes and gliders. However, the focus of TRK in the future will be on accommodating turboprop and business jet aircraft, as these aircraft continue to gain a greater share of the national fleet mix. This focus acknowledges national trends but is subject to limitations in accordance with community expectations.

As a "Community Airport" the TTAD does not currently seek to encourage: all-weather operational capability, nighttime aircraft activity, scheduled commercial flight operations, nor operations by aircraft larger than the ones presently using the airport.

The TTAD operates its facility as a "Community Airport". In doing so, the TTAD engages and actively seeks opportunities to support local initiatives and to provide facilities that can be used for community and/or joint aviation-community purposes. Initiatives include: open-space preservation, sponsoring educational programs and youth activities, and hosting aviation-related family events. Additionally, TTAD has undertaken several initiatives to reduce off-airport annoyance, enhance aviation-community trust, and enhance safety. Facilities that benefit the general public include: an on-airport restaurant, picnic areas, children's park, and emergency helipad sites (future). Public meeting space available at TRK is being used by groups such as the Girl Scouts, American Youth Soccer, Chamber of Commerce, and Toastmasters.

The role of the airport is not expected to change in the foreseeable future. It is expected that activity at the airport will increase comparable with the overall growth of the community and that the mix of aircraft types using the airport will be changed incrementally over time consistent with broad-scale changes affecting the U.S. general aviation industry.

5. AIRPORT SERVICE AREA

This Airport Service Area shown in **Figure 2-2** is defined by having a driving time to the airport of one hour or less in good weather conditions (i.e., locations within 50 miles of TRK). Also shown are other nearby airports. Most are classified as general aviation airports that service similar aircraft types as those using TRK. **Table 2-9** highlights major features of these airports, with distance from TRK.

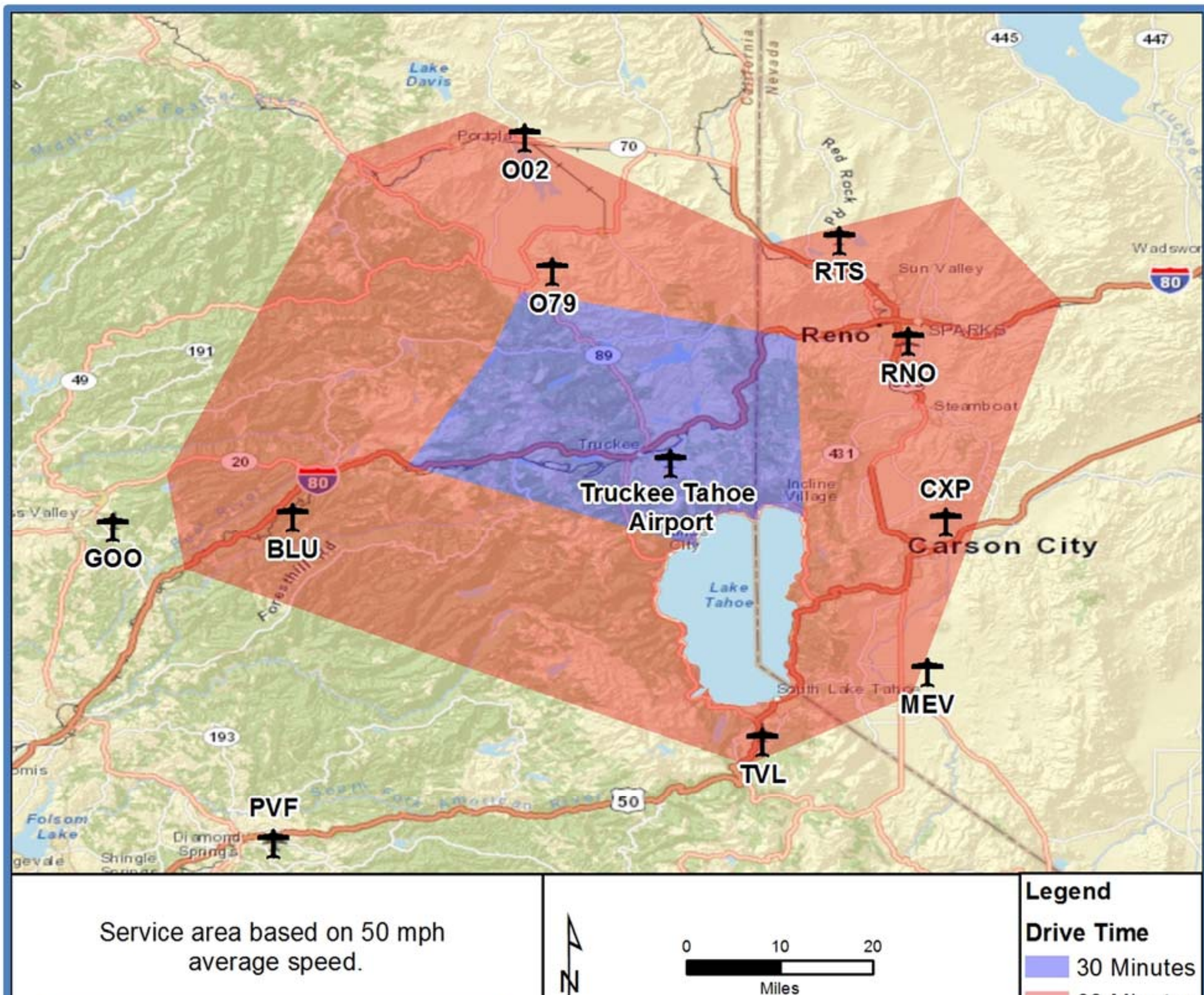


Figure 2-2 AIRPORT SERVICE AREA

Table 2-9 Area Airports			
Airport	**Distance from TRK (NM)**	**Runways (longest in feet)**	**Major Facilities**
TRK – Truckee–Tahoe Airport	N/A	2 (7,000)	• Fuel – 100LL, Jet A and Jet A1+ • Hangars and tie-downs for parking • Airframe and powerplant service.
RNO – Reno Tahoe International	20 NE	3 (11,002')	• Air carrier services and passenger terminal • Customs landing rights airport • Fuel – 100LL and Jet A1+ • Hangars and tie-downs for parking • Airframe and powerplant service. • Deicing facilities
CXP – Carson City	20 E	1 (6,100')	• Fuel – 100LL and Jet A • Hangars and tiedowns for parking • Airframe and powerplant service.
O79 – Sierraville Dearwater	20 NW	1 (3,260')	• Tiedowns
RTS – Reno/Stead	24 NE	2 (9,000')	• Fuel – 100LL and Jet A • Tie-downs for parking • Airframe and powerplant service.
MEV – Minden-Tahoe	26 SE	3 (7,400')	• Fuel – 100LL and Jet A • Hangars and tie-downs for parking Airframe and powerplant service.
TVL – Lake Tahoe	26 S	1 (8,544)	• Fuel – 100LL and Jet A
BLU – Blue Canyon – Nyack	27 W	1 (3,300')	• Tiedowns
O02 – Nervino Beckwourth	31 N	1 (3,260')	• Fuel – 100LL • Tie-downs for parking
GOO – Grass Valley	46 W	1 (4,351')	• Fuel – 100LL and Jet A • Tie-downs for parking Airframe and powerplant service.
PVF – Placerville	53 SW	1 (3,910')	• Fuel – 100LL and Jet A • Tie-downs for parking Airframe and powerplant service.

Source: Airnav.com

6. RECENT ACTIVITY AND TRENDS

Current year activity provides an accurate “snapshot” for purposes of comparison, analyzing trends, and to function as a “base year” starting point in the forecasts to be developed. The trends in activity may be used to validate the assumptions used in the development of previous forecasts, compare with trends of a larger geographic area, and to extrapolate new activity projections.

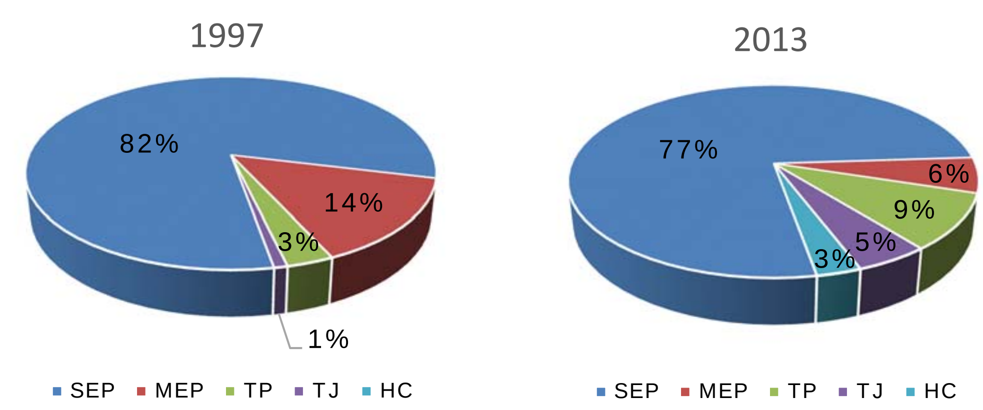
6.1 Based Aircraft

It should be noted that some airports do not maintain historic records of based aircraft. Individual aircraft may be based at more than one location and are often registered to a non-airport household and business addresses remote from the based location. In the case of TRK, based aircraft records maintained by the District and included in prior planning efforts are considered to be reasonably accurate. However, the number of based aircraft is significantly higher during the summer and winter peaks than during the spring and fall. The term ‘based aircraft’ in this plan refers to aircraft that are stored at the Airport, either permanently or seasonally. This should not be confused with aircraft that are based at TRK for tax purposes. Aircraft that call TRK home for tax purposes may also be considered ‘seasonally based’ if they house at another airport during the winter. Alternatively, aircraft that call another airport home for tax purposes may store at TRK seasonally.

The District provided data on the types of aircraft based at TRK in 2013. These totals are presented in **Table 2-10**. It is estimated that two-thirds of the based aircraft fleet is stored at TRK on a year-round, or continuous basis. This number is equal to the based aircraft total in the FAA’s National Based Aircraft Inventory Program that represent aircraft permanently based at TRK in 2013.

Table 2-10 Based Aircraft

Year	Single-Engine Piston		Multi-Engine Piston		Turbo Prop		Turbo Jet		Helicopter		Total[1]	
1997[2]	182		32		7		2		0		223	
2013[3]	155		12		19		10		6		202	
	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal	Permanent	Seasonal
	103	52	8	4	13	6	7	3	4	2	135	67



Notes: SEP= Single-Engine Piston; MEP= Multi-Engine Piston; TP= Turbo-Prop, TJ= Turbo-Jet; HC= Helicopter.
1- Total based aircraft include permanently and seasonally based aircraft.
2- Source is 1998 Master Plan permanently based aircraft increased 70% to combine seasonally based aircraft.
3- TRK Airport Management Records for based aircraft on December 12, 2013. Records do not differentiate permanent and seasonal occupancy. Records do not include 18 aircraft on current waiting list for executive hangars.

6.2 *Aircraft Operations*

Most non-towered airports do not monitor actual activity (e.g., takeoffs and landings). For reporting and planning purposes, airport operators rely on estimations. Various methods may be employed to estimate activity; typically, little effort is expended to validate the accuracy of those estimates. For general aviation airports in particular, accepted methods for estimating activity have been complicated by a combination of abrupt declines in new aircraft production and significant swings in aircraft utilization.

In 2007, the District began counting departures using a four-camera video system (**Figure 2-3**). The motion-activated cameras are strategically installed along the taxiway route to photograph aircraft as they enter the runway; one camera is installed at each of the four possible departure directions. The system is being continuously enhanced for accuracy (e.g. reconciling false camera reports). Based on camera counts, the historic estimates of operations contained in the 1998 master plan are believed to be overstated. This master plan therefore emphasizes the changes in activity that has occurred between 2007 and 2012.

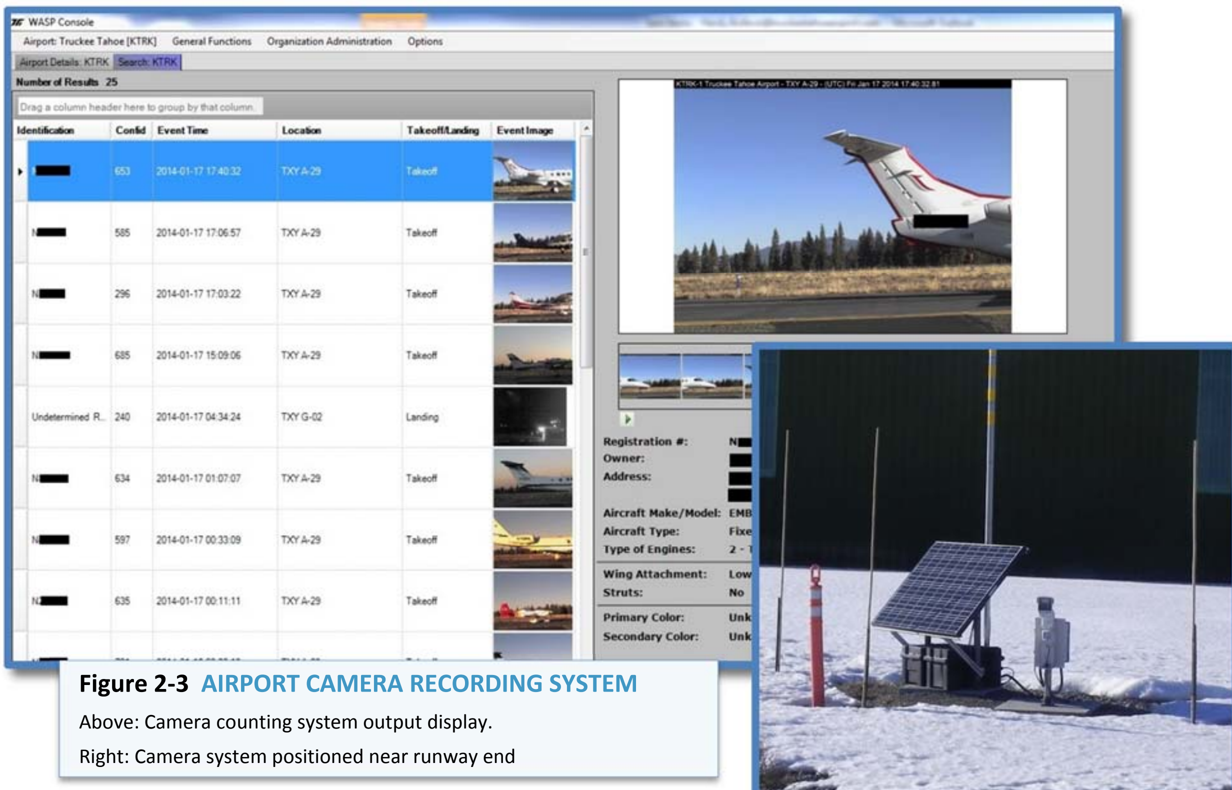


Figure 2-3 AIRPORT CAMERA RECORDING SYSTEM

Above: Camera counting system output display.

Right: Camera system positioned near runway end

The camera system also provides a wealth of reliable data in terms of: aircraft type (including transient aircraft), runway utilization, and nighttime activity. This data is usually not available even at a towered airport. The system, however, does not record arriving aircraft, overflights, low approaches, touch-and-gos, or helicopter flights. Therefore, the operational estimates assume that the number of arrivals is the same as departures in whole and with respect to individual aircraft types. TTAD estimated the additional activity using the multi-lats (radar) tracking system. **Table 2-11** summarizes the recent changes in operational activity. Total annual operations were over 40% higher in 2012 than 2007. The difference between 2007 and 2012, when annualized, is 7.58% per year although actual changes in annual activity fluctuated between positive and negative from year to year. 2010 was the busiest year of the 5-year sample. Included in the activity data is glider activity which comprises flights by non-powered gliders and the powered tow plane. Total activity related to gliders has averaged about 5,000 operations per year over the sampling period and 5,250 were recorded in 2012. There were also over 1,600 helicopter operations during 2012 approximately half of which are air ambulance. (**Table 2-22** later in this Chapter breaks out operations by aircraft type for 2012.)

Table 2-11 TRK Annual Operations			
Year	**Itinerant**	**Local**	**Total**
2007	7,845	10,521	18,366
2008	3,440	9,743	13,183
2009	10,319	10,957	21,276
2010	17,339	12,196	29,535
2011	11,933	11,242	23,175
2012	14,902	11,568	26,470
CAGR	13.69%	1.92%	7.58%

Table Notes:
- Operation: A takeoff or a landing. Each is a single operation.
- Itinerant: Aircraft operations between airports.
- Local: Aircraft operations occurring at or near the airport and not involving another destination. At TRK, these include touch-and-go practice, glider flights, and glider-tow operations.
- CARG: Compounded annual growth rate.
- Source: TRK Records interpreted by Mead & Hunt, Inc.

As can be expected, TRK experiences significant seasonal variations in activity (see **Figure 2-4**). Peak operational activity occurs during the summer; July is the busiest month. During the winter turbo-prop, turbo-jet and helicopter operations comprise between 40% and 50% of the operating mix. The winter peak occurs in February.

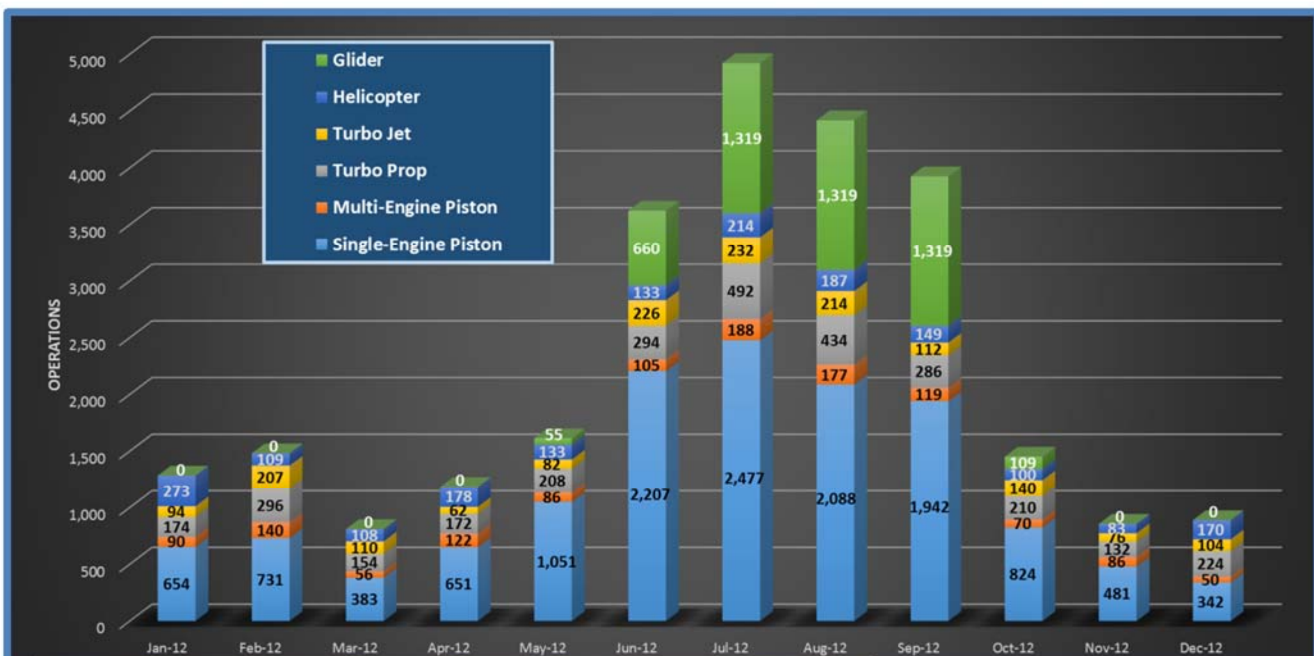


Figure 2-4 2012 OPERATIONS PER MONTH AND AIRCRAFT CATEGORY

7. DEMAND INFLUENCES

Aviation activity at TRK is influenced by a unique combination of market demand, policy restrictions, and facility constraints. This section describes the influence that each has on existing and future demand to be accommodated at TRK.

7.1 Market Demand

Truckee has always been and will continue to be a desired location to visit and visit regularly. The profile of seasonal visitors is changing to encompass a larger radius (e.g., from the Bay Area to Los Angeles). Increasingly, with changes in technology combined with local initiatives to diversify the economy, the area is also becoming a place to live and work year round. This changing socio-economic profile will likely be reflected in the airport's activity, which should also be expected to increase proportionally and experience a gradual flattening of the high/low activity cycles.

Also of note is the area's access to high income/wealth individuals, a highly educated contributing population, and a comparatively high percentage of business owners and company managers. These individuals have a higher propensity to travel more frequently, own aircraft, and use chartered flight services than the general population. Continued socio-economic growth of the area will likely result in additional demand for based aircraft, particularly turbo-props and turbo-jets, and increased operations by these aircraft types, the combination of which could include based aircraft flights by the owner and chartered transient operations.

The volume of light piston airplanes have been declining for several decades as airplane retirements have outpaced new deliveries. This change is being experienced at TRK; there are some vacant T-hangar units. Although nationally the rate of decline is slowing, recovery of this segment will be slow through the 2025 planning horizon. Generally, increases in light piston demand would be supported by modest increases in population and/or a reduction in storage capacity elsewhere (i.e., closure of a nearby airport or redevelopment that reduces storage capacity, such as the removal of hangars).

7.2 Policy Restrictions

The District operates TRK as a "Community Airport" that places significant emphasis on influencing off-airport visual, noise, and perceived safety impacts associated with overflights, takeoffs, and landings. There are presently several volunteer incentives to dissuade nighttime operations with discussions now focusing on ways to extend these programs to transient operators. Likewise, the District does not wish to encourage all-weather operations by pursuing lower approach minimums. Recent discussions have included the degree to which an internally heated, air/chemical-spray or infrared deicing facility might incentivize all-weather activity and how to minimize that potential if such a facility were pursued. Supporting all of these efforts is TRK's own challenging flight environment (i.e., high altitude, surrounding mountains, and fast-changing weather patterns) that dissuades much of this activity. For example, nighttime activity is significantly lower [as a percentage of total operations] than those of a typical lowland airport. Various questions raised during this master plan process included:

- **Will increased use by turbo-prop and turbo-jets, particularly transient operators, increase nighttime and all-weather operations?**
- **What impact might new technologies and weather aids such as GPS-navigation, synthetic vision, other flight automation enhancements, surface and/or mountain peak weather monitoring, radio-repeater or data-link enhancements, and wing/engine design improvements have on nighttime and all-weather operations?**

- **Will aircraft using the airport get any larger; how can this be prevented at TRK?**

Currently, TRK experiences limited nighttime operations. The District is committed to monitoring potential increases in nighttime activity that may result from increased use of advanced aircraft systems and performance. Some examples include: synthetic vision, enhanced wing/airframe design, and engine performance enhancements. The District will periodically reevaluate its operational incentive programs and policies to address increases in nighttime activity over time.

TRK currently receives infrequent operations by the largest airplanes in the general aviation fleet. These operations can be accommodated with the facilities that are in place today. Because the higher end business jet market desires access to smaller airports such as TRK, there is a marketplace incentive for airplane purchasers and manufacturers to moderate the physical size of the aircraft. For this reason, the maximum size of aircraft expected to use TRK is not expected to increase beyond what is already present. Marketplace emphasis is instead expected to concentrate on engine, wing, emissions, and noise performance enhancements. That said, operations by these and smaller turbo-prop and turbo-jet aircraft are expected to increase as a percentage of total operations. When combined with the potential for further declines in small piston airplane operations, the result will be an increase in the average aircraft size. The average increase in aircraft size is a national trend that may be unavoidable. For most general aviation airports, these anticipated changes in the fleet mix have crucial financial, facility design, operational, and community implications.

7.3 Facility Constraints

The airside (i.e., runway-taxiway) environment does not impose significant constraints to operational demands: the runways are sufficiently long enough to accommodate the aircraft that wish to access TRK. Although there is no significant demand for use by heavier aircraft, the pavement strength is only sufficient to accommodate current aircraft. Airfield pavements cannot accommodate regular use by airline or airliner-type business jets; pavement strengthening would be necessary.

TRK's primary constraints are on the landside (i.e., hangars and apron) environment. At the time this master plan was being prepared, there were 15 airplanes on a waiting list for "executive" or "box" hangars. These hangars are larger than the T-hangars that house primarily light piston aircraft. The lack of sufficient hangar space constitutes a constraint on "natural" demand that would otherwise be in place today. Housing more aircraft would contribute to additional operational activity. However, in some cases the demand for larger aircraft is from current operators of smaller, piston aircraft. In this case, larger aircraft would replace the smaller piston aircraft and result in a net-zero increase in operations.

Other constraints relate to all-weather capability such as instrument approach procedures and deicing capability. The approach minimums are high, essentially providing for a descent through a cloud layer and landing in semi-visual conditions (more than 1-mile visibility). Likewise, TRK does not have a deicing facility that would enable continued operations during a winter storm. The combination high approach minimums and lack of deicing likely contributes to a portion of planned flights diverting to another airport or cancelling a trip. Other operators, such as air charter operators in general, may conduct additional drop off / pick up operations or reposition to other airports. In these cases, the operator is avoiding snow/ice accumulation during day-long or overnight stopovers.

8. AVIATION FORECASTS

This section details the analysis undertaken to derive a preferred forecast of aviation demand. The forecasts will be used in subsequent sections of this master plan to derive demand-driven facility requirements and also to assess potential operational impacts. Aviation activity at TRK consists of two primary components: the number and type of aircraft to be based at the airport and the operations (i.e., takeoffs and landings). The peaking characteristics of both components are also particularly important since the airport experiences particularly dramatic changes between seasonal highs and lows.

8.1 Based Aircraft Forecasts

Based aircraft are the aircraft that are located, or based, at TRK (The term 'based aircraft' in this plan refers to aircraft that are stored at the Airport, either permanently or seasonally and should not be confused with aircraft that are based at TRK for tax purposes). As mentioned, TRK experiences significant seasonal fluctuations in activity, including the number of aircraft that are stored at the airport. **Currently, 66% of the based aircraft are stored at the airport year-round. However, the combined seasonal and home-based aircraft pay for facilities on a year-round basis. Therefore, the forecasts assess total based aircraft which most accurately reflect the airport's storage facility needs.** It is also expected that a higher proportion of aircraft will base permanently at TRK rather than seasonally in the future.

Two primary methods were used to estimate demand for based aircraft through 2025. Method #1, Total Based Aircraft Method, first projects the demand for total aircraft and then breaks the total projection into aircraft categories. Method #2, Aircraft Category Method, is the reverse of the first. It projects growth within the aircraft categories and then combines the estimates to form total demand. To establish initial demand, both methodologies use 202 total based aircraft and 15 wait-listed aircraft to form a total 2013 base-year demand of 217 aircraft. Both methods also attempt to correlate future aviation demand with the growth anticipated within the District. The forecasts also considered how TRK is evolving relative to national aviation trends. Section 8 concludes with a recommended based aircraft forecast for use in gauging operational activity in related to the based aircraft in Section 9 and for estimating aircraft storage needs through 2025 in Chapter 3.

METHOD #1: TOTAL BASED AIRCRAFT METHOD

The first method assumes that total demand for based aircraft will reflect socio-economic growth within the District communities (see Section 3, Regional Analysis). **Table 2-12** identifies a time-trend rate and various socio-economic rates to project a corresponding change in total based aircraft. The home-value variable, which included a growth rate of 8.8%, was discarded since it produced a significantly higher level of growth and because of its overall volatility. The remaining variables were then averaged to produce an annual growth rate of 1.45%.

Table 2-12 Method #1: Total Based Aircraft Demand

Year	Time-Trend	Population	Employment	Household Income	Commercial Floor Space	Combined Average
2013	217	217	217	217	217	217
2015	219	226	221	224	228	219
2020	222	249	233	241	256	240
2025	226	275	245	259	288	258
CAGR[1]	0.350%	2.000%	1.000%	1.500%	2.400%	1.45%

CAGR – Compound Annual Growth Rate, 2013 to 2025
Note: Includes seasonal and year-round based aircraft.

A future fleet mix (as a percentage of total based aircraft) was developed by comparing TRK's 1997 and 2013 mix of aircraft with those of the entire United States General Aviation Fleet. FAA national forecasts were then assessed for applicability at TRK consistent with past trends. **Table 2-13** identifies the fleet mix percentages for 1997, base year 2013, and future years. Generally speaking, the changes to TRK's based aircraft fleet reflect those of the U.S., except for turbine aircraft (turbo-props and turbo-jets) which have increased more significantly than national trends. Based on TRK's recent trends combined with the regional conditions assessment, this section suggests particularly strong demand to base single-engine piston, turbo-prop, and turbo-jet airplanes relative to the national mix. **Table 2-14** summarizes the based aircraft mix forecast for Method #1 by applying the combined average total demand of Table 2-12 with the TRK specific fleet mix percentages of **Table 2-13**.

Table 2-13 Method #1: Fleet Mix Percentages: TRK / US General Aviation Fleet

Year	SEP		MEP		TP		TJ		HC	
	TRK	US	TRK	US	TRK	US	TRK	US	TRK	US
1997	81.61	68.69	14.35	9.70	3.14	2.65	0.90	3.22	0.00	3.29
2013	71.89	61.60	5.53	7.07	12.44	4.38	7.37	5.39	2.76	4.84
2015	70.82	60.01	5.44	6.94	13.04	4.57	7.89	5.89	2.80	5.27
2020	68.16	57.60	5.22	6.64	14.52	4.89	9.20	6.81	2.90	6.00
2025	65.50	55.34	5.00	6.25	16.00	5.22	10.50	7.87	3.00	6.66

SEP- Single Engine Piston Airplane
MEP- Multi-Engine Piston Airplane
TP- Turbo-Prop Airplane
TJ- Turbo-Jet Airplane
HC- Helicopter (combines piston and turbine engine types)
2013 Base Year includes 15 waitlist aircraft

Table 2-14 Method #1: Based Aircraft Demand Forecast

Year	SEP	MEP	TP	TJ	HC	Total
1997	182	32	7	2	0	223
2013	156	12	27	16	6	217
2015	158	12	29	18	6	223
2020	164	13	35	22	7	240
2025	169	13	41	27	8	258

Note: Includes seasonal and year-round based aircraft.

METHOD #2: AIRCRAFT CATEGORY METHOD

The second method assumes that the aircraft categories will change in a manner that reflects a blend trends that are specific to TRK and those of the U.S. general aviation as a whole. **Table 2-15** compares average annual changes in the TRK based aircraft fleet with those of the U.S. fleet between 1997 and 2012 and shows growth rates for the national fleet from 2013 through 2033, as projected in the FAA's Aerospace Forecast FY 2013-2033.

Table 2-15 Comparison of Annual Changes in Fleet Mix

	SEP	MEP	TP	TJ	HC
TRK[1] 1997-2013	-0.96%	-5.95%	8.80%	13.88%	NA[2]
US GA Fleet[3] 2000-2012	-0.78%	-2.48%	4.41%	4.51%	3.39%
US GA Fleet[3] 2013-2033	-0.25%	-0.63%	1.69%	3.53%	2.67%

1- TRK Fleet mix changes compare 1997 based aircraft with 2013 based aircraft combined with 15 wait-listed airplanes.
2- There were no helicopters based at TRK in 1997 and 6 in 2012 (average growth= 0.4 units / year).
3- Historical and projected U.S. growth rates derived using Table 28, FAA Aerospace Forecast FY 2013-2033.

Table 2-16 applies Method #2 to project TRK's future fleet mix and corresponding total aircraft through 2025. For single-engine piston aircraft, historic annual changes at TRK closely tracked those of the U.S. general aviation fleet. Multi-engine piston aircraft actually declined at TRK at a greater rate than the U.S. general aviation fleet. For Method #2, the projected FAA forecast growth rates were applied to the single-engine and multi-engine piston categories at TRK. The FAA national forecasts were also applied to helicopters given their more recent introduction at TRK.

The rate of growth for turbo-prop aircraft at TRK was two times higher than that experienced nationwide from 2000-2012. The forecasts apply a corresponding factor to the national forecasts to reflect this condition; however, because turbo-prop production is forecast to decline, the rate of growth will be slower than that experienced at TRK between 1997 and 2013. Annual growth associated with turbo-jet storage (including waitlist aircraft) was over three times higher at TRK than nationally. The forecasts assume demand to base jet airplanes at TRK will taper to twice that which is projected for the nation as a whole.

Table 2-16 Method #2: Based Aircraft Demand Forecast

Year	SEP	MEP	TP	TJ	HC	Total
1997	182	32	7	2	0	223
2013	156	12	27	16	6	217
2015	155	12	29	18	6	221
2020	153	11	34	26	7	232
2025	151	11	40	36	8	247

Note: Includes seasonal and year-round based aircraft.

BASED AIRCRAFT FORECAST SELECTION

The two forecasting methods produce noticeably different results. Most notably, demand for single-engine airplane storage increases in Method #1 and decreases in Method #2. Due to this difference the Method #2 also produced a lower total demand for aircraft storage. Demand for turbo-jet storage is also higher in Method #2. The methods produced similar results for multi-engine piston, turbo-props, and helicopters.

The purpose of the forecast analysis is to provide a realistic framework from which to gauge future facility needs, financial impacts, and policy. Both methods are valid for accomplishing this goal. Given the regional analysis, there is strong likelihood that socio-economic growth in the area will help maintain demand for piston aircraft similar to what is in place today. Likewise, it is assumed that demand for turbo-props and jet storage will continue to increase, but that the demand will likely be tapered by local policies and the need to develop the storage units needed to accommodate the demand. The recommended forecast, included in **Table 2-17**, blends methods 1 and 2 to better balance the nationally projected declines in piston aircraft and the historically higher than average demand for turbo-prop and turbo-jet storage.

Currently, 66% of the based aircraft are stored at the airport year-round. However, the combined seasonal and home-based aircraft pay for facilities on a year-round basis. Therefore, the forecasts assess total based aircraft which most accurately reflect the airport's storage facility needs. **Table 2-17 includes permanent (aircraft in the FAA's National Based Aircraft Inventory Program) and seasonal based aircraft.**

Table 2-17 Selected Based Aircraft Demand Forecast

Year		Single Piston		Multi Piston		Turboprop		Turbojet		Helicopter		Total	
2013	Total	156		12		27		16		6		217	
	Based / Seasonal	104	52	8	4	18	9	11	5	4	2	145	72
2015	Total	157		12		29		18		6		222	
	Based / Seasonal	105	52	8	4	19	10	12	6	4	2	148	74
2020	Total	158		12		34		24		7		235	
	Based / Seasonal	105	53	8	4	23	11	16	8	5	2	157	78
2025	Total	160		12		41		32		8		253	
	Based / Seasonal	106	54	8	4	27	14	21	11	5	3	167	86

8.2 *Aircraft Operations Forecast*

The methodologies used for projecting aircraft operational activity at an airport are similar to ones used to project based aircraft demand. Aircraft operations are generally divided into two separate components: itinerant and local. Itinerant operations occur between airports and, at TRK in particular, are highly influenced by its appeal as a seasonal destination. Itinerant operations are affected by the economy in general. Local operations are those that occur nearby and don't involve another airport. They are highly influenced by light aircraft training activity, such as practice takeoffs and landings, touch-and-go operations, and glider activity. Locally based aircraft make up the majority of local operations.

Historical operation data is presented in Table 2-11 in Section 6 above. As mentioned, operations from 2007 are considered very accurate since TRK installed a camera recording system that records every departure. The camera does not capture touch-and-go activity by fixed wing and helicopter aircraft, and these operations are estimated. For these forecasts, the last complete year of data available is 2012 (26,740 total operations) and this is used for base year data for operations.

Three methods were used to project future operations at TRK: Method #1 focuses on itinerant operations and projects these based on socio-economic factors. Methods 2 and 3 focus on local operations. Method #2 uses the same socio-economic factors as Method #1 while Method #3 estimates future local operations as a function of projected based aircraft.

Itinerant Operation: Takeoff or landing operations of airplanes going from one airport to another airport that involves a trip of at least 20 miles.

Local Operation: Any operation performed by an aircraft that (a) operates in the local traffic pattern or within sight of the tower or airport, or (b) is known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the control tower or airport. *(FAA AC 150/5325-4B)*

ITINERANT OPERATIONS

Method #1 assumes changing trends in itinerant operations are a function of economic conditions. From 2007 to 2012, itinerant operations increased at an average annual rate of 13.69%, with 14,902 itinerant operations in 2012. Itinerant operations are not expected to maintain this rate of growth throughout the planning period, but rather grow at rates similar to local socio-economic factors introduced in Section 4 above.

Method #1 looks at the economic indicators associated with the local economy and projects itinerant operations at rates between 1.0% and 2.4% per year. For instance, population growth in the region is projected at 1.0%, so this rate is applied to itinerant operations. The selected itinerant operation forecast uses an average of the socio-economic growth rates (1.725%). Each of the variable rates and selected forecast in itinerant operations are summarized in **Table 2-18**.

Table 2-18 Method #1: Itinerant Operations: Socio-Economic Growth

Year	Population	Employment	Household Income	Commercial Floor Space	Selected Master Plan Forecast
2012	14,902	14,902	14,902	14,902	14,902
2015	15,814	15,354	15,583	16,001	15,687
2020	17,460	16,137	16,787	18,015	17,087
2025	19,277	16,960	18,084	20,284	18,612
CAGR[1]	2.000%	1.000%	1.500%	2.400%	1.725%

1. CAGR – Compound Annual Growth Rate, 2012 to 2025

LOCAL OPERATIONS

Local operations include glider activity, training flights, and miscellaneous activity such as low/missed approaches and aborted takeoffs and landings. From 2007 to 2012, local operations increased at an average annual rate of 1.92%, with 11,568 local operations in 2012. Glider activity remained relatively constant over this time. For local forecasts, it is assumed that glider and glider-tow activity will remain constant through 2025 (about 5,250 per year). So while glider operations are considered local, these are removed from projections in Methods 2 and 3, and then re-included in the local operations summary table.

Method #2 for projecting local operations is based on population growth and shown in **Table 2-19**. This scenario projects growth in local operations (of powered aircraft) based on the population growth rate of 2.0%.

Table 2-19 Method #2: Local Operations: Population Growth

Year	Local[1]		
	SEP	MEP	Total[2]
2012	5,694	624	6,318
2015	6,043	662	6,705
2020	6,671	731	7,403
2025	7,366	807	8,173
CAGR	2.000%	2.000%	2.000%

1. Local operations are primarily practice training activity being conducted by single and multi-engine piston airplanes.
2. Excludes glider activity and operations by the glider tow-plane.

Method #3 projects local operations as a function of based aircraft. This method reflects the national decline in the types of aircraft (piston) that perform local training flights for which there has also been a declining number of operations per aircraft.

At most airports, the majority of local operations are those being conducted by locally based aircraft. TRK camera counts taken from June 28 through July 8, 2012 were analyzed to determine that single-engine airplanes account for 90.12% of piston activity; the remainder are multi-engine piston airplanes. A ratio of local operations per based aircraft per year was then derived using based aircraft and operations records for 2012: 36.5 for single-engine piston and 52 for each multi-engine piston. These ratios were held constant and applied to the selected based aircraft forecast (Table 2-17) to estimate future local activity being conducted by piston aircraft. The results of Method #3 are detailed in **Table 2-20**.

Table 2-20 Method #3: Local Operations: Based Aircraft Growth

Year	Based SEP[1]	SEP Local Operations[1]	Based MEP[1]	MEP Local Operations[1]	Total Local Operations[2]
2012	156	5,694	12	624	6,318
2015	157	5,720	12	624	6,344
2020	158	5,784	12	624	6,408
2025	160	5,847	12	624	6,471
CAGR	0.204%		0.000%		0.184%

1. Local operations are primarily practice training activity being conducted by single and multi-engine piston airplanes.
2. Excludes glider activity and operations by the glider tow-plane.

SELECTED LOCAL FORECASTS

Method #2 uses 2.0% CAGR for local piston operations and Method #3 uses 0.184%. The selected forecast for local powered operations uses an average between the two methods: 1.092% CAGR. This rate is applied to both single-engine and multi-engine piston aircraft. The selected local operations are presented in **Table 2-21**, and include glider operations which are not expected to grow throughout the planning period.

Table 2-21 Selected Local Operations Forecast					
Year	Glider[1]	Powered Local[2]			Total Local
		SEP	MEP	Total	
2012	5,250	5,694	624	6,318	11,568
2015	5,250	5,883	645	6,527	11,777
2020	5,250	6,211	681	6,892	12,142
2025	5,250	6,558	719	7,276	12,527
CAGR	0.000%	1.092%	1.092%	1.092%	0.614%

1. Glider activity includes glider operations and the operations by the glider tow-plane. No growth projected.
2. Other Local Operations are primarily practice training activity being conducted by light single and multi-engine piston airplanes.

SELECTED OPERATION FORECASTS

Selected forecasts for itinerant operations (Table 2-18) and local (Table 2-21) are separated into operations by aircraft type in **Table 2-22**. This table gives a better idea of growth in operations for each aircraft type. As with based aircraft, growth in operations by turboprop and jet aircraft is expected to outpace piston aircraft.

Table 2-22 Selected Operation Forecast: Aircraft Type									
Year	SEP		MEP		TP	TJ	HC	Glider[1]	Total
	Itinerant	Local	Itinerant	Local					
2012	8,031	5,694	857	624	2,866	1,532	1,616	5,250	26,470
2015	8,235	5,883	784	645	2,980	2,040	1,647	5,250	27,464
2020	8,971	6,211	854	681	3,247	2,221	1,794	5,250	29,229
2025	9,772	6,558	930	719	3,536	2,420	1,954	5,250	31,139

1. Glider activity includes glider operations and the operations by the glider tow-plane.

In addition to showing operations separated by local and itinerant activity, the selected forecasts are broken out to show operations by based aircraft and transient aircraft in **Table 2-23**. Operations by based aircraft are strictly those by aircraft that hangar at TRK. Transient operations are those by aircraft based at other airports.

Based Operation: Any operation performed by any aircraft based at the airport.

Transient Operation: Any operation performed by any aircraft not based at the airport.

The percentage of 2013 operations that are by based versus transient aircraft are estimated by the airport. For piston aircraft, an estimated 46% of operations are by based and 54% by transient aircraft. For turboprops, the split is 10% based and 90% transient. Jets are 2% based and 98% transient, and helicopter operations are 84% based and 16% transient. It is projected a greater share of jets and turboprops will base at TRK in the future. Therefore, it is expected that operations by based turboprops and jets will increase over time.

Table 2-23 Selected Operation Forecast: Based and Transient Aircraft

Year	SEP		MEP		TP		TJ		HC		Glider[1]	Total	
	Based	Transient	Based	Transient	Based	Transient	Based	Transient	Based	Transient	Based	Based	Transient
2012	6,314	7,412	681	800	269	2,597	22	1,510	1,357	259	5,250	13,893	12,577
2015	6,494	7,624	657	772	328	2,653	102	1,937	1,384	264	5,250	14,215	13,249
2020	6,984	8,198	706	829	455	2,792	178	2,044	1,507	287	5,250	15,079	14,150
2025	7,512	8,818	759	891	530	3,006	290	2,129	1,642	313	5,250	15,983	15,156

1. Glider activity includes glider operations and the operations by the glider tow-plane.

9. PEAKING CHARACTERISTICS

Planning for aviation facilities is often based on peak periods of activity. This is particularly important at TRK because of the seasonal concentration of activity that occurs during the summer combined with a changing operational mix that occurs throughout the year. This section identifies monthly, daily, and hourly peaking characteristics related to transient operations. The information will be helpful for identifying the airport's paved apron needs (summer) and potential overnight/temporary hangar demand (winter). Overnight hangar demand is related primarily to larger air taxi/ business-aviation aircraft for purposes of avoiding snow/ice accumulation or to melt it in advance of a planned departure. **Tables 2-24** and **2-25** project peak summer and winter activity, respectively.

Table 2-24 Summer Peaking Characteristics

	2012			2015			2020			2025		
	Month (July)	Day (÷30)	Hour (15% Day)	Month (July)	Day (÷30)	Hour (15% Day)	Month (July)	Day (÷30)	Hour (15% Day)	Month (July)	Day (÷30)	Hour (15% Day)
ITINERANT:												
SEP	1,138	38	6	1,175	39	6	1,249	42	6	1,324	44	7
MEP	136	5	1	134	4	1	130	4	1	126	4	1
TP	492	16	2	522	17	3	576	19	3	636	21	3
TJ < 12.5k	72	2	0	76	3	0	84	3	0	93	3	0
TJ < 20k	78	3	0	83	3	0	91	3	0	101	3	1
TJ> 20k	82	3	0	87	3	0	96	3	0	106	4	1
HC	214	7	1	227	8	1	251	8	1	277	9	1
TOTAL	2,212	74	11	2,305	77	12	2,479	83	12	2,664	89	13
LOCAL:												
SEP	1,339	45	7	1,358	45	7	1,396	47	7	1,434	48	7
MEP	52	2	0	52	2	0	50	2	0	50	2	0
Glider	1,319	44	7	1,319	44	7	1,319	44	7	1,319	44	7
TOTAL	2,710	90	14	2,729	91	14	2,765	92	14	2,803	93	14
TOTAL:	4,922	164	25	5,034	168	25	5,244	175	26	5,467	182	27
% Annual	18.60%			18.29%			17.83%			17.36%		

Table 2-25 Winter Peaking Characteristics												
	2012			2015			2020			2025		
	Month (February)	Day (÷30)	Hour (15% Day)	Month (February)	Day (÷30)	Hour (15% Day)	Month (February)	Day (÷30)	Hour (15% Day)	Month (February)	Day (÷30)	Hour (15% Day)
ITINERANT:												
SEP	560	19	3	578	19	3	614	20	3	651	22	3
MEP	101	3	1	100	3	0	97	3	0	94	3	0
TP	296	10	1	314	10	2	347	12	2	383	13	2
TJ < 12.5k	91	3	0	97	3	0	107	4	1	118	4	1
TJ < 20k	54	2	0	58	2	0	64	2	0	70	2	0
TJ> 20k	62	2	0	65	2	0	72	2	0	80	3	0
HC	109	4	1	115	4	1	127	4	1	141	5	1
TOTAL	1,272	42	6	1,327	44	7	1,428	48	7	1,536	51	8
LOCAL:												
SEP	172	6	1	178	6	1	188	6	1	200	7	1
MEP	39	1	0	38	1	0	38	1	0	38	1	0
Glider	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	210	7	1	216	7	1	226	8	1	238	8	1
TOTAL:	1,483	49	7	1,543	51	8	1,654	55	8	1,774	59	9
% Annual	5.60%			5.60%			5.62%			5.63%		

10. FORECAST SUMMARY

The forecasts of aviation demand covered in this chapter will form the basis of both facility planning and land use policy at Truckee Tahoe Airport. For reference, **Table 2-26** provides a summary of all aviation projections described in this chapter. Succeeding chapters of this plan will further refine the demand forecasts to translate the forecast demand into specific facility requirements and also to assess potential impacts such as overflights/noise. Activity projections are often used by airport operators and dependent businesses for financial and business planning purposes.

Table 2-26 Forecast Summary	2012 (Actual)	2015	2020	2025
BASED AIRCRAFT[1,2]:				
Single-Engine Piston	156	157	158	160
Multi-Engine Piston	12	12	12	12
Turbo-Prop	27	29	34	41
Turbo-Jet	16	18	24	32
Helicopter	6	6	7	8
TOTAL	217	222	235	253
OPERATIONS:				
Itinerant	14,902	15,687	17,087	18,612
Local	11,568	11,777	12,142	12,527
TOTAL	26,470	27,464	29,229	31,139
PEAK CONDITIONS:				
Peak Month (July)	4,922	5,034	5,244	5,467
(% annual)	(18.60%)	(18.29%)	(17.83%)	(17.36%)
Average Day/ Peak Month	164	168	175	182
Peak Hour (15%)	25	25	26	27

1. Based aircraft numbers include executive hangar waitlist to reflect actual demand.
2. Based aircraft totals equal permanent and seasonally based aircraft. Permanent based aircraft mirror what is in the FAA's National Based Aircraft Inventory Program. See Table 2-17 for more detailed based aircraft info.

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TRUCKEE TAHOE AIRPORT

MASTER PLAN

Chapter 3 Facility Requirements

MASTER PLAN

CHAPTER 3 # Facility Requirements

1. OVERVIEW

This chapter focuses on facility requirements at Truckee Tahoe Airport (TRK). Airport facilities are generally divided into airside and landside facilities. Airside facilities include runways, taxiways, navigation aids, required clear areas, aircraft parking and aprons, support facilities and hangar areas. Landside facilities typically include other building (non-hangar) areas, roads, security, automobile access and other airport property outside of aircraft movement areas.

Airport facility planning is largely driven by a combination of criteria and standards developed by the Federal Aviation Administration (FAA) that emphasize safety and efficiency while protecting federal investment in airport transportation infrastructure, demand for services, and the airport operator's vision of its aviation and community roles. This chapter is organized into the following sections.

- **Runway and Taxiway System**
- **Aircraft Storage Facilities**
- **Aviation Support Facilities**
- **Airport Property**
- **Landside and Parking**

2. RUNWAY AND TAXIWAY SYSTEM

Airside facilities support the movement of aircraft. These facilities include paved surfaces like the runways and taxiways, plus other airfield design considerations such as NAVAIDS and instrument procedures. This section begins with a discussion on the critical design aircraft and associated airport reference code. The critical aircraft and reference code determine the adequacy of the runway system and airport geometry, the taxiway system, airside support facilities, and development areas.

2.1 FAA Standards

The FAA is responsible for the overall safety of civil aviation in the United States; therefore, FAA design standards are primarily driven by safety. Secondary goals including efficiency and utility are also reflected in FAA standards and policy. Design standards are constantly evolving as the aviation industry changes and new safety data is obtained.

FUNDAMENTALS OF AIRPORT DESIGN

Planning and development of airside facilities are heavily predicated on complying with the FAA design standards of Advisory Circular (AC) 150/5300-13A, *Airport Design*. This section summarizes those design standards, and identifies TRK's unique conditions that influence design recommendations.

2.2 Airfield Demand and Capacity Analysis

FAA Advisory Circular 150/5060-5, *Airport Capacity and Delay*, defines capacity as "a measure of the maximum number of aircraft operations which can be accommodated on the airport or airport component in an hour." Methodology used to quantify capacity focuses on the annual service volume (ASV). AC 150/5060-5 defines ASV as "a reasonable estimate of an airport's annual capacity. It accounts for differences in runway use, aircraft mix, weather condition, etc., that would be encountered over a year's time."

The FAA's *Airport Capacity and Delay* computer program helps calculate ASV. Input required for the program includes the percentage of aircraft that weigh over 12,500 pounds and the configuration of the runway (TRK has two runways that intersect). According to the operational data of the previous 5 years, about 8 percent of operations at TRK are by aircraft weighing over 12,500 pounds. The program output estimates an ASV of 230,000 annual aircraft operations. Given the current level of activity at TRK (26,470 in 2012) the runway/taxiway system is functioning at about 12% of capacity. Based on this analysis, TRK's runway configuration is expected to be adequate for the long-term and no additional runways are planned.

2.3 Runway Design Code (RDC)

FAA design standards for an airport are determined by a coding system relating the physical and operational characteristics of the most demanding aircraft regularly using the airport to the design and safety setback distances of the airfield facility. The Runway Design Code (RDC) is a three-component code that defines the applicable design standards of a specific runway. The first component, depicted by a letter (A-E) is the Aircraft Approach Category (AAC), relates to the approach speed of the design aircraft. The second component, Airplane Design Group (ADG), depicted by a Roman numeral (I-VI), relates to the wingspan or tail height of the design aircraft. The third component relates to runway visibility minimums as expressed in Runway Visual Range (RVR) measurements. This directly relates to the instrument approach minimums for that runway. RVR values represent feet of forward visibility that have statute mile equivalents (e.g. 2400 RVR = ½ mile). RDC classifications are summarized in **Table 3-1**.

Table 3-1 Runway Design Code System		
Aircraft Approach Category (AAC)		
AAC	**Approach Speed**	
A	Approach Speed less than 91 knots	
B	Approach speed 91 knots or more but less than 121 knots	
C	Approach speed 121 knots or more but less than 141 knots	
D	Approach speed 141 knots or more but less than 166 knots	
E	Approach speed 166 knots or more	
Airplane Design Group (ADG)		
Group #	**Wingspan (ft)**	**Tail height (ft)**
I	< 49’	< 20’
II	49’ - < 79’	20’ - < 30’
III	79’ - < 118’	30’ - < 45’
IV	118’ - < 171’	45’ - < 60’
V	171’ - < 214’	60’ - < 66’
VI	214’ - < 262’	66’ - < 80’
Approach Visibility Minimums		
RVR (ft)[1]	**Flight Visibility Category (statue miles)**	
VIS	Runways designed for visual approach use only	
5000	Not Lower than 1 mile	
4000	Lower than 1 mile but not lower than ¾ mile (APV ¾ but< 1 mile)	
2400	Lower than ¾ mile but not lower than ½ mile (CAT-I PA)	
1600	Lower than ½ mile but not lower than ¼ mile (CAT-II PA)	
1200	Lower than ¼ mile (CAT-III PA)	

1. RVR- Runway Visual Range. The approximate visibility (in feet) as measured by the RVR light transmission/reception equipment or equivalent weather observer report.

DESIGN AIRCRAFT

The first step in airside facility planning is the identification of the design aircraft that determine the scale and setbacks of airfield facilities. The design aircraft is the most demanding aircraft operating or forecast to operate at that facility on a regular basis. The FAA defines “regular basis” as more than 500 operations per year. Characteristics of the design aircraft that are used in facility planning include approach speed, wingspan, tail height, main gear width, cockpit to main gear length, aircraft weight, and takeoff and landing distances. Dimensions of airfield facilities determined by the design aircraft include: runways, taxiways, taxilanes, aprons, and associated setbacks and clearances. The design aircraft may be a specific aircraft type or a composite of aircraft characteristics.

Multilateration is a tool used to enhance air traffic surveillance. Rather than traditional radar which uses one sensor, multilateration employs multiple small remote sensors throughout a wide area. The sensors gather data which is then used by airport staff for advisory purposes.

The current design aircraft at TRK is determined through an analysis of aircraft models operating at TRK today. The aviation forecasts in Chapter 2 and national fleet mix trends are both taken into account in determining the appropriate ultimate design aircraft for TRK.

Acquiring operation data for specific aircraft types is usually difficult at non-towered airports like TRK. Fortunately at TRK, there are two systems that capture what types of aircraft regularly operate there. One system is the wireless airport surveillance platform (WASP) system that takes a photo of an aircraft when passing near the departure end of the runway, just prior to departure. This data provides two important factors: the type of aircraft and runway use by aircraft type. The other system is TRK's multilateration (multi-lats) surveillance system. The multi-lats data helps validate the camera system data and also captures additional activity not recorded on camera.

The WASP differentiates between single-engine piston, multi-engine piston, turboprops, three weight classes of jets (<12,500 lbs., 12,500-20,000 lbs., and >20,000 lbs.), helicopters, and gliders. Multi-lats data is accessible, but using it to gather a full year of data and decipher specific aircraft types is more difficult. A sample of multi-lats from flight tracking data was used to generate existing noise contours for this plan.

Based on this data, specific aircraft models were analyzed and grouped into Aircraft Approach Category (AAC) (**Table 3-2**) and Airplane Design Group (ADG) (**Table 3-3**). The operations for each group and category were then broken out for operations on each runway. Each runway may have a different Runway Design Code (RDC), so it is important to break out operations for aircraft categories and groups on each runway.

Table 3-2 Aircraft Approach Category

2012 Operations on Each Runway				
AAC	Rwy 11	Rwy 29	Rwy 2	Rwy 20
A / B	790	17,372	1,531	2,269
C / D	18	350	2	10

Table 3-3 Airplane Design Group

2012 Operations on Each Runway				
ADG	Rwy 11	Rwy 29	Rwy 2	Rwy 20
I	694	14,744	1,444	2,080
II	107	2,842	86	190
III	6	178	3	8

Totals operation in Table 3-2 and 3-3 may not equal total operations in Forecast Chapter due to missing data.

The design aircraft is the most demanding aircraft operating or forecast to operate at an airport with more than 500 operations per year. Based on this criterion, the design aircraft at TRK today is a medium business jet, the Cessna Citation V (Model 560). The Cessna Citation V has an approach speed of 107 knots and a wingspan length of 55.8 feet, putting it in design category B-II. Other aircraft that are prominent at TRK and fall within the B-II category include: Beechcraft King Air and Super King Air, Cessna 441 and Cessna Citation jets (500 series).

There are occasional operations by larger business jets such as the Gulfstream III and IV, and the Global Express. These aircraft fall into the C/D Aircraft Approach Category. It is important to note that the FAA does not impose operation restrictions on aircraft exceeding the design of the airport. Such occasional operations are at the discretion of the pilot and may reasonably be accommodated by the airport. Rather, the airport design-code system is a planning tool used by the FAA to balance funding and avoid over-building.

ULTIMATE DESIGN AIRCRAFT

Operational data shows that TRK currently has more than 500 annual operations by aircraft in Approach Category B (approach speed less than 141 knots) and Design Group II (wingspans less than 79 feet). To help determine the ultimate design aircraft, forecasts from Chapter 2 were reviewed. These forecasts indicate that the growth in based aircraft and operations will be modest. Table 2-22 in Chapter 2 shows turbo-jet operations increasing to 2,500 in 2025. The types of turbo-jets that are expected to utilize TRK in the future are Citation (500 series) and similar sized business jets. Turboprops are also anticipated to increase at a similar growth rate. It is not expected that approach category C and D aircraft will reach the 500 annual operations to push TRK into that runway design category. Therefore, the design aircraft and design code is expected to remain the same through 2025 (Cessna Citation V – B-II).

APPROACH VISIBILITY MINIMUMS

TRK has two runways: a primary runway designated as 11-29 and a crosswind runway numbered 2-20. The runways intersect and are perpendicular to each other. Runway 11 and 20 are equipped with GPS straight-in instrument approach procedures. Aircraft using these procedures may land on Runway 11 or 20, or circle-to-land to another runway. The parameters to the GPS approaches to Runway 11 and 20 are shown in **Table 3-4**. For Runway Design Code, Runways 2 and 29 are each classified as visual (VIS) runways. Minimums to Runway 11 and 20 are not lower than 1-mile and both runways are classified as RVR 5000.

Table 3-4 TRK Instrument Approaches

	Aircraft Approach Category:	**A**	**B**	**C**	**D**
Runway and Instrument Approach		Minimum Descent Altitude / Visibility (Statue Mile)			
Runway 11 RNAV (GPS)	Straight-In (LNAV MDA) & Circling	8,160’ / 1 ¼	8,160’ / 1 ½	8,160’ / 3	N/A
Runway 20 RNAV (GPS) Y	Straight-In (LP MDA)	7,400’ / 1 ¼	7,400’ / 1 ½	7,400’ / 3	N/A
	Straight-In (LNAV MDA)	7,460’ / 1 ¼	7,460’ / 1 ½	7,460’ / 3	N/A
	Circling	7,460’ / 1 ¼	7,460’ / 1 ½	8,480’ / 3	N/A
Runway 20 RNAV (GPS) Z	Straight-In (LP MDA)	6,420’ / 1		6,420’ / 1 ½	N/A
	Straight-In (LNAV MDA)	7,120’ / 1 ¼	7,120’ / 1 ½	7,120’ / 3	N/A
	Circling	7,120’ / 1 ¼	7,200’ / 1 ½	8,480’ / 3	N/A

Note: Updated June 2015 to reflect current published instrument approaches.
Values represent the minimum descent altitude in feet above mean sea level, and the visibility minimums in statue miles.

The FAA published the non-precision approach to Runway 11 with approach minimums greater than 1-mile as this Master Plan was being completed. This Plan was updated accordingly, including Table 3-4 and appropriate airspace surfaces and setbacks on the airport layout plan.

Mountainous terrain limits instrument approach capabilities for runways at TRK. Runways 11 and 20 are aligned more favorably with lower terrain and therefore are able to be equipped with an instrument approach. An approach to Runway 11 or 20 with lower minimums is not proposed at this time. However, the FAA may introduce new procedures for Runway 2-20 or 11-29 and approach minimums could continue to reduce in the future. Due to mountainous terrain, though, it will be difficult to obtain an instrument approach that would offer minimums below 1 mile.

2.4 Runway 11-29

Runway 11-29 is TRK's primary runway. This runway is 7,000 feet in length and 100 feet wide. Most turboprop and jet-powered aircraft utilize this runway to take advantage of the longer length than is available on runway 2-20.

Significant features of Runway 11-29 include:

- **Straight-in instrument approach procedure to Runway 11 (1-mile, GPS)**
- **Runway is equipped with medium-intensity edge lighting (MIRLs).**
- **Approach end of Runway 11 equipped with runway end identifier lights (REILs).**
- **The pavement strength is 50,000 pounds for aircraft with single-wheel main landing gear and 80,000 pounds for dual-wheel aircraft.**
- **Pavement is grooved asphalt in good condition.**
- **Pavement is marked as a non-precision runway even though no straight-in instrument approach exists to either runway end. Markings are in fair condition.**
- **Signs and lights are in good condition – upgraded in 2011.**

Based on operations detailed in Tables 3-2 and 3-3 above, Runway 11-29 is designated as a B-II runway. The runway configuration complies with major design factors such as width, runway safety area, object free area, and runway protection zone dimensions. **Table 3-5** assesses all of the runway design requirements. Runway 11-29 meets all current FAA standards as a B-II design code runway and exceeds them in many cases which enhances the operational safety margin available to aircraft. No change in the RDC for Runway 11-29 is anticipated.

Runway Safety Area (RSA): A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway.

Object Free Area (OFA): A surface surrounding runways, taxiways, and taxilanes which should be clear of parked airplanes and objects except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes.

Runway Protection Zone (RPZ): A trapezoidal shaped area at the end of a runway, the function of which is to enhance the protection of people and property on the ground through airport owner control of the land. The RPZ usually begins at the end of each primary surface and is centered upon the extended runway centerline.

Table 3-5 Runway 11-29 Design Standards				
Runway Design Code	**B-II**			
Aircraft Approach Speed	<121 kts			
Aircraft Wingspan	<79 ft.			
Aircraft Weight Group	>12,500 lbs.			
Approach Visibility Minimums	Visual or >¾ mile			
Item	**Existing Conditions**	**FAA Design Standards[1]**	**Meets Standards?**	**Disposition**
Runway Design				
Width	100 ft.	75 ft.	Yes	No Action
Shoulder Width	10 ft.	10 ft.	Yes	No Action
Blast Pad Width	100 ft.	95 ft.	Yes	No Action
Blast Pad Length	150 ft.	150 ft.	Yes	No Action
Crosswind Component		13 knots	Yes	No Action
Gradient (maximum)	0.1%	1.5%	Yes	No Action
Runway Protection				
Runway Safety Area (RSA) Width	150 ft.	150 ft.	Yes	No Action
RSA Length Beyond Departure End	300 ft.	300 ft.	Yes	No Action
RSA Length Prior to Threshold	300 ft.	300 ft.	Yes	No Action
Object Free Area (OFA) Width	500 ft.	500 ft.	Yes	No Action
OFA Length Beyond Departure End	300 ft.	300 ft.	Yes	No Action
OFA Length Prior to Threshold	300 ft.	300 ft.	Yes	No Action
Obstacle Free Zone (OFZ) Width	400 ft.	400 ft.	Yes	No Action
OFZ Length Beyond Departure End[2]	200 ft.	200 ft.	Yes	No Action
Runway Protection Zone (RPZ) Length	1,000 ft.	1,000 ft.	Yes	No Action
PRZ Width at Inner End	500 ft.	500 ft.	Yes	No Action
RPZ Width at Outer End	700 ft.	700 ft.	Yes	No Action
Runway Separation				
From Runway Centerline to:				
Hold Line	200 ft.	200 ft.	Yes	No Action
Parallel Taxiway Centerline	250 ft.	240 ft.	Yes	No Action
Aircraft Parking Area	475 ft.	250 ft.	Yes	No Action

Notes:

1 Source: FAA Advisory Circular 150/5300-13A, *Airport Design* (September 2012)

2 Object Free Zone normally extends 200’ beyond end of runway; additional length required for runways with approach light systems.

RUNWAY 11-29 LENGTH

Runway length requirements are determined by analyzing the needs of the airport's critical aircraft and anticipating future needs. Length requirements are defined in AC 150/5325-4C, *Runway Length Requirements for Airport Design*, which states that "the recommended length for the primary runway is determined by considering either the family of airplanes having similar performance characteristics or a specific airplane needing the longest runway." Runway length requirements are presented for aircraft that weigh 60,000 pounds or less, since aircraft that are greater than 60,000 pounds rarely use TRK today.

The FAA *Airport Design* computer program is used to estimate runway lengths for general aviation aircraft. The software separates general aviation aircraft into two categories: small airplanes that weigh 12,500 pounds or less and larger aircraft that weigh 12,500 to 60,000 pounds, grouped by family. A representative small airplane that uses TRK is the Beechcraft King Air 200 and a representative large airplane is the Cessna 560 Citation V. Small airplane runway length requirements are determined for two groups of airplanes: those having less than 10 seats and those with 10 or more seats. Runway length requirements for large airplanes depends on whether that airplane is operating relatively light with 60 percent of its useful load or is near capacity at 90 percent of its useful load. Runway length requirements are also dependent upon other variables, the most significant being the airport elevation and air temperature during the hottest month. Runway lengths for TRK are presented in **Table 3-6**.

Table 3-6 Take-Off Runway Length for Aircraft Weighing Less Than 60,000 Pounds

Program Inputs:	
Airport elevation	5,900 feet
Mean daily maximum temperature of the hottest month	82.30 F.
Maximum difference in runway centerline elevation	8 feet
Haul Length	1,000 miles
Aircraft Description	**Length (Feet)**
75% of Small Airplanes with less than 10 passenger seats	5,000
95% of Small Airplanes with less than 10 passenger seats	7,050
100% of Small Airplanes with less than 10 passenger seats	7,050
Small Airplanes with 10 or more passenger seats	7,050
75% Large Airplanes, 60 percent useful load	6,860
75% Large Airplanes, 90 percent useful load	8,680
100% Large Airplanes, 60 percent useful load	11,080
100% Large Airplanes, 90 percent useful load	11,080

Source: FAA Airport Design Computer Program

Table 3-6 reveals that the existing 7,000 feet available is sufficient to accommodate most small airplanes. However, TRK's high altitude limits takeoff and climb performance of these aircraft, particularly during hot summer days. Turboprops and jets are less affected by altitude, but the length does impose some operational restrictions, forcing them to limit their takeoff payloads and fuel. Some of these aircraft types thus may require a fuel stop for long hauls. The current length is sufficient to accommodate a wide range of aircraft and also meets the community needs. No change in length is required.

2.5 Runway 2-20

Runway 2-20 functions as a secondary runway at TRK, although it is better aligned with prevailing winds. It is 4,650 feet in length and 75 feet wide with a displaced threshold of 115 feet at the approach end of Runway 20. The majority of activity on Runway 2-20 is by single-engine piston aircraft and gliders. Occasional use by turboprops and jets will occur when wind conditions are favorable. Most instrument arrivals occur on Runway 20 which offers the only published instrument straight-in approach to the airport.

Significant features of Runway 2-20:

- **Straight-in instrument approach procedure to Runway 20 (1-mile, GPS)**
- **Runway 20 is equipped with a 2-box VASI with a 3.5 degree glide slope.**
- **Runway is equipped with medium-intensity edge lighting.**
- **The pavement strength is 35,000 pounds for single wheel aircraft and 50,000 for dual wheel.**
- **Pavement is asphalt in good condition.**
- **Pavement markings are non-precision and in fair condition.**
- **Signs and lights are in good condition.**

Tables 3-2 and 3-3 above detail operations by aircraft in each design group on Runway 2-20. Based on the 500 annual operations criterion, Runway 2-20 falls into the B-I runway design category. For a full list of airfield design standards and critical areas for Runway 2-20, see **Table 3-7**. Runway 2-20 currently meets FAA standards as a B-I design code runway for major design factors such width, runway safety area, object free area, and runway protection zone dimensions. Runway 2-20 does not currently comply with:

- **Runway centerline to parallel taxiway (Taxiway G) separation (225 feet required/180 feet actual).**
- **Runway centerline to hold line setback (200 feet required/125 feet actual).**
- **Upgrade runway markings to non-precision, to correspond with instrument approach to Runway 20.**

RUNWAY 2-20 LENGTH

At 4,650 feet, less than 75% of Small Airplanes with less than 10 passenger seats are able to use Runway 2-20 (see Table 3-6). Aircraft that need to utilize Runway 2-20 during high winds typically weigh less than 12,500 pounds. Forecasts indicate that operations by turboprops and business jets will supplant some operations by piston aircraft in the future. Runway 2-20 will likely need to accommodate greater operations by turboprops and business jets, since Runway 20 is the runway the prevailing wind favors and is also equipped with a straight-in instrument approach with the lowest minimums (1-mile) at TRK. As with Runway 11-29, the length of Runway 2-20 imposes some operational restrictions, forcing them to limit their takeoff payloads and fuel.

Table 3-7 Runway 2-20 Design Standards

Runway Design Code	B-I			
Aircraft Approach Speed	<121 kts			
Aircraft Wingspan	<49 ft.			
Aircraft Weight Group	>12,500 lbs.			
Approach Visibility Minimums	Visual or >¾ mile			
Item	**Existing Conditions**	**FAA Design Standards[1]**	**Meets Standards?**	**Disposition**
Runway Design				
Width	75 ft.	60 ft.	Yes	No Action
Shoulder Width	10 ft.	10 ft.	Yes	No Action
Blast Pad Width (2 / 20)	75 / 75 ft.	80 ft.	No	No Action
Blast Pad Length (2 / 20)	200 / 200 ft.	100 ft.	Yes	No Action
Crosswind Component		10.5 knots	Yes	No Action
Gradient (maximum)	0.0%	±2.0%	Yes	No Action
Runway Protection				
Runway Safety Area (RSA) Width	120 ft.	120 ft.	Yes	No Action
RSA Length Beyond Departure End	240 ft.	240 ft.	Yes	No Action
RSA Length Prior to Threshold	240 ft.	240 ft.	Yes	No Action
Object Free Area (OFA) Width	400 ft.	400 ft.	Yes	No Action
OFA Length Beyond Departure End	240 ft.	240 ft.	Yes	No Action
OFA Length Prior to Threshold	240 ft.	240 ft.	Yes	No Action
Obstacle Free Zone (OFZ) Width	400 ft.	400 ft.	Yes	No Action
OFZ Length Beyond Departure End[2]	200 ft.	200 ft.	Yes	No Action
Runway Protection Zone (RPZ) Length	1,000 ft.	1,000 ft.	Yes	No Action
PRZ Width at Inner End	500 ft.	500 ft.	Yes	No Action
RPZ Width at Outer End	700 ft.	700 ft.	Yes	No Action
Runway Separation				
From Runway Centerline to:				
Hold Line	125 ft.	200 ft.	**No**	Realign Taxiway
Parallel Taxiway Centerline	180 ft.	225 ft.	**No**	Realign Taxiway
Aircraft Parking Area	380 ft.	200 ft.	Yes	No Action

1. Source: FAA Advisory Circular 150/5300-13A, *Airport Design* (September 2012)
2. Object Free Zone normally extends 200' beyond end of runway; additional length required for runways with approach light systems.

RUNWAY 2-20 FUTURE DISPOSITION

Table 3-8 Runway 2-20 Future Design Standards	
Runway Design Code	**B-II**
Aircraft Approach Speed	**<121 kts**
Aircraft Wingspan	**<79 ft.**
Aircraft Weight Group	**>12,500 lbs.**
Approach Visibility Minimums	**Visual or >¾ mile**
Item	**FAA Design Standards**
Runway Design	
Width	75 ft.
Shoulder Width	10 ft.
Blast Pad Width	95 ft.
Blast Pad Length	150 ft.
Crosswind Component	13 knots
Gradient (maximum)	±2.0%
Runway Protection	
Runway Safety Area (RSA) Width	150 ft.
RSA Length Beyond Departure End	300 ft.
RSA Length Prior to Threshold	300 ft.
Object Free Area (OFA) Width	**500 ft.**
OFA Length Beyond Departure End	300 ft.
OFA Length Prior to Threshold	300 ft.
Obstacle Free Zone (OFZ) Width	400 ft.
OFZ Length Beyond Departure End[2]	200 ft.
OFZ Shape[3]	A
OFZ Vertical Height[4] / Slope	N/A
Runway Protection Zone (RPZ) Length	1,000 ft.
PRZ Width at Inner End	500 ft.
RPZ Width at Outer End	700 ft.
Runway Separation	
From Runway Centerline to:	
Hold Line	**200 ft.**
Parallel Taxiway Centerline	**240 ft.**
Aircraft Parking Area	250 ft.

Operations by Airplane Design Group II aircraft on Runway 2-20 are under the 500 annual operations threshold (276 in 2012). As discussed further in the Alternatives Chapter, there is interest in trying to shift operations from Runway 11-29 to Runway 2-20. The intention is to increase safety margins and distribute aircraft operations to help disperse noise and overflight impacts away from residential areas. With this potential increase in operations on Runway 2-20, it is expected operations by ADG II aircraft will increase to over 500 annually. This plan proposes the future design code for Runway 2-20 be B-II. As a B-II runway, 2-20 would require greater runway protection areas and setbacks. The FAA design standards for a B-II runway are detailed in **Table 3-8**.

When comparing B-II standards in Table 3-8 with the existing conditions on Table 3-7 above, Runway 2-20 already meets most requirements for a B-II runway, such as width and RPZ dimensions.

As a B-II runway, four design standards would need to be met:

- **Grading for the RSA to extend 300 feet beyond each end of runway.**
- **Runway to parallel taxiway offset – 240 feet required / 180 feet today.**
- **Runway to hold line offset – 200 feet required / 125 feet today.**
- **Runway object free area width of 500 feet – aircraft on Taxiway G would penetrate.**

Once Taxiway G is setback to the required distance (240 feet centerline to centerline), the OFA would no longer be penetrated by aircraft taxiing on Taxiway G. Additionally, the hold lines could be marked at the appropriate distance from runway centerline.

Should activity on Runway 2-20 increase, for the purpose of safety and efficient operations at TRK, it is recommended that additional length and width for Runway 2-20 be considered. The additional length may also encourage operators to use Runway 2-20, which would help distribute aircraft operations between both runways to mitigate noise impacts on nearby residences, a goal of this Master Plan.

2.6 *Taxiways*

Taxiways connect the runways to the aprons, hangars and other support facilities at an airport. A taxiway system is in place at TRK that provides access to each runway end with full length parallel taxiways. Additional connector taxiways are located at intervals between the parallel taxiways and the apron areas. **Figure 3-1** illustrates the taxiway system at TRK.

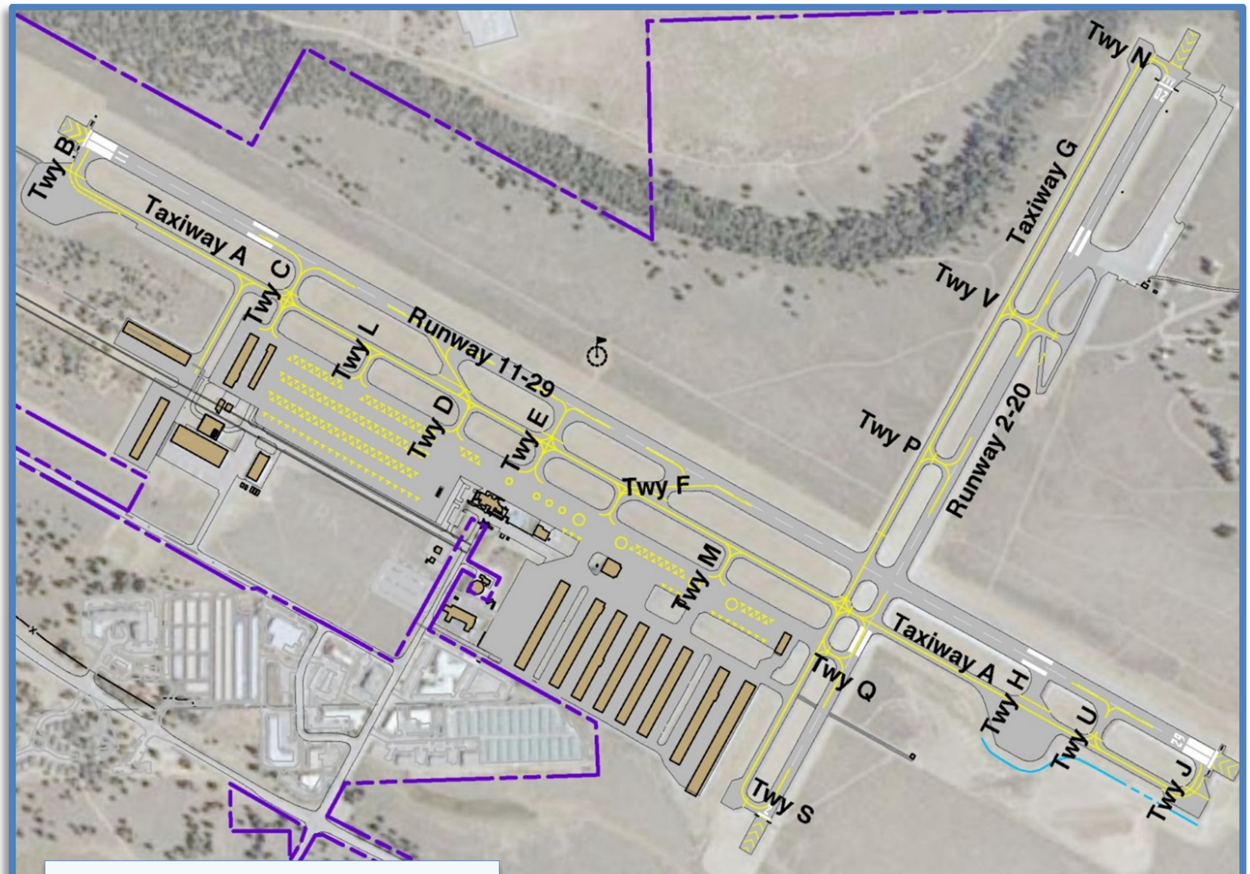

Figure 3-1 TAXIWAYS AND APRONS

TAXIWAY DESIGN GROUP (TDG)

Separation between runways, taxiways, taxilanes, and objects is related to the aircraft characteristics encompassed by the ADG: wingspan and tail height. The Taxiway Design Group (TDG) was introduced when AC 150/5300-13A, was released in September 2012 (and Change 1 – February 2014) and takes into account the dimensions of the aircraft landing gear (main gear width and cockpit to main gear length) to determine taxiway widths and pavement fillets to be provided at taxiway intersections. Fillet pavement is required to accommodate the inner wheel of the airplane as it turns. **Figure 3-2** shows the FAA's table on how to determine TDG. As determined earlier, the critical aircraft using TRK is the Cessna Citation V (Model 560). The Citation V has a main gear width of just over 15 feet and cockpit to main gear length of 19 feet. Based on this and the table above, the taxiway design group for TRK is TDG 2. The design standards for taxiways with ADG II and TDG 2 are presented in **Table 3-9**.

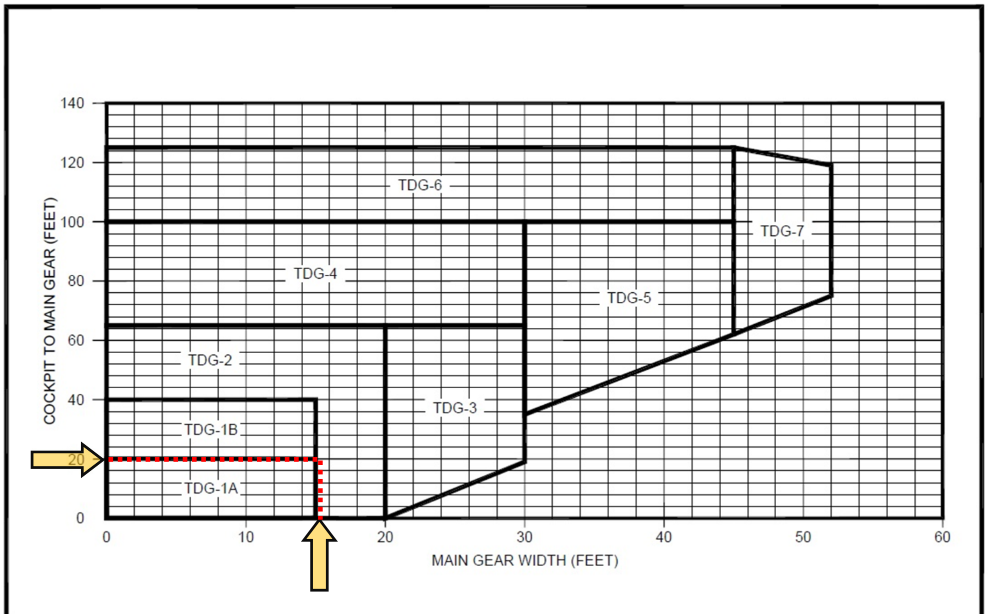

Figure 3-2 TAXIWAY DESIGN GROUP TABLE
Source: AC 150/5300-13A, Change 1, Figure 1-1

Table 3-9 Taxiway Design				
Airplane Design Group	**II**			
Taxiway Design Group	**2**			
Item	**Existing Conditions**	**FAA Design Standards**	**Meets Standards?**	**Disposition**
Taxiway Width	50 ft.	35 ft.	Yes	No Action
Safety Area Width	79 ft.	79 ft.	Yes	No Action
Taxiway Object Free Area Width	131 ft.	131 ft.	Yes	No Action
Centerline to Parallel Taxiway/Taxilane	105 ft.	105 ft.	Yes	No Action
Tw. Centerline to Fixed/Movable Object	65.5 ft.	65.5 ft.	Yes	No Action
Taxiway Wingtip Clearance	26 ft.	26 ft.	Yes	No Action

Note: Table applies to taxiways only, not taxilanes. Designated taxiways are labeled on Figure 3-1 above.

All taxiways at TRK are paved and 50 feet wide and meet or exceed standards shown in Table 3-9. No recommended upgrades to taxiway width or safety areas are needed at this time (with the exception of offsetting Taxiway G from Runway 2-20, as described in Section 2.5).

In addition to taxiway width and safety areas, AC 150/5300-13A, Change 1 provides greater detail on standard fillet design at taxiway curves and intersections. The required dimensions for taxiway fillets for a for taxiway design group 2 are provided in **Figure 3-3**. It is recommended TRK construct to these fillet standards when time comes for taxiway reconstruction, especially on connector taxiways near the terminal apron where larger aircraft typically park.

TDG 2							
Dimension (See Figure 4-13, Figure 4-14, and Figure 4-15)							
Δ (degrees)	30	45	60	90	120	135	150
W-0 (ft)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
W-1 (ft)	29	35	26	26	27	26	28
W-2 (ft)	29	35	40	48	48	50	54
L-1 (ft)	192	228	183	185	192	183	194
L-2 (ft)	0	0	60	75	65	75	71
L-3 (ft)	8	14	23	48	117	170	279
R-Fillet (ft)	0	0	0	0	25	25	25
R-CL (ft)	75	75	75	60	75	75	80
R-Outer (ft)	92	92	92	77	92	92	97

Note: Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

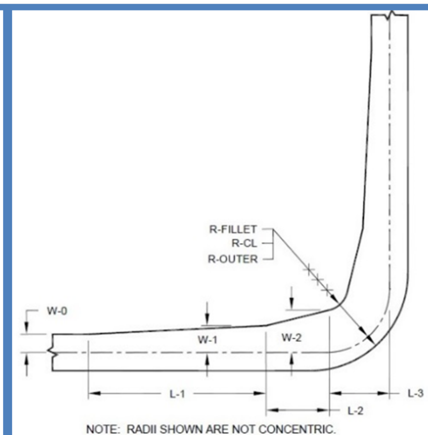

Figure 3-3 TAXIWAY FILLET DESIGN
Source: AC 150/5300-13A, Change 1, Figure 4-13 and Table 4-5

Taxilanes are taxiways designed for low speed taxiing such as on a parking apron. Taxilane design standards are less restrictive than those of taxiways and are presented in **Table 3-10**. When comparing the design standards between Table 3-9 and 3-10, the significant differences in taxiway and taxilane design standards is the object free area and distance to fixed or movable object.

Table 3-10 Taxilane Design

Airplane Design Group	II
Taxiway Design Group	2
Item	**FAA Design Standards**
Taxilane Width	35 ft.
Safety Area Width	79 ft.
Taxilane Object Free Area Width	115 ft.
Centerline to Parallel Taxiway/Taxilane	105 ft.
TL Centerline to Fixed/Movable Object	57.5 ft.
Taxilane Wingtip Clearance	18 ft.

The apron taxilanes on the terminal apron do not provide adequate separation between wingtips and parked aircraft. See **Figure 3-4**. When larger sized business jets are parked on dedicated parking circles near the administration building, it can be difficult for other aircraft to taxi on the apron taxilanes to access other aprons or the runways. This sometimes requires wing-walkers to guide aircraft by parked aircraft that may be within the taxilane object free area.

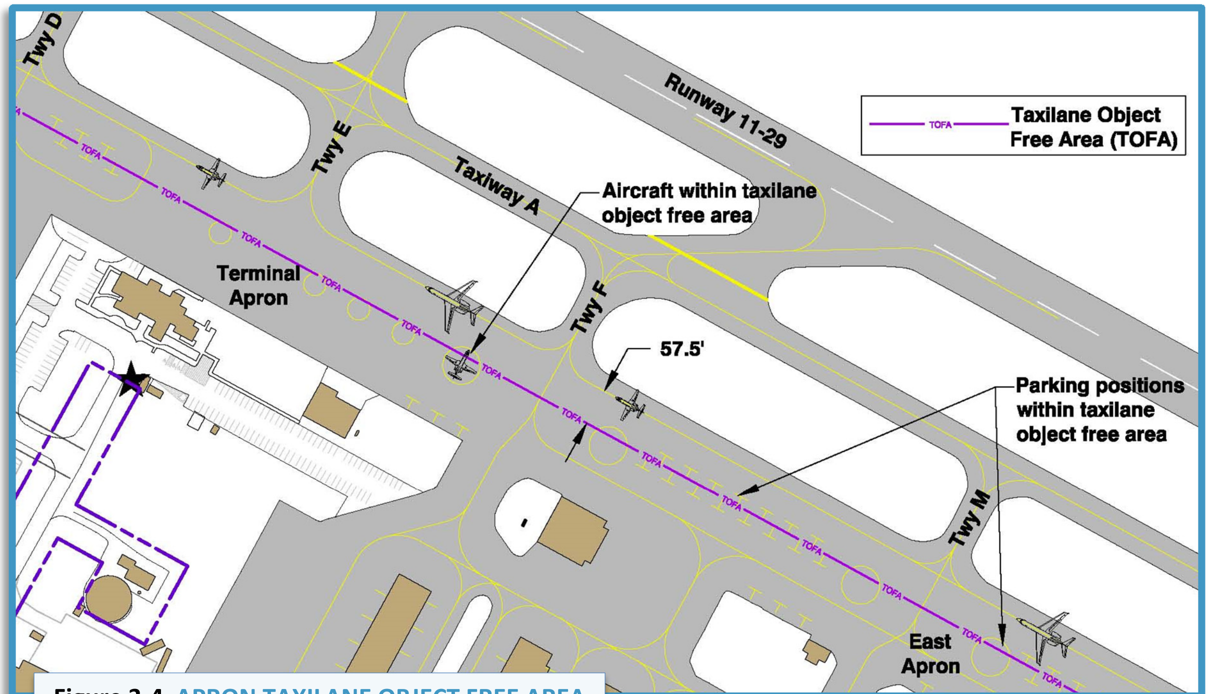

Figure 3-4 APRON TAXILANE OBJECT FREE AREA

New taxiway guidance in AC 150/5300-13A expands guidance on taxiway design with the purpose of enhancing safety by improving taxiway geometry. Major emphasis was placed on avoiding runway incursions and to standardize taxiway intersections/directional choices. Taxiway configurations that are no longer standard should be corrected.

Some examples of taxiway geometry that is now considered proper design:

- **Three-node concept – a pilot is presented with no more than three choices at an intersection – left, right or straight ahead.**
- **Right angle intersections are preferred to increase visibility.**
- **Limit runway crossings.**
- **Indirect access – avoid connector taxiways that lead directly from an apron to a runway.**
- **Avoid wide expanse of pavement.**

Taxiways at TRK, for the most part, comply with the new guidance. Most taxiways are at 90 degree angles, with the exception of the 45 degree exit taxiways off of Runway 11-29. All intersections follow the 3-node rule and runway crossings are limited. However, there are multiple connector taxiways (Taxiways C, D, E and F) that provided direct access from the apron to runway. **Figure 3-5** shows an example of direct and indirect taxiways. It is recommended that TRK plan for relocating these connector taxiways in the future.

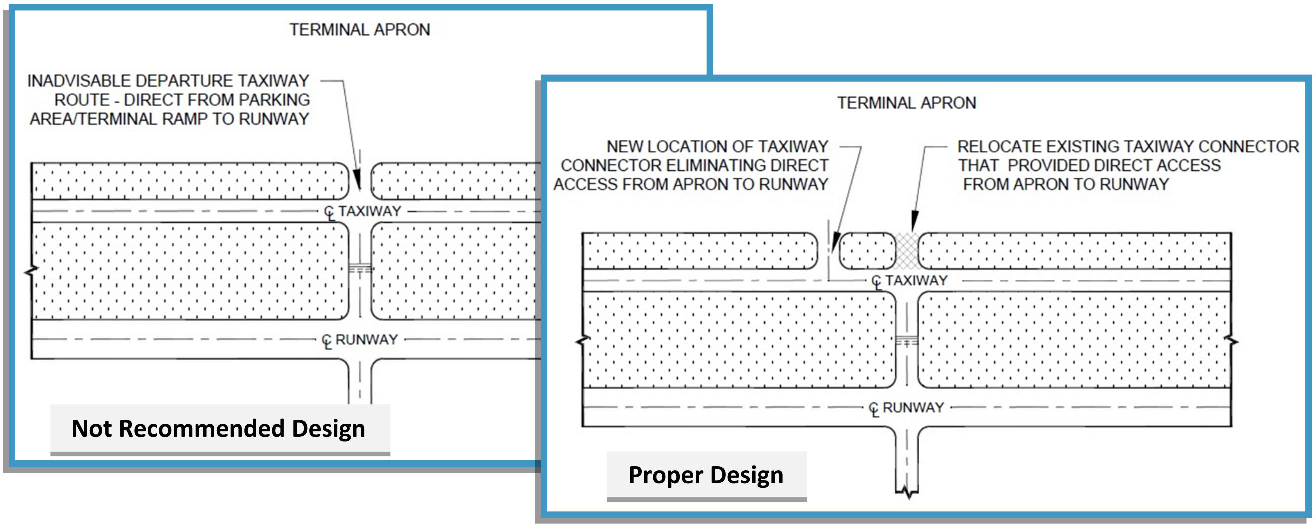

Figure 3-5 RECOMMENDED CONNECTOR TAXIWAY DESIGN
Source: AC 150/5300-13A, (Figures 4-3 and 4-4)

2.7 Other Airfield Design Considerations

In addition to runway geometry, the following design considerations affect airport geometry and development patterns.

APPROACH AND DEPARTURE PROTECTION

Runway approach minimums and flight procedures are determined by imaginary surfaces that originate from the runway. These surfaces typically extend along the extended runway centerline, or branch out laterally from the runway. Nearby objects and trees can impose restrictions on aircraft operations if the object penetrates the imaginary surfaces. Airports typically work with nearby communities to adopt land use planning techniques to minimize incompatible development. Imaginary surfaces are often used to determine whether the height and location of an object will adversely impact aircraft operations and the extent to which new objects may need to be lighted, marked and mapped.

14 CFR Part 77, Safe, Efficient Use, and Preservation Of The Navigable Airspace – establishes standards for determining obstructions in navigable airspace; defines the requirements for notice to the FAA Administrator of certain proposed construction or alteration; provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace; provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation; and provides for establishing antenna farm areas.

For purposes of airspace planning and Part 77 surfaces, Runways 11 and 20 are designated as runways greater than utility with visibility minimums greater than ¾-mile (Part 77 category C runway). Runway 20 is currently equipped with a non-precision approach with visibility minimums of 1¼-mile. It is expected that the FAA will publish an approach with similar parameters to Runway 11 during the planning period. Runways 2 and 29 are designated visual runways for aircraft larger than utility (Part 77 category B(V) runway).

PREVAILING WINDS AND WEATHER PATTERNS

Runways are generally aligned so that aircraft can arrive and depart into the prevailing winds. Because winds at TRK regularly blow from different directions, two runways are needed. Wind direction is also a factor in development of instrument approach procedures and related navigational aids (NAVAIDs). Ideally, these facilities and procedures are established on the runway or runways that winds favor during periods of low visibility and cloud height. Commonly, the wind direction during inclement weather is opposite of that during fair weather. (Terrain and other airspace considerations can also affect which runways can have instrument procedures. Such is the case at TRK.)

Wind coverage percentages for each runway are presented in Chapter 1 (Exhibit 1-5). As the data indicates, the combination of the two runways at TRK provide nearly complete (99%) wind coverage. Runway 2-20 provides the greatest wind coverage. No additional runways are necessary for wind coverage. The data also reveals that the best direction for operation during poor weather is on Runway 2, which provides support for the straight-in instrument approach to that runway.

VISUAL AND ELECTRONIC AIDS

A rotating beacon is located near the administration building. Runway 20 is equipped with a 2-box VASI and the approach end of Runway 11 is equipped with REILs. Visual aids require unobstructed views to aircraft in flight that need to be considered in the planning and design of airport facilities.

Visual Approach Slope Indicator (VASI): An airport landing aid which provides a pilot with visual descent (approach slope) guidance while on approach to landing.

A remote communications outlet (RCO) is an unmanned communications facility that enables pilots of aircraft on the ground or flying at a low altitude near an airport to communicate with distant air traffic control personnel when intervening terrain blocks radio signals. An RCO is needed at TRK for improved radio communications. A memo of understanding with air traffic control should be obtained to confirm FAA's recognition of TRK's multi-lats radar to promote traffic coordination and clear airspace.

AIRFIELD LINE OF SIGHT

FAA airport design standards dictate that intersecting runways must have a runway visibility zone (RVZ) that is clear of obstructions so that an aircraft approaching the intersection can see converging traffic. Similarly, runway grading standards are predicated on providing line of sight between aircraft operating at opposite ends of the same runway.

The EAA hangar at TRK currently exists within the runway visibility zone between the two runways. This building blocks the line of sight between runways and should be removed or relocated. See **Figure 3-6**.

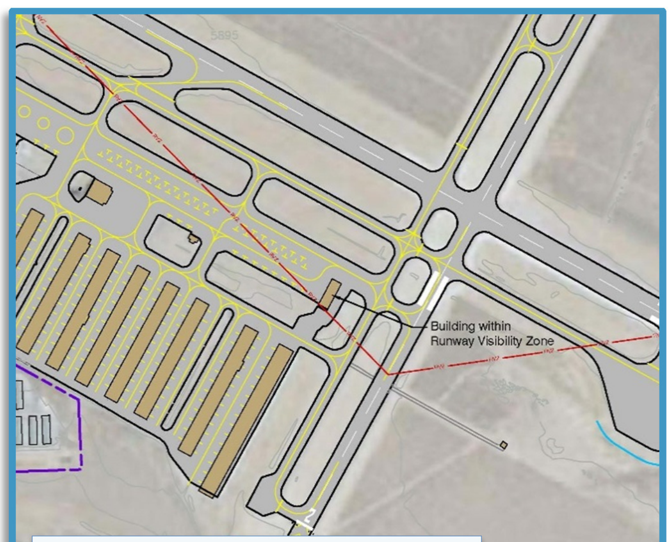

Figure 3-6 RUNWAY VISIBILITY ZONE

AIR TRAFFIC CONTROL AND FLIGHT PATTERN DISTRIBUTION

Truckee Tahoe Airport District (TTAD) is exploring current and future options for redistributing of aircraft operations between its runways. The purpose is to balance noise annoyance associated with overflight frequency and repetition and also to promote and enhance operational safety. Potential options under consideration include: temporary / seasonal tower operation (during peak summer times), enhanced UNICOM and advisory services, remote "tower" monitoring and modified policies and procedural publications.

3. AIRCRAFT STORAGE FACILITIES

Aircraft parking constitutes the most extensive current development of building area land for aviation-related uses at the airport. Additional space will be required to meet future demands. As of December 2013, there are about 202 aircraft based at the airport. (The term 'based aircraft' in this plan refers to aircraft that are stored at the Airport, either permanently or seasonally. This should not be confused with aircraft that are based at TRK for tax purposes. Aircraft that call TRK home for tax purposes may also be considered 'seasonally based' if they house at another airport during the winter. Alternatively, aircraft that call another airport home for tax purposes may store at TRK seasonally.) Chapter 2 forecasts expect at least 50 more aircraft by the end of the planning period in 2025. Additionally, peak-period transient aircraft parking demand is projected to increase from 15 to about 25 during this period. Several types of facilities will be needed to accommodate this demand.

3.1 Aircraft Hangars

As is the case at most general aviation airports, the demand for aircraft parking space at TRK is primarily for hangars. Aircraft storage hangars can be grouped into five general categories, of which only three are currently found at the airport:

T-HANGARS

T-hangars are the most common form of aircraft storage at TRK with 203 units. The back-to-back arrangement of the individual T-shaped bays is efficient from a structure-size standpoint, but requires taxilane access on both sides of the building. For reasonable economy of construction, T-hangar buildings preferably should contain at least 10 aircraft bays.

RECTANGULAR "EXECUTIVE" HANGARS

Rectangular-shaped hangar units are well-suited to locations where access is practical to only one side of the building. The hangar bays are larger than typical T-hangar units and usually are designed to accommodate twin-engine airplanes or small business jets. Alternatively, they sometimes are used for storage of two or three smaller aircraft. The buildings may consist of either single or multiple bays and may have small office areas attached. At TRK, there are two rows of existing executive hangars, one with 6 bays at the west end of the main apron (row L) and one with 10 bays adjacent to Runway 2-20 (row H). All the bays are 65 feet square. TRK may consider larger bays to meet its future executive hangar demand.

CONVENTIONAL "CORPORATE" HANGARS

Corporate hangars are large, free-standing structures intended to house large business jets or multiple smaller aircraft. A size of 10,000 square feet is common at many general aviation airports, although the buildings can be somewhat smaller or considerably larger. Office and pilots' lounge areas typically are attached. Also, corporate hangars usually have an adjacent parking area that vehicles can access without the need to pass through a security gate. There are no hangars of this type currently at TRK.

SHADE HANGARS

Shade hangars are similar to T-hangars except that they do not have doors or interior partitions. They help keep the sun and rain off the aircraft, but do not provide the security afforded by an enclosed T-hangar. Shade hangars should be considered at TRK as a future storage options for transient and based aircraft.

INDIVIDUAL "PORTABLE" HANGARS

Portables are small, individual hangars designed to be constructed elsewhere and hauled to the airport. They typically are T-shaped, but can be rectangular. An advantage of portables is that they can economically be added in increments of just one unit at a time (the cost per unit, though, is similar to or even higher than the cost of an individual unit in a multiple-unit T-hangar building). Most often they are owned individually rather than by the airport or a hangar developer. Portables also have the advantage of being capable of installation almost anywhere on the airport, including on existing apron pavement or on unpaved areas. A chief disadvantage is that their inconsistency of appearance and often poor maintenance can make them unattractive and prone to deterioration. One portable hangar is currently located at TRK and, for a variety of reasons—climate, aesthetics, and financial—their use is not recommended.

HANGAR REQUIREMENTS

As of December 2013, there are 18 vacant T-hangars and a wait list for 15 executive hangars. A significant near-term need for additional executive hangars is apparent. Furthermore, most of the 36 additional aircraft expected to be based at the airport over the 12-year time frame of the Master Plan are turboprops and jets that are too large to fit into the vacant T-hangar spaces. Construction of more executive and/or corporate hangar facilities will be needed to accommodate this demand. Table 2-17 in Chapter 2 projects the following increase in based aircraft by 2025:

- **+4 single engine piston**
- **+14 turboprops**
- **+16 jets**
- **+2 helicopter**

This plan recommends designating an area and conceptual layout for executive hangars with phased development. Hangars should be constructed as future demand dictates while factoring in cost. It is also assumed that not all future based aircraft will require hangar storage. There is also potential for a corporate hangar that could service multiple aircraft of different sizes that do not base year-round at TRK.

Table 3-11 breaks out potential hangar demand per year. The following assumptions were made for future hangar types:

- **Additional single-engine piston aircraft may be stored in any vacant T-hangar. As of December 2013, 18 T-hangar bays were vacant. Given this status, no additional T-hangars are required to meet future demand.**
- **Smaller turboprops may be accommodated in the T-hangars that are currently vacant.**
- **Executive hangars are proposed for jets and the remaining turboprops. Vacant T-hangars would not be large enough for these types.**
- **Helicopters may be stored either on an apron or within an executive or corporate hangar. One executive hangar is planned for a helicopter.**

Table 3-11 Future Hangar Demand

2013		2015		2020		2025	
T-Hangars	Executive	T-Hangars	Executive	T-Hangars	Executive	T-Hangars	Executive
204	16	204	22	204	28	204	34

The Alternatives Chapter of this Master Plan identifies sites best suited to additional hangar development. The need for additional T-hangar capacity is not currently foreseen. However, if any of the existing buildings become unusable either because of deterioration or a need to use the site for other purposes, sites should be provided where the lost capacity can be replaced. It is also recommended that TRK further study the cost and benefit of constructing a multi-use hangar on the airfield that would be able to store multiple aircraft and also host community activities. This hangar may offer deicing, through infrared heat or another system, which is a service TRK does not offer today. Sites for the multi-use hangar are evaluated in the Alternatives Chapter.

3.2 *Aircraft Parking Aprons*

Airports need paved apron areas for parking the portion of their based aircraft fleet that is not hangared, as well as for short-term usage by transient aircraft visiting the airport. A large apron available for aircraft parking is located south of Taxiway A and stretches from Taxiway G near Runway 2-20 to a row of T-hangars near the maintenance building on the west side of the building area. The total area of the main apron at TRK is 982,000 square feet and has 192 total tie-downs and dedicated apron parking spaces. The aprons are divided into four sections: east apron, terminal apron, west apron and south apron. Another apron, 156,000 square feet in size, but unpaved, is located near the approach end of Runway 20 and is primarily utilized by gliders. The paved apron areas are shown in **Figure 3-7**.

Tie-down Apron: Spaces for based and smaller transient aircraft are normally equipped with tie-down anchors and chains or ropes to prevent the aircraft from being blown around by

TERMINAL AREA APRON

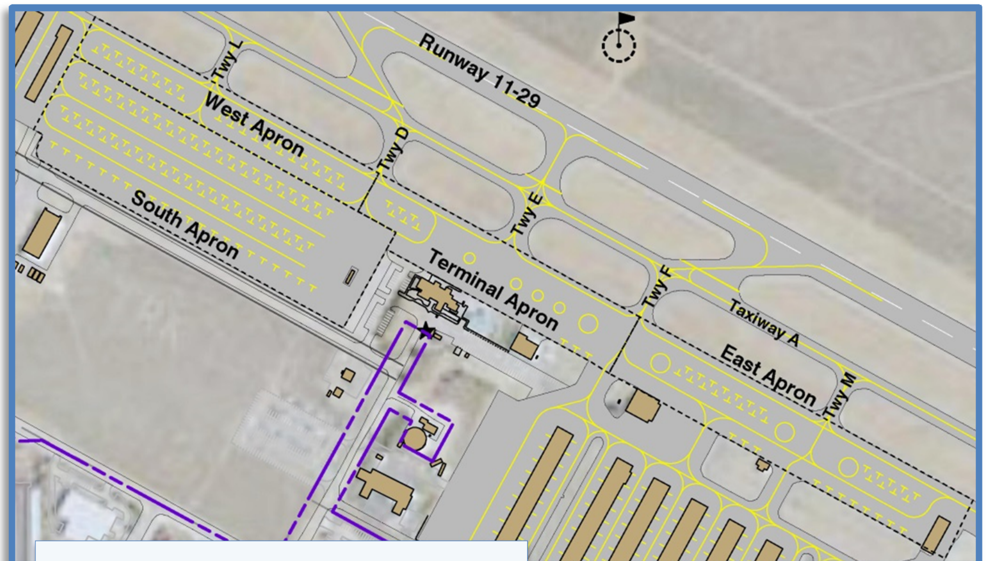

Figure 3-7 APRON AREA DESIGNATIONS

The terminal area apron is located near the administration building and is defined as the area from Taxiway D to Taxiway F. The terminal apron is 183,000 square feet in area and has 9 tie-downs. The terminal apron typically fills up first with transient aircraft before the other aprons are utilized. Executive aircraft like turboprops and turbo-jets typically park on the terminal apron, where five circular areas are dedicated for larger aircraft. There are times when larger turbo-jet aircraft park and wingtip clearance on the adjacent taxilanes are not met by aircraft taxiing by. See Figure 3-4 in Section 2-6 above. Chapter 4 addresses circulation improvements.

EAST APRON

The east apron is located east of the terminal apron and stretches to Taxiway G. The east apron is 251,000 square feet in area and contains 35 tie-downs and 3 circular spaces. Twelve tie-downs are located within the runway visibility zone. Aircraft and other objects should not be located within the runway visibility zone.

WEST APRON

The west apron is the area of pavement west of the terminal apron and Taxiway D and north of the row of light poles. Thirty-six tie-downs are located on the west apron, which is 144,000 square feet in area. The west apron is used for overflow transient parking when the airport is busy, usually during summer and holiday weekends.

SOUTH APRON

The south apron is located south of the row of light poles, with the fuel farm to the east and maintenance buildings to the west. The south apron is also used for overflow transient parking during busy summer weekends and holidays. In winter, the south apron is utilized to store excess accumulation of snow that must be cleared from critical movement areas. The south apron is 404,000 square feet with 104 tie-downs.

APRON REQUIREMENTS

The existing apron area is adequate to meet the future demand generated by based aircraft. Most of the need for apron area expansion will be created by increases in the number of transient aircraft, particularly larger aircraft, parking at TRK during busy periods. Also, construction of additional hangars, providing convenient taxilane access to those hangars, and clearing the runway visibility zone of aircraft parking will eliminate some existing capacity that may need to be replaced elsewhere. These options are explored in the next chapter.

4. AVIATION SUPPORT FACILITIES

Support facilities provide emergency services, airport maintenance, and aircraft services. These facilities support day-to-day airport operations and essential services during emergencies and inclement weather.

4.1 Administration Building

A new administration building was completed in 2011. This building includes state-of-the-art equipment to assist with aircraft operations, administrative offices, pilots lounge, and a board room that can also be used by community groups. This building is brand new and does not require any changes.

4.2 Emergency Support Services

TRK does not have a certified aircraft and rescue and firefighting (ARFF) station, nor is one required by FAA policies. Today, the Truckee Fire Protection District (TFPD), Station 96 occupies a building south of the airport terminal on Truckee Tahoe Airport Road. While this station is not ARFF certified, crews are trained in ARFF needs and can respond quickly to emergencies on the airfield. TRK has an agreement with TFPD to provide training on ARFF regulations and house an ARFF truck in the TFPD station.

TRK has air ambulance services (Careflight) and a civil air patrol and operationally supports firefighting, surveillance, and search and rescue. The community supports these resources at TRK in maintaining these facilities.

4.3 Airport Maintenance

Airport maintenance handles the upkeep, protection, and preservation at TRK, and removal of snow and ice from pavements. Maintenance equipment is stored in multiple buildings adjacent to the west apron. It is recommended that airport maintenance facilities be expanded as equipment and services are added.

4.4 Fuel Storage

The airport currently has aboveground fuel tanks for 100LL and JET-A fuel. A self-service fuel island for 100LL is located just west of the administration building. At this location, piston aircraft are able to access the tank and refill without any assistance. Jet fuel is stored under a canopy near the maintenance building on the west apron. Jet fuel is trucked to aircraft that request refueling. No additional fuel tanks are recommended since operations are anticipated to increase at a modest rate over the planning period.

4.5 Aircraft Deicing

TRK does not operate deicing equipment or provide deicing services. For this reason, some operators use Reno for overnight parking or during periods of winter storms and forecast poor weather conditions. TTAD is exploring options to construct a heated multi-use hangar that would accommodate some of these aircraft as well provide as well as provide a facility that could be used for community events when not needed by aircraft. TRK does not currently envision the need to operate a chemical (glycol) system, but may assess this service in the future.

4.7 *Fixed Base Operations (FBO) Facilities*

Fixed base operators constitute the commercial side of general aviation business. They provide a wide variety of facilities and services for pilots and their aircraft (see adjacent box). The Airport currently provides most of these services to aircraft and pilots. There is no need for a full service FBO at TRK in the near future.

Specialty FBOs cater to one or two services that a full service FBO might not offer. A specialty FBO is also referred to as a Specialized Aviation Service Operator or SASO. Although this plan does not identify a specific SASO need, it is noted that sufficient land is available to provide additional facilities and services.

Examples of FBO Facilities and Services

- Aircraft rental and charter
- Flight instruction
- Flight preparation room, pilots' lounge, and rest rooms
- Pilots' supplies
- Aircraft and avionics maintenance and repair
- Aircraft fueling
- Based aircraft hangar and tiedown space rental
- Transient aircraft parking

Facilities and services provided by the FBOs at Truckee Tahoe Airport are listed in Chapter 1, Table 1B

4.8 *Weather Reporting*

The natural settings of TRK in the High Sierra can create challenging weather conditions for aircraft arriving and departing the airport. TRK currently is equipped with an AWOS 3 that communicates weather information to pilots. However, weather can vary greatly from Martis Valley and the surrounding mountain passes. This plan recommends that TTAD consider installing weather reporting stations at various mountain passes and/or peaks where aircraft often fly. This will provided better weather information to pilots and help enhance safety.

5. AIRPORT PROPERTY

The total amount of property that is held by the TTAD is expansive (over 2,600 acres) and not just limited to the active airfield. Efforts have been made by the TTAD to acquire nearby property with the purpose of limiting residential development where overflight may occur. For purposes of this plan, the property has been divided into two categories for evaluation: immediate airport property and open space property acquired to prevent residential building.

5.1 *Immediate Airport Property*

Airport property dedicated to airfield operations equals approximately 946 acres. The existing runway and taxiway system with critical areas occupies about 250 acres of this total (See Figure 1-4 in the Inventory Chapter). The remaining property is occupied by aprons, aviation support buildings, non-aviation related business and open space. The existing building and apron area is located in the west quadrant of the airport and covers 70 acres. Another 80 acres of land is dedicated to glider operations near the approach end of Runway 20. The remaining property is unassigned. More discussion on land use and potential building area development (not specific to aircraft storage) is provided in Chapter 4.

The FAA is putting more emphasis on encouraging airports to acquire fee title or easements on runway protection zone (RPZ) property that they do not currently control. Portions of the RPZ at the approach ends of Runways 2 and 20 are not located on TTAD property. At the approach end of Runway 2, 2.2 acres are off-airport property. Most of this is U.S. Highway 267 right-of-way. At the approach end of Runway 20, 11.4 acres are off-airport property. It is recommended TTAD acquire this property in fee simple. This property is currently owned by the Tahoe-Truckee Sanitation Agency which has no known plans for its development.

5.2 Open Space Program

TTAD has an interest in another ±1,760 acres of land, either through fee simple or conservation easements, in areas that are located a significant distance from the airfield. This land is illustrated in the Inventory Chapter in Exhibit 1-3. Through ownership or easement, this land is now limited in what can be placed on it. Residences are specifically precluded. This land is important to TTAD for two reasons: it avoids development of new noise sensitive land uses and it allows for community investment in open space preservation. This program has proved to be successful and popular with TTAD residents who may not use the airport for aviation-related purposes. This plan recommends continuing to acquire property that limits overflight impacts and helps preserve open space.

5.3 Medevac Heliports

TTAD is enhancing emergency service response capability within the District, an initiative supported by the community. Various areas will be considered for placement of medevac heliports. The first is in Tahoe City. If successful there, this program may be expanded to other locations. These sites will benefit the community by improving emergency response times.

6. LANDSIDE AND PARKING

The primary thoroughfare to TRK is U.S. Highway 267, which borders the west and south boundaries of the airport. Highway 267 connects TRK to the Town of Truckee (via Brockway Road) and Interstate 80 to the north and North Lake Tahoe to the south. Interstate 80 provides access to Reno, Nevada, to the east, and Sacramento and San Francisco, California, to the west.

6.1 Automobile Access

Truckee-Tahoe Airport Road intersects Highway 267 and allows automobiles to access landside facilities at TRK. Truckee-Tahoe Airport Road leads to the administration building and visitor parking. Other roads that provide access to support facilities and hangars include:

- **Soaring Way**
- **Airshow Way**
- **Omni Way**
- **Chandelle Way**
- **Joerger Drive**

Two parking lots are located south of the administration building. The lot adjacent to the administration building is used by those visiting the airport on official business, community activities or other purposes that do not require overnight parking. The second parking lot is located off of Truckee-Tahoe Airport Road, south of the administration building and west of the fire station. This lot is used for long-term parking. Tenants also drive onto the airfield to access their hangar and park nearby. Airfield access by automobile is convenient for tenants, but can complicate airfield operations and safety. Hertz Rent-A-Car occupies a lot between long-term parking and Chandelle Way.
It is expected that a preferred means of ground access to the Airport will remain the same – by automobiles. This plan recommends that the Airport expand or redesign long-term parking. Encouraging more public transportation trips is also recommended to help decrease individual automobile traffic. This may be done by expanding the public transportation stop into a transit center. This could be used by users of the Airport or by people working in the business park. This idea is evaluated more in the Alternatives Chapter.

7. SUMMARY

The following is a summary of the facility requirements included in this chapter. It is recommended that the Airport:

AIRFIELD

- **Encourage distributing aircraft operations between both runways to mitigate noise impacts on nearby residences.**
- **Increase Runway 2-20 design standards to RDC B-II.**
  - Increase in RSA length and width.
  - Realign Taxiway G so Runway 2-20 centerline to parallel taxiway separation is 240 feet.
  - Remark hold lines at Runway 2-20 to 200 feet from centerline to meet B-II standards.
- **Provide greater apron taxilane centerline to fixed/moveable object separation on terminal apron.**
- **Plan on relocating connector taxiways in the future, but only when rehabilitation to the pavement is necessary.**
- **Provide standard fillet design on taxiway curves.**
- **Remove/relocate building on east apron near runway intersection that blocks runway visibility zone.**
- **Consider a temporary air traffic control tower during summer peak times, with the intention of more control on operations and runway utilization.**

AIRCRAFT STORAGE FACILITIES

- **Study the cost and benefit of constructing a multi-use hangar.**
- **Phase construction of executive hangars based on market demand for based turboprops and turbo-jets.**
- **Consider apron expansion and relocation of tie-downs that are located within the runway visibility zone.**

AVIATION SUPPORT FACILITIES

- **Consider thermal deicing capabilities within the multi-use hangar.**
- **Install weather reporting stations at various mountain passes and/or peaks to help enhance safety.**

PROPERTY

- **Acquire property located within RPZs at approach ends of Runways 2 and 20.**
- **Continue investing in property to limit noise exposure and preserve open space.**
- **Investigate the establishment of remote medevac helipads.**

AUTOMOBILE ACCESS AND PARKING

- **Study establishing a public transit hub and encourage more use of public transit.**

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MASTER PLAN

Chapter 4 Alternatives Analysis

MASTER PLAN

CHAPTER 4

Alternatives Analysis

1. OVERVIEW

The objective of this chapter is to identify and evaluate options for providing the facilities identified in Chapter 3. The desired outcome of this analysis is to identify an optimal development pattern that best meets the needs of the airport over many years in terms of: Federal Aviation Administration (FAA)/Truckee Tahoe Airport District (TTAD) safety standards, airport service offerings, anticipated changes in aviation activity, and non-aviation facilities benefitting the community. Significant emphasis was devoted to reducing and mitigating annoyance resulting from aircraft overflights. To support a pattern of logical development, the exploration of alternatives progressed from the runways out to the building areas.

Any development situation has one or more alternatives, but in some cases only one is feasible. For some facility improvements where there is one clearly advantageous development concept, improvement alternatives are not developed and only the recommended improvement is presented as a concept. The following areas are evaluated as alternatives or concepts at Truckee Tahoe Airport (TRK):

- **Overflight Mitigation Alternatives**
  Runway modifications
  Off-airport mitigation
  Enhanced flight control and advisory options
- **Design Standards**
  Taxiways
  Aprons
- **Land Use**
- **Building Development Concept**

2. OVERFLIGHT MITIGATION ALTERNATIVES

Community outreach efforts identified residential overflight annoyance as a primary concern to be addressed by this master plan. Among the specific concerns are: loudness of individual operations, repetitive frequency of overflights, and visual impacts related to aircraft (particularly jets) at low altitude.

To address these community concerns, the master plan study evaluated options in accordance with what TTAD can control directly (such as the physical layout of the airfield) and what can be influenced (e.g. incentives, outreach, etc.). In this way, alternatives were developed and proposed as follows: runway alternatives, enhanced flight control and advisory options, other policy and incentive programs, and off-airport mitigation.

2.1 Runway Alternatives

A total of six runway alternatives were identified. Two alternatives were eliminated during preliminary investigations. The remaining four were evaluated in detail. Two alternative scenarios involve primary Runway 11-29 and the potential to shift the runway ends to help reduce noise and overflight impacts on residential areas immediately west of the approach end of Runway 11. The other two alternative scenarios involve changes to secondary Runway 2-20 with the hopes of enticing aircraft to operate on this runway more often. One alternative is recommended for implementation. The four alternatives evaluated in detail are summarized in **Figure 4-1** Alternative Matrix.

DISMISSED RUNWAY OPTIONS

Described briefly in this section are two runway options that were identified but eliminated early during initial investigation.

New Runway Concept. This alternative involves the development of a new runway. Generally the alignment would be established by 1) minimizing residential overflight, 2) providing clear arrival and departure paths avoiding mountainous terrain, and 3) optimizing airport property usage to obtain sufficient runway length to maximize its utilization. The alternative was eliminated on the basis of cost (estimated at $27 million to construct). The inability to avoid wetland impacts was also a consideration. Though not specifically quantified, other concerns were highlighted as well. The alignment of this runway was not favorable for prevailing winds. Comparatively long taxi times would likely dissuade its use if the two existing runways were to remain operational. Likewise, a third runway arrival and departure stream would add additional traffic convergence risk. Finally, the additional runway would increase pavement maintenance costs considerably.

Extend Runway 2-20 North. A major barrier to increasing the utilization of Runway 2-20 is its length. Additional length can be provided to the north or south ends of the existing runway or at both ends. Mountainous terrain obstructs the southern flight corridor. The north corridor is comparatively clear. However, extending to the north is complicated by a steep drop of 100 feet at the runway's north end. Two options are available to extend the runway north: fill the ridge with new material or bridge over using pylon support structures. The incremental cost of providing additional length was deemed prohibitive—between $5 and $15 million for about 350 feet of additional length.

Alternative 1 – Runway 11-29 Modification

The purpose of Alternative 1 is to shift aircraft operations to the east so that aircraft are higher above the residences west of the airport. It consists of two sub-alternatives: 1A and 1B. Alternative 1A extends the runway east while retaining all existing pavement and landing thresholds. Alternative 1B removes pavement at the west end to retain the current runway length. Alternative 1A is illustrated in **Figure 4-2**, and Alternative 2A in **Figure 4-3**.

ALTERNATIVES:	ALTERNATIVE 1A	ALTERNATIVE 1B	ALTERNATIVE 2A	ALTERNATIVE 2B
Description	Extend Runway 11-29 1,322' east with 1,332' displaced threshold at both runway ends.	Extend Runway 11-29 1,322' east with 874' displaced threshold on Runway 29 only.	Extend Runway 2-20 south to 5,000' with 556' displaced threshold on Runway 2 and widen to 100'.	Widen Runway 2-20 to 100'.
Airfield Impacts				
Runway Length	8,322'	7,000' (No Change)	5,000'	4,650' (No Change)
Runway Width	100' (No Change)	100' (No Change)	100'	100'
Declared Distances	Runway 11 / Runway 29	Runway 11 / Runway 29	Runway 2 / Runway 20	Runway 2 / Runway 20
TORA	8,322' / 8,322'	7,000' / 7,000'	5,000' / 4,444'	None / None
TODA	8,322' / 8,322'	7,000' / 7,000'	5,000' / 5,000'	
ASDA	8,322' / 8,322'	7,000' / 7,000'	5,000' / 5,000'	
LDA	7,000' / 7,000'	7,000' / 5,678'	4,444' / 4,945'	
Taxiways	Extend Taxiway A east 1,322' to new end of Runway 29.	Extend Taxiway A east 1,322' to new end of Runway 29. Reduce Taxiway A at new approach end of Runway 11.	Offset Taxiway G, for new design category.	Offset Taxiway G, for new design category.
Runway Safety Area Standards	Declared Distances used to satisfy RSA requirements.	Declared Distances used to satisfy RSA requirements.	Declared Distances used to satisfy RSA requirements.	No Change
Impacts to Airport Property Use	Reduction in available building area west of relocated approach end of Runway 11 due to RPZ and approach surface shift.	Reduction in available building area west of relocated approach end of Runway 11 due to RPZ and approach surface shift.	Minor. Runway visual zone would shift slightly limiting hangar build out at east and of apron.	No significant change.
Off-Airport / Community Impacts				
Over flight Impacts	Increased height of aircraft departing Runway 29 and arriving on Runway 11 would reduce overflight impacts west of Airport. Potential increase in aircraft weights / range.	Aircraft would depart on a lengthened Runway 29 allowing greater altitude when overflying nearby residences west. .	Increased utilization for departures on Runway 2.* Increased utilization or Runway 2-20 by all aircraft classifications* *-assumes RW 11-29 is not extended.	Possible increase in utilization of Runway 2-20 by all aircraft classifications* *- Decreased utilization if Runway 11-29 extended.
Community Noise	See Single Event and Grid Analysis Graphics			
Impacts to Off-Airport Land Use Zones	Increased restrictions east.	Increased restrictions east and reduced restrictions west.	No Change	No Change
Aeronautical Factors				
Construction impacts to airport operation (e.g., downtime, temporary changes, etc.)	Nighttime work inside RSA – 2 months (Rwy 11-29 closed at night). Daytime closure up to 7 days. Airport closed for 36 hours.	Nighttime work inside RSA – 2 months (Rwy 11-29 closed at night). Daytime closure up to 7 days. Airport closed for 36 hours.	Nighttime work inside RSA – 2.5 months (Rwy 11-29 closed at night). Daytime closure up to 7 days. Airport closed for 36 hours.	Nighttime work inside RSA – 2.5 months (Rwy 11-29 closed at night). Daytime closure up to 4 days. Airport closed for 36 hours.
Runway Protection Zone	Runway 11 departure RPZ crosses Martis Creek Road. Requires FAA approval.	RW 11 departure RPZ crosses Martis Creek Road. Requires FAA approval. Relocated RW 29 app RPZ crosses Martis Road- requires FAA approval.	With declared distances, Hwy 267 removed from Rwy 2 RPZ. Portion of Rwy 20 RPZ remains off property.	No changes. Highway 267 would remain inside Rwy 2 RPZ. Portion of Rwy 20 RPZ remains off property.
Potential Property Acquisition (RPZ compliance)	10.0 acres (Runway 29 RPZ)	10.0 acres (Runway 29 RPZ)	11.4 acres (Runway 2 RPZ)	11.4 acres (Runway 2 RPZ)
Attract Larger Airplanes and Operating Weights and Range	Possible with longer published runway length for Runway 11-29.	Not likely since Runway 11-29 would remain the same length, while reducing LDA on Runway 29.	Possible with longer published runway length and width for Runway 2-20. However, the extension will not result in a runway longer than 11-29, meaning the longest runway at TRK would remain unchanged.	Not likely since Runway 2-20 would remain the same length.
Effect on All-Weather Capabilities	No Change	No Change	No Change	No Change
Effect on Night Operations	None. No new instrument lighting proposed.	None. No new instrument lighting proposed.	None. No new instrument lighting proposed.	None. No new instrument lighting proposed.
Critical Airspace Approach and Departure Surface Considerations	No Change to instrument approach capabilities.	No Change to instrument approach capabilities.	No Change to instrument approach capabilities.	No Change to instrument approach capabilities.
NAVAIDs	No Change	No Change	No Change	No Change
Environmental Impact Potential				
Wetlands	Minor or No Impact.	Minor or No Impact.	Potential impact to wetland south of Rwy 2-20. Connection of ditch may be practical to mitigate by culverting.	None
Earthwork / Fill	18,500 CY	18,500 CY	62,500 CY	None
Impervious Surfaces (Runways and associated Taxiways)	23,700 SY of additional pavement. (includes extension to Twy A)	23,700 SY of additional pavement. (includes extension to Twy A)	18,778 SY of additional pavement. (does not include Txw G improvements)	13,100 SY of additional pavement. (does not include Txw G improvements)
Construction Costs				
Estimated Costs (Design, Build and Environmental)	$6.1 Million	$6.1 Million	$6.8 Million	$3.4 Million

Figure 4-1 RUNWAY ALTERNATIVE MATRIX

Fig 4-1 (11x17)
Reverse Side

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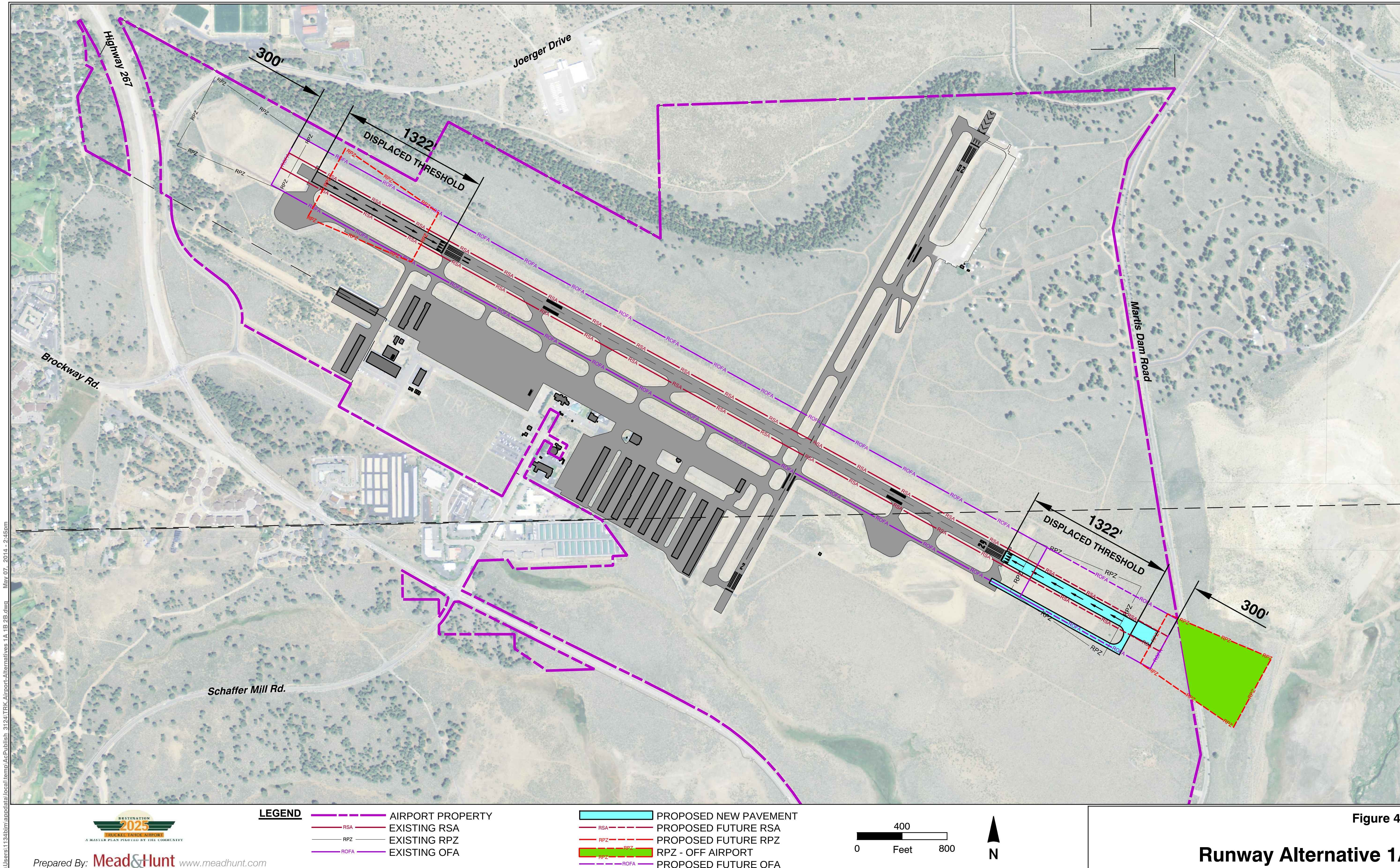

Figure 4-2

Runway Alternative 1A

Truckee Tahoe Airport

Fig 4-2 (11x17)
Reverse Side

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LEGEND

- AIRPORT PROPERTY
- EXISTING RSA
- EXISTING RPZ
- EXISTING OFA
- PAVEMENT TO BE REMOVED
- PROPOSED NEW PAVEMENT
- PROPOSED FUTURE RSA
- PROPOSED FUTURE RPZ
- RPZ - OFF AIRPORT
- PROPOSED FUTURE OFA

0 400 800 Feet

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C:\Users\1134bjm\appdata\local\temp\AcPublish_3124\TRK Airport-Alternatives 1A 1B 2B.dwg May 07, 2014 - 2:46pm

Figure 4-3

Runway Alternative 1B

Truckee Tahoe Airport

Fig 4-3 (11x17)
Reverse Side

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TERRAIN CONSIDERATIONS

The analysis assessed the potential to reposition the Runway 29 landing further to the east. As demonstrated in **Figure 4-2** below, the position of the landing threshold is restricted by high terrain east of the airport.

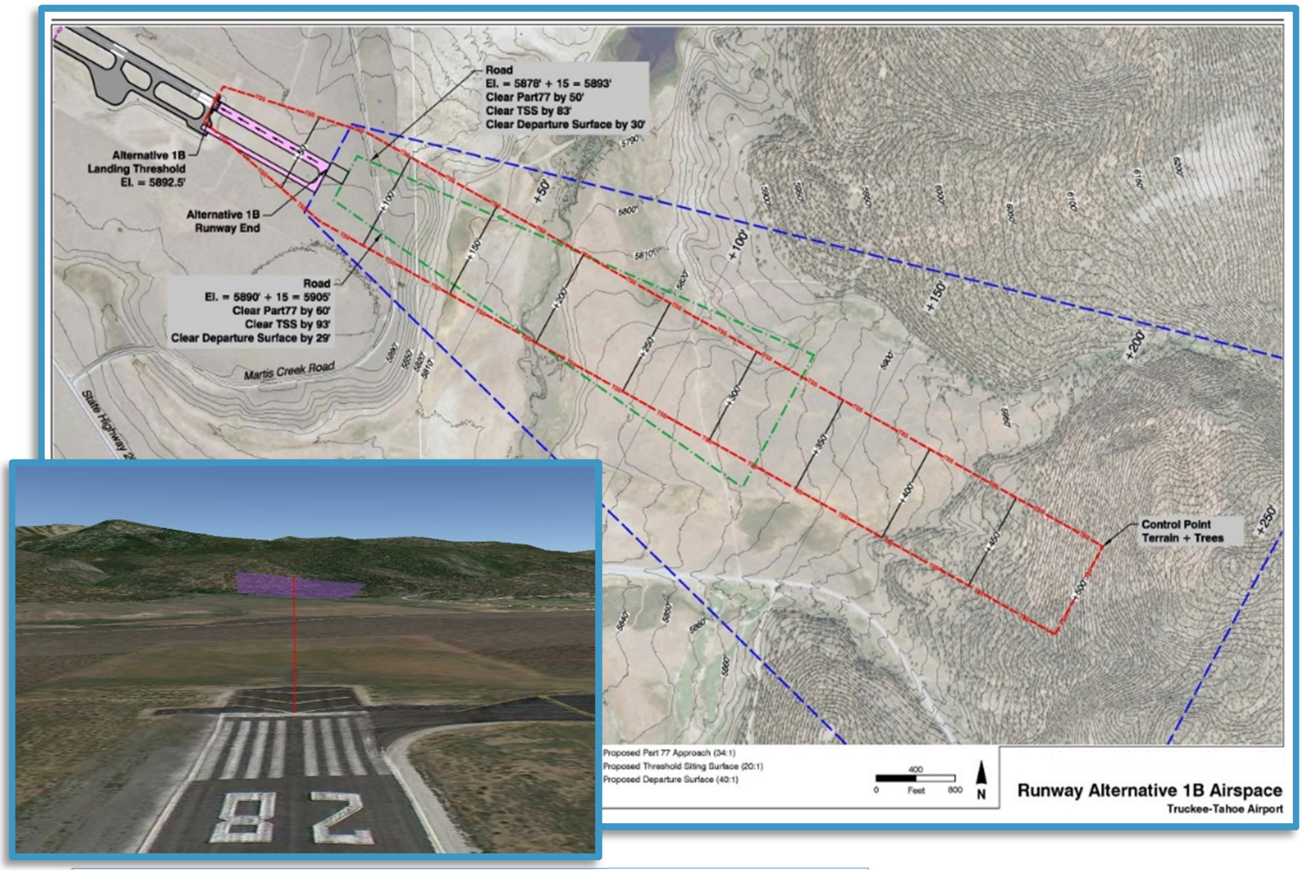


Figure 4-4 TERRAIN IMPACTS TO RUNWAY 29 LANDING THRESHOLD

For purposes of height and noise analysis over Martis Valley Estates and Olympic Heights, Alternatives 1A and 1B are essentially the same. Aircraft would depart on Runway 29 and land on Runway 11 at the same points in both alternatives. The only differences would be the published runway length and distance available for landings on Runway 29. If noise and overflight impacts decrease significantly on residences from this shift, then further analysis will be performed for which alternative (1A or 1B) is more suitable for operations at TRK.

HEIGHT ANALYSIS

An important factor in evaluating the effectiveness of Alternatives 1A and 1B is the height of aircraft over affected residential areas and the degree to which the alternative improves an observer's perception of the event. To assess the visual impacts, existing and future (with alternative implementation) flight profiles were evaluated. This was done by observing the departure profiles of three aircraft that TRK identified as prominent operators: the turbo jet Cessna Citation V (560), the turboprop Piaggio P180 Avanti, and the single-engine piston Cessna 172. **Figures 4-5** through **4-7** illustrate the flight profiles of aircraft after departure from the existing Runway 29 end and proposed Runway 29 end. Each graphic is broken into two viewports: a plan view of the departure path, and a profile view. The plan view gives a comparison of where aircraft are located above neighborhoods in relation to time after departure roll. The profile view compares the altitude of aircraft on a standard departure path, from the existing and proposed end of Runway 29.

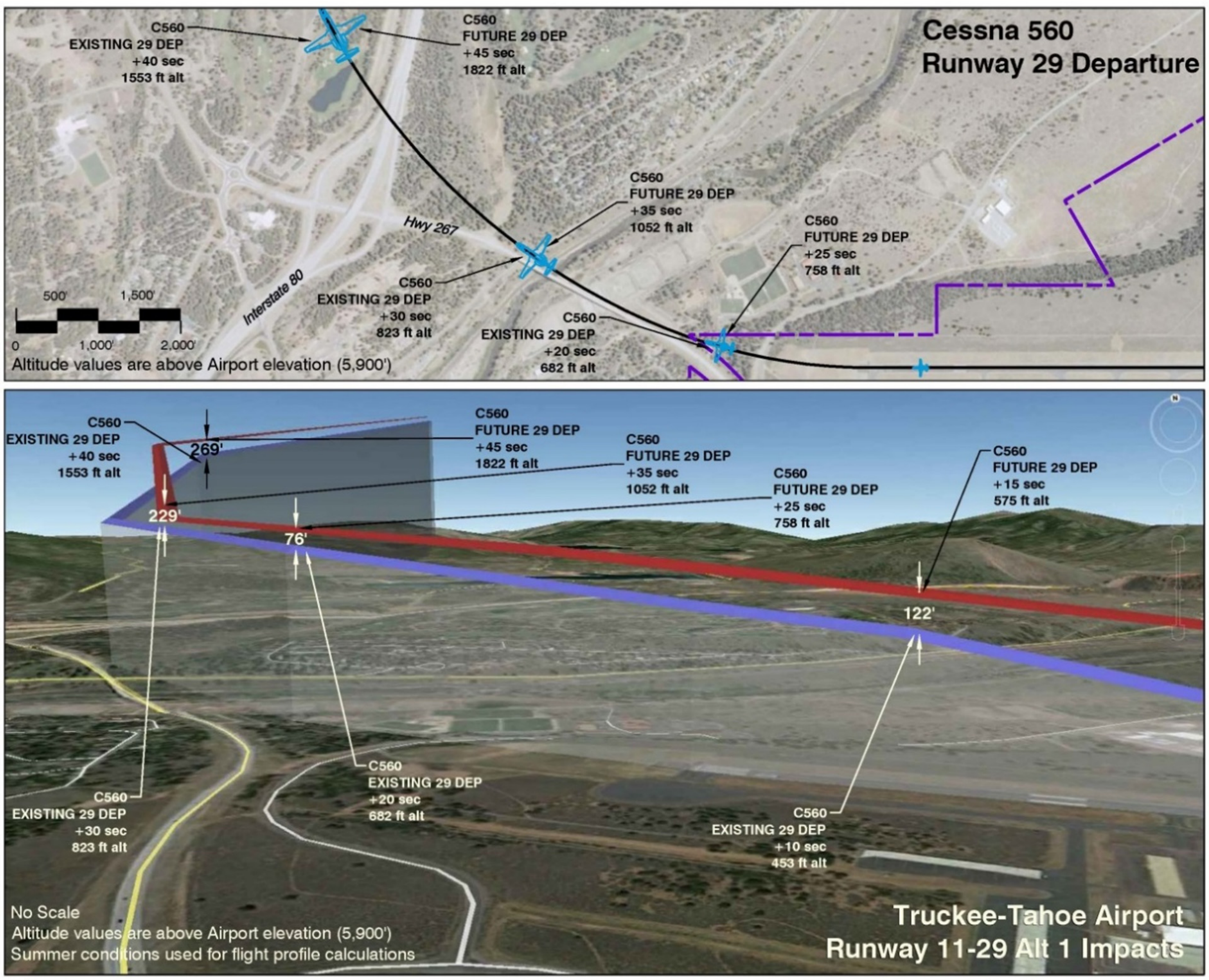


Figure 4-5 OVERFLIGHT IMPACTS: CESSNA 560 DEPARTURES ON RUNWAY 29

Departure Profile on Future Runway 29

Departure Profile on Existing Runway 29

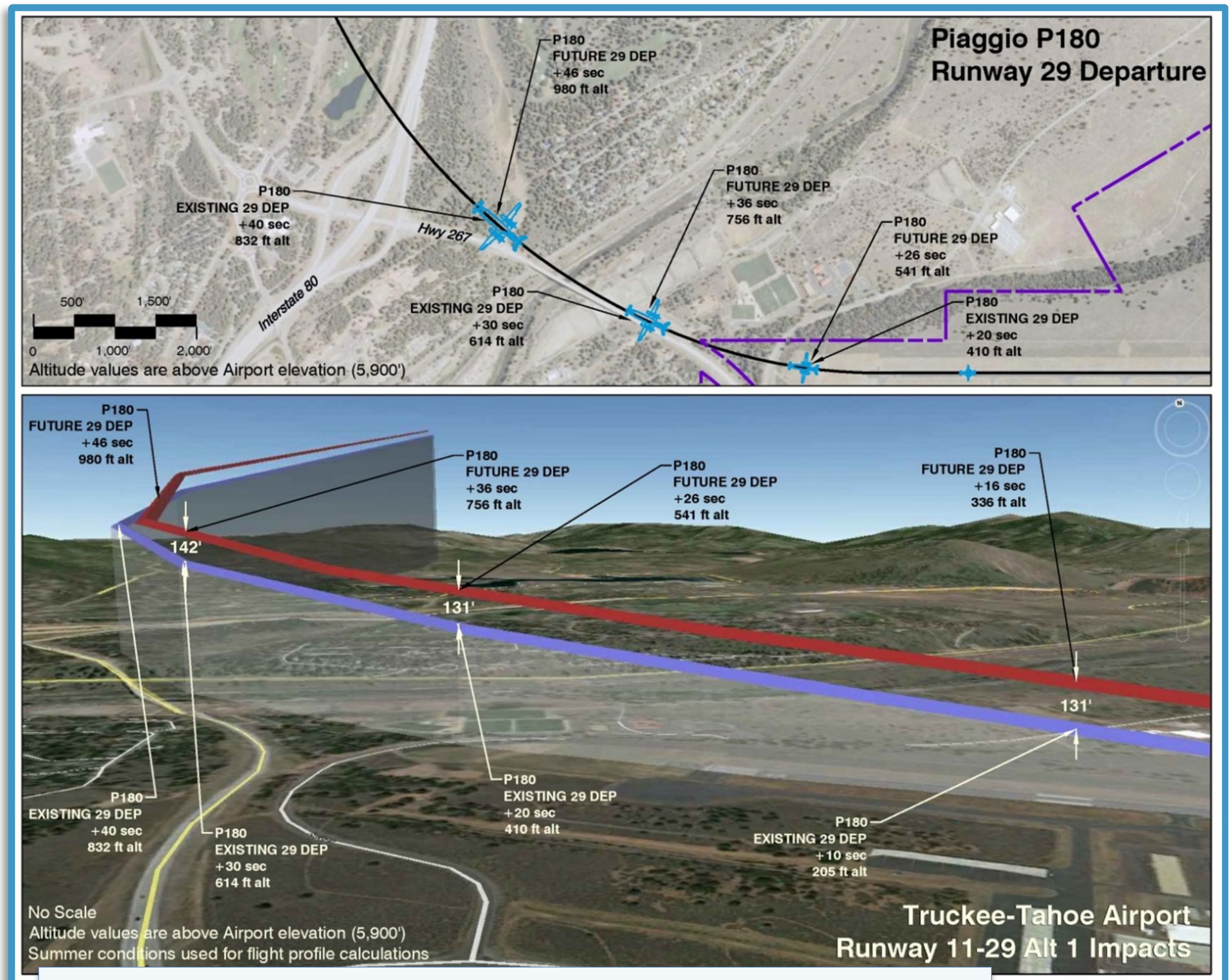


Figure 4-6 OVERFLIGHT IMPACTS – PIAGGIO 180 DEPARTURES ON RUNWAY 29

Departure Profile on Future Runway 29 (red)

Departure Profile on Existing Runway 29 (blue)

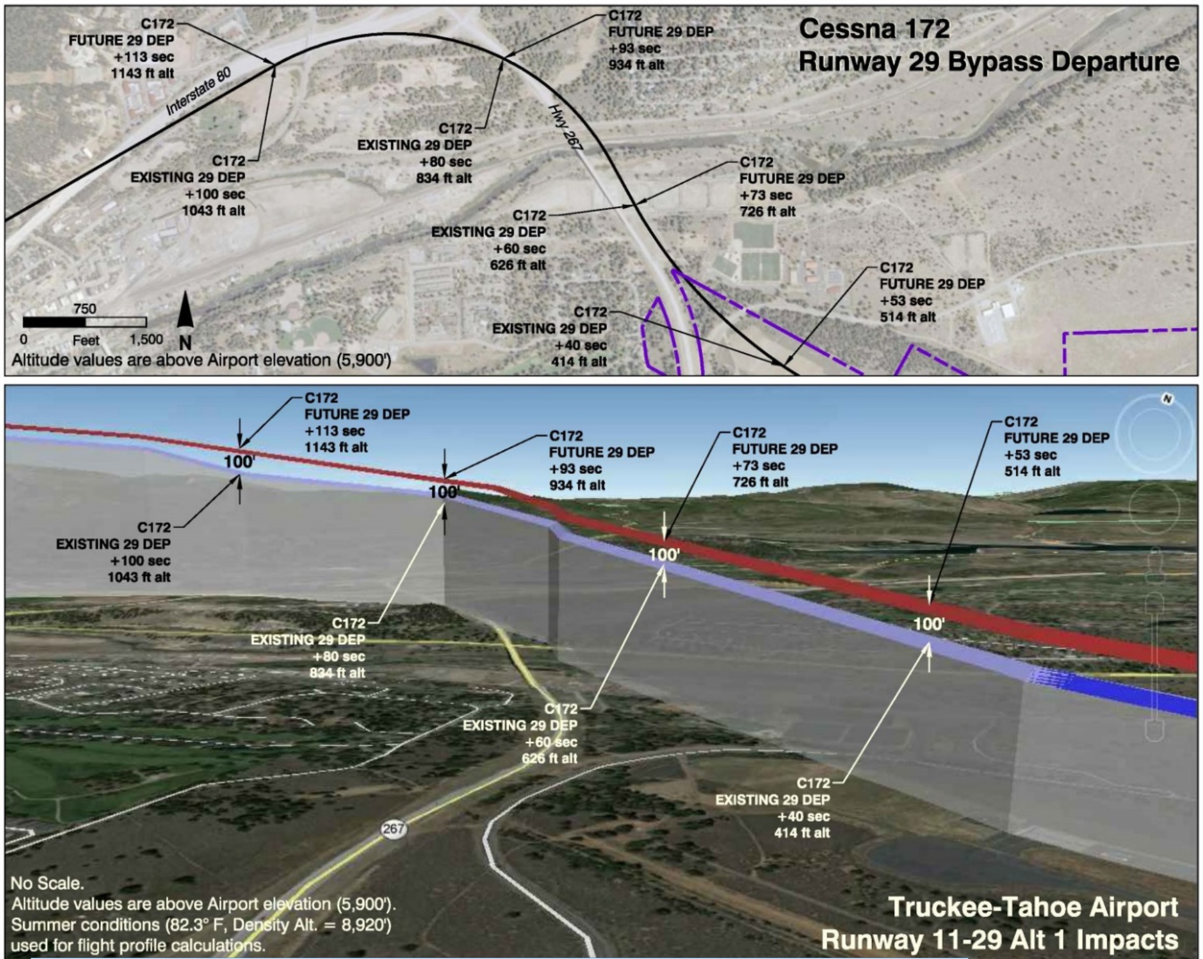


Figure 4-7 OVERFLIGHT IMPACTS – CESSNA 172 DEPARTURES ON RUNWAY 29

Departure Profile on Future Runway 29

Departure Profile on Existing Runway 29

For each aircraft scenario, aircraft would be higher when departing from the proposed end of Runway 29. For the Cessna 560 turbo-jet, differences in departure profile would be 120-200 feet. For the Piaggio 180, the difference in altitude on departure is 130 feet, and for the Cessna 172 the difference is 100 feet. It was determined that these differences of a hundred feet would not be noticeable to people on the ground.

NOISE ANALYSIS

An analysis was undertaken to quantify and convey aircraft noise and how it might improve if this alternative were to be implemented. TTAD specifically required an assessment of sound levels and event duration. Repetition of noise events are not specifically affected by this alternative.

The FAA's Integrated Noise Model (INM) was used to model single-event aircraft operations. The analysis assessed maximum noise levels for individual flight operations of the three aircraft noted above and displayed these as maximum noise contour lines. To assess annoyance related to duration, the grid-point analysis quantified time (in seconds above 65 decibels). Points were spread out at 600-foot intervals. Graphics were then created to illustrate time above 65 decibels on a chromatic scale to help illustrate noise impacts.

Figure 4-8 illustrates examples of noise footprints for arrivals and departures of aircraft that typically operate at TRK. These footprints show single-event Lmax contours from a runway at 5,900 feet elevation above mean sea level. Figure 4-8 provides scale and a better understanding of the differences in noise impacts each aircraft produces.

Figures 4-9 through **4-18** illustrate noise impacts for Martis Valley Estates, Olympic Heights and vicinity for single event operations and seconds above 65 decibels per operation. Observing differences at common grid points (for identical aircraft in existing and future scenarios) shows little change in time exposure above 65 decibels.

For instance, when looking at the Cessna Citation departure from the existing Runway 29 end versus the proposed Runway 29 end (Figures 4-9 and 4-10), there is little difference in time exposure. The same is true for the other the aircraft—extending the runway 1,322 feet to the east does not produce a significant decrease in noise exposure over residences west of the airport.

LMAX and Single Event Definitions

Lmax (maximum sound level). This is the loudest sound measured at a location during an aircraft's operation. It is useful for determining detectable noise changes. A 3 dB increase in Lmax is "barely perceptible," while a 5dB increase in Lmax is "clearly perceptible."

TA (Time Above). This is a single-event metric. It provides the number of minutes an aircraft's noise level is louder than a reference noise level during a given period, Examples include the duration an aircraft is louder than the ambient noise or louder than the level above which speech interference may occur. TA may include information ranging from time above a specific noise level at a specific point, to the time above multiple levels (in 10 dB increments) throughout an area at specified grid points.

Source: FAA's Airports Desk Reference, Chapter 17 Noise

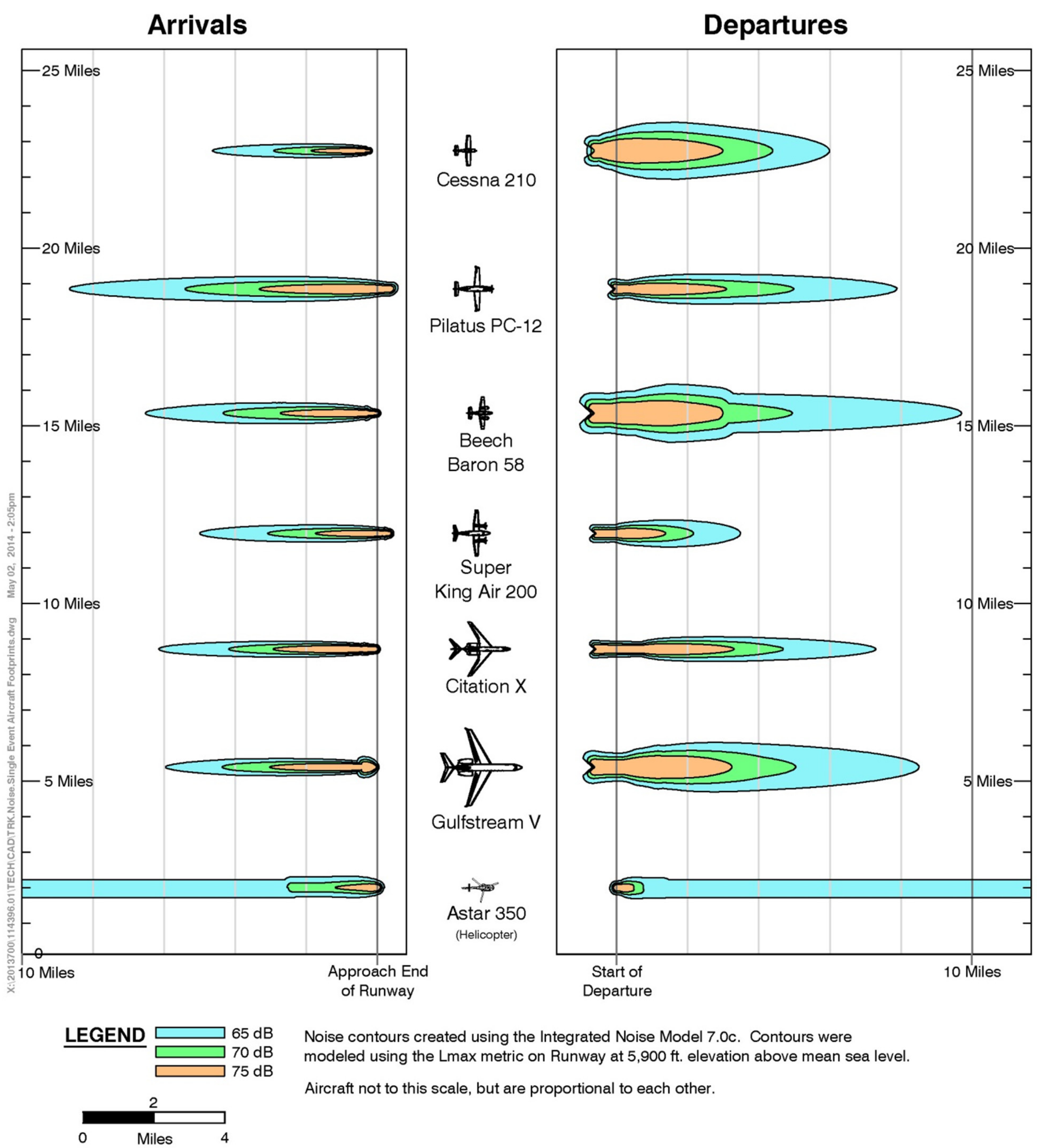


Figure 4-8 SINGLE EVENT AIRCRAFT NOISE FOOTPRINTS

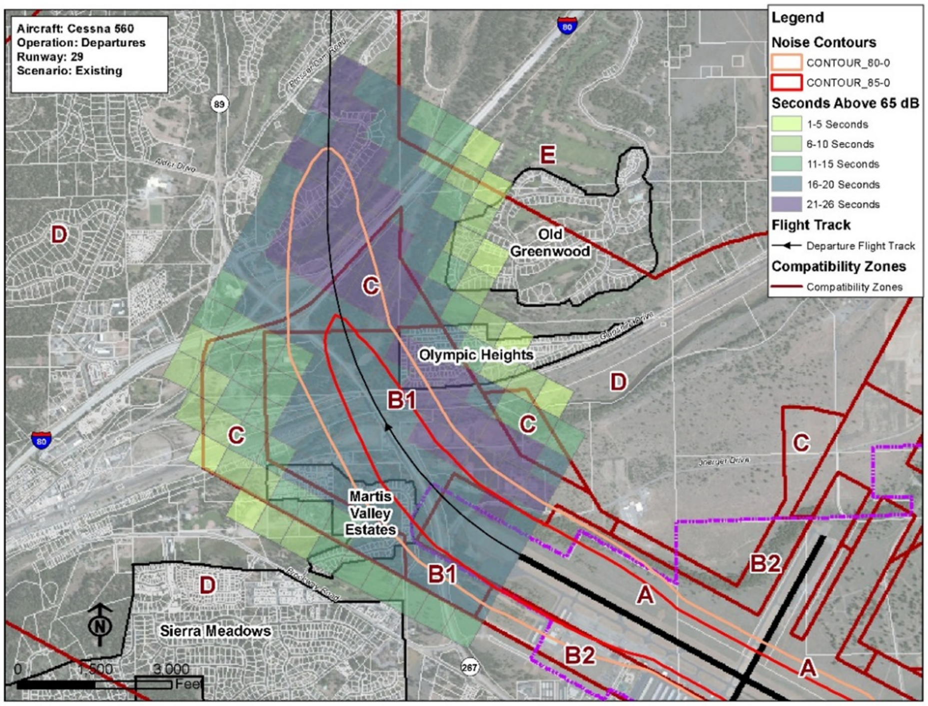


Figure 4-9 NOISE IMPACTS – CESSNA 560 DEPARTURE ON EXISTING RUNWAY 29

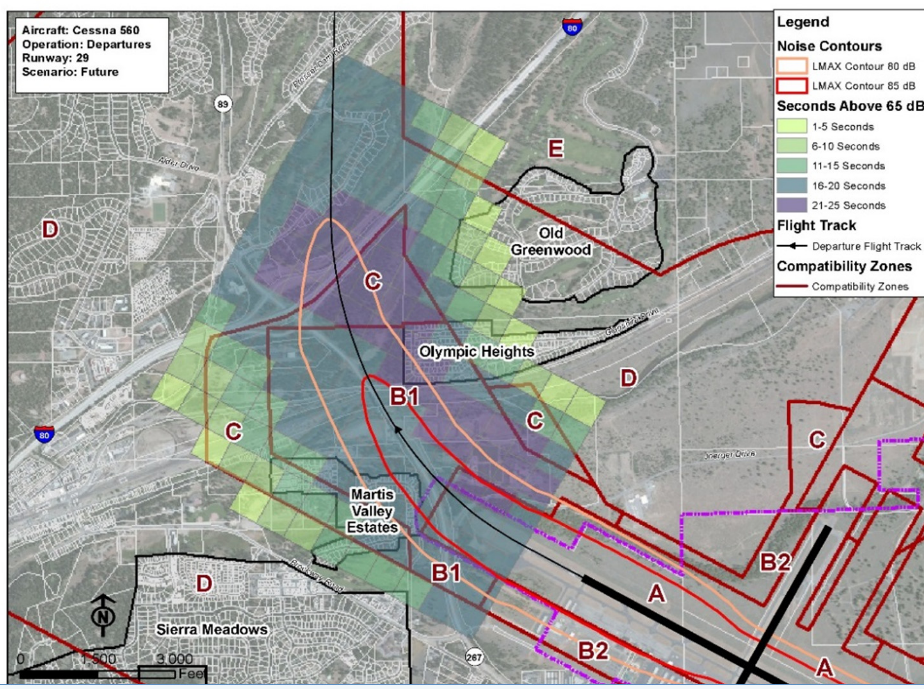


Figure 4-10 NOISE IMPACTS – CESSNA 560 DEPARTURE ON FUTURE RUNWAY 29

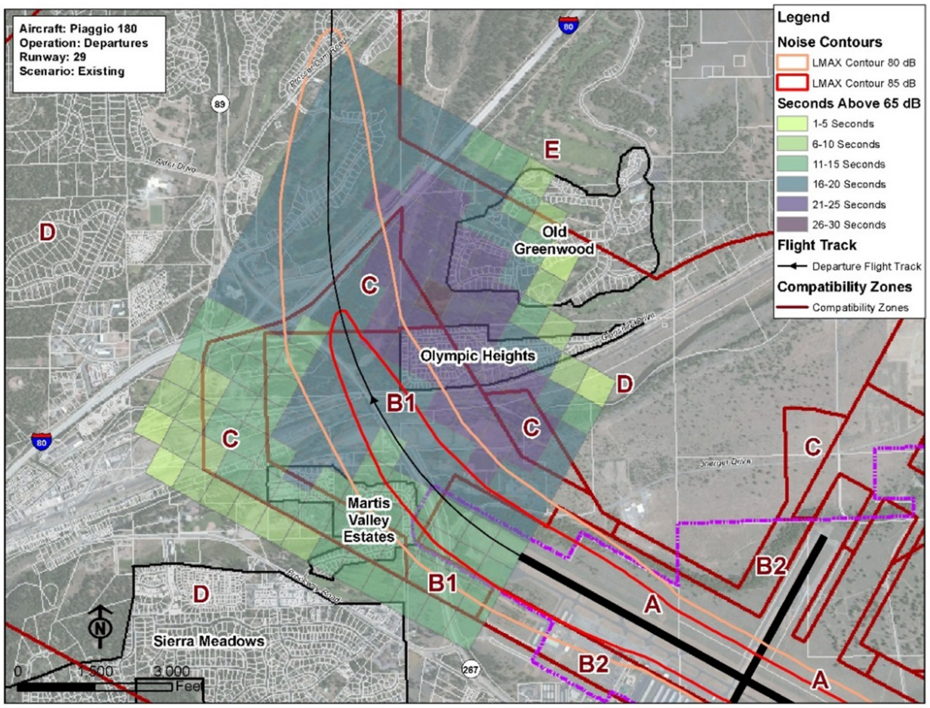


Figure 4-11 NOISE IMPACTS – PIAGGIO 180 DEPARTURE ON EXISTING RUNWAY 29

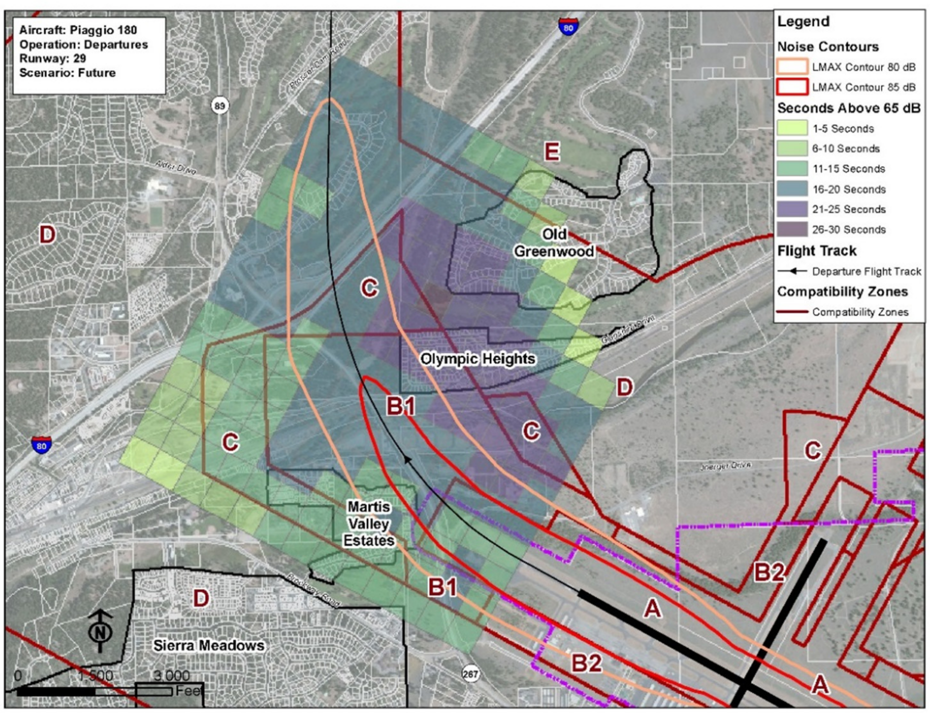


Figure 4-12 NOISE IMPACTS – PIAGGIO 180 DEPARTURE ON FUTURE RUNWAY 29

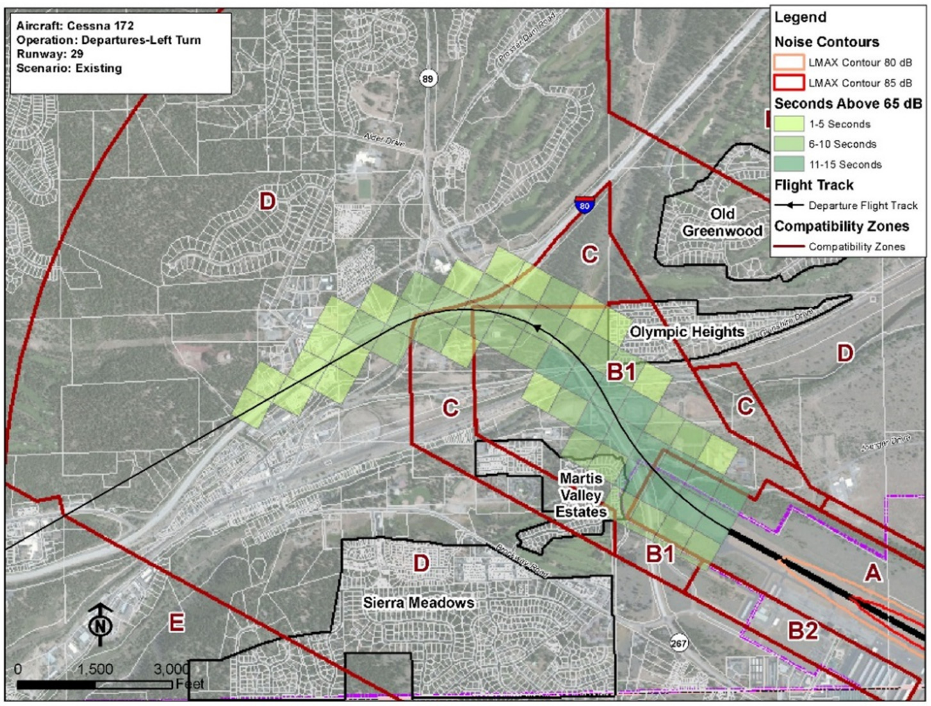


Figure 4-13 NOISE IMPACTS – CESSNA 172 DEPARTURE ON EXISTING RUNWAY 29

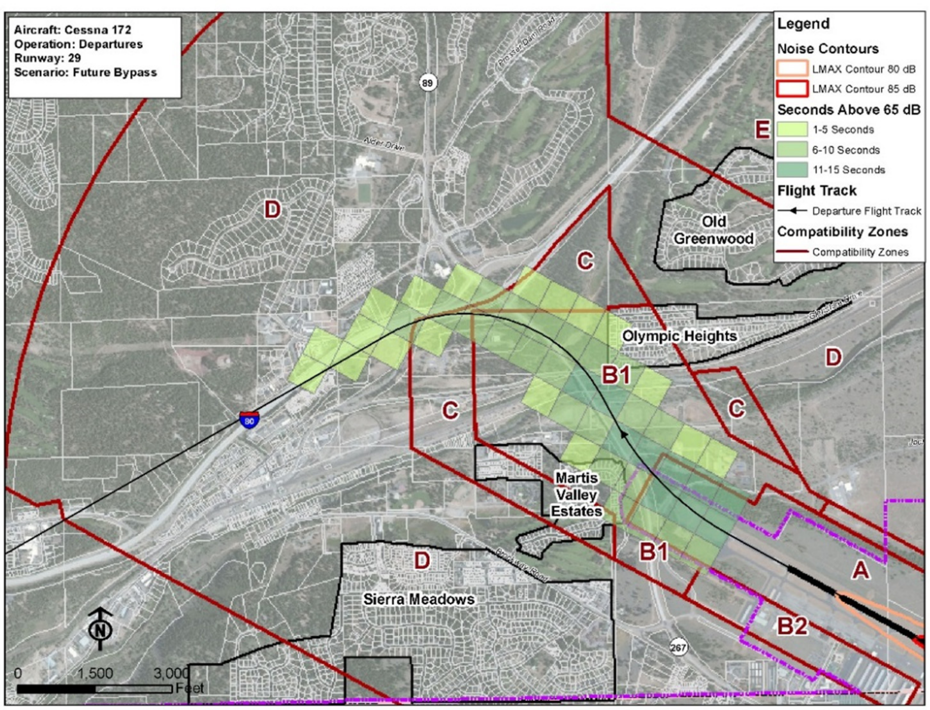


Figure 4-14 NOISE IMPACTS – CESSNA 172 DEPARTURE ON FUTURE RUNWAY 29

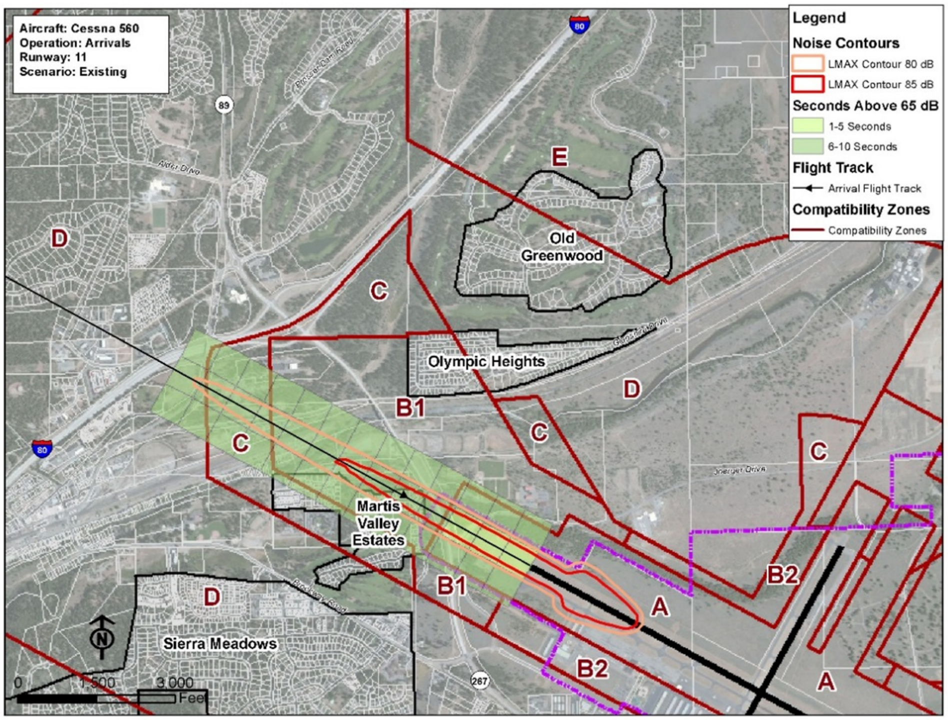


Figure 4-15 NOISE IMPACTS – CESSNA 560 ARRIVAL ON EXISTING RUNWAY 11

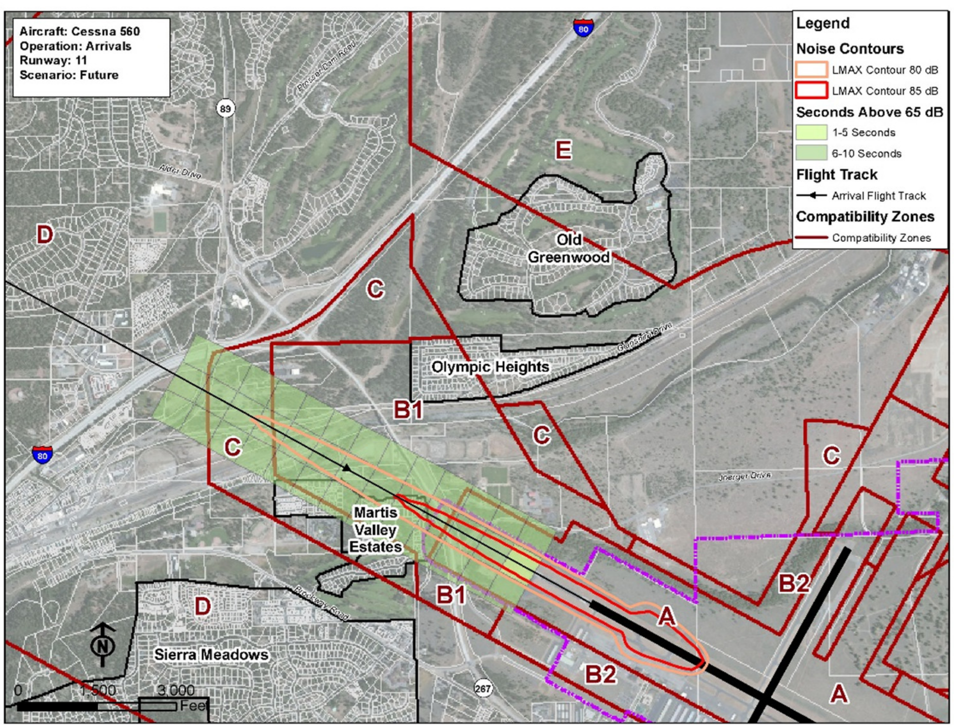


Figure 4-16 NOISE IMPACTS – CESSNA 560 ARRIVAL ON FUTURE RUNWAY 11

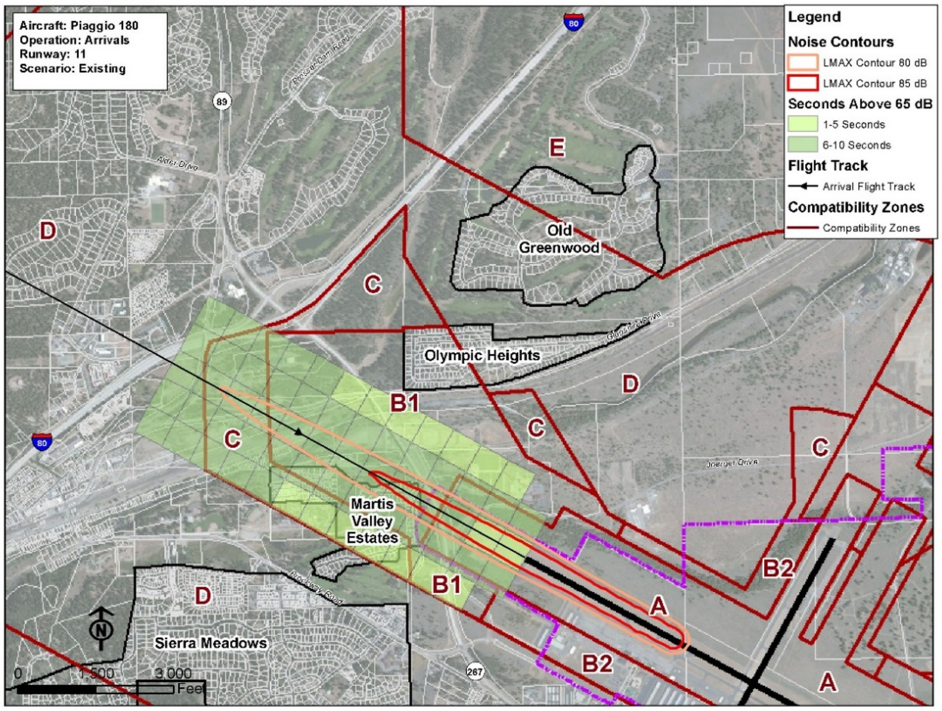


Figure 4-17 NOISE IMPACTS – PIAGGIO 180 ARRIVAL ON EXISTING RUNWAY 11

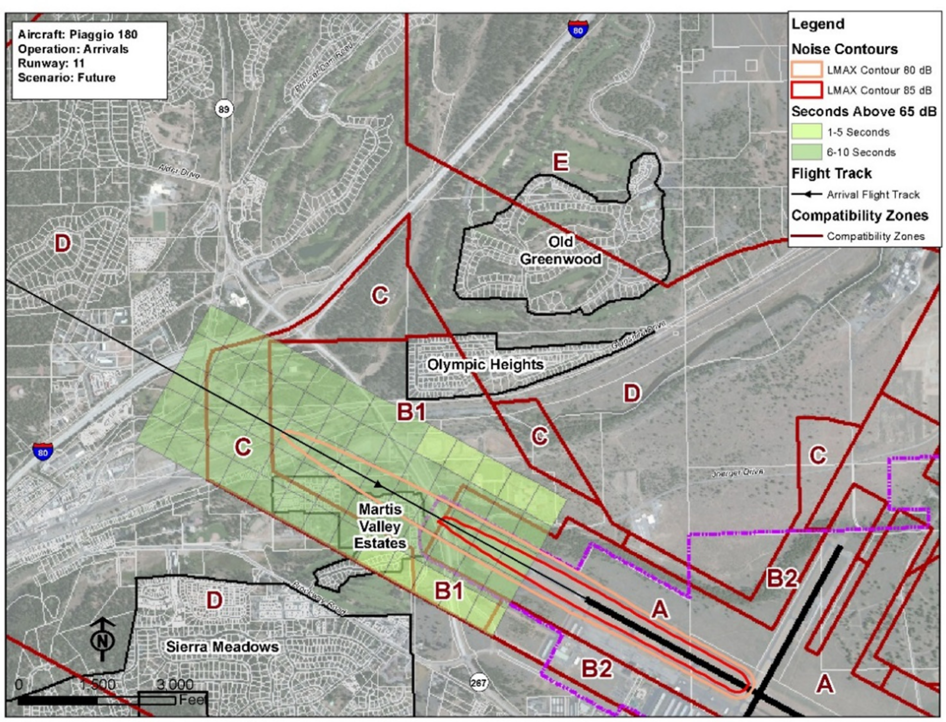


Figure 4-18 NOISE IMPACTS – PIAGGIO 180 ARRIVAL ON FUTURE RUNWAY 11

PRELIMINARY COSTS ESTIMATES

Costs to design and build Alternative 1A or 1B were calculated at $6.1 million. This figure includes design and environmental mitigation. Costs assume two months of nighttime work inside the RSA when Runway 11-29 would need to be closed at night, although other options for timing and closure are available.

Alternative 1 – Conclusion

The analysis was presented to the TTAD board and the public at an open house session. The general consensus of the participants was that the difference in aircraft altitude would not be perceptible.

Based on the conclusions from the following criteria, Alternatives 1A and 1B are not recommended for planning and implementation proposes.

- **Implementation and construction costs of $6.8 million – Acceptable only if adequate community benefits can be realized.**
- **Improvement to visual impacts – No significant benefit anticipated.**
- **Reduced noise impacts on a per operations basis (maximum sound levels and event duration) – No significant benefit anticipated.**

Declared Distances represent the maximum distances available and suitable for meeting takeoff, rejected takeoff, and landing distances performance requirements for turbine powered aircraft. The declared distances are Takeoff Run Available (TORA) and Takeoff Distance Available (TODA), which apply to takeoff; Accelerate Stop Distance Available (ASDA), which applies to a rejected takeoff; and Landing Distance Available (LDA), which applies to landing.

Declared distances may be used to obtain additional RSA and/or ROFA prior to the runway's threshold (the start of the LDA) and/or beyond the stop end of the LDA and ASDA, to mitigate unacceptable incompatible land uses in the RPZ, to meet runway approach and/or departure surface clearance requirements, in accordance with airport design standards, or to mitigate environmental impacts.

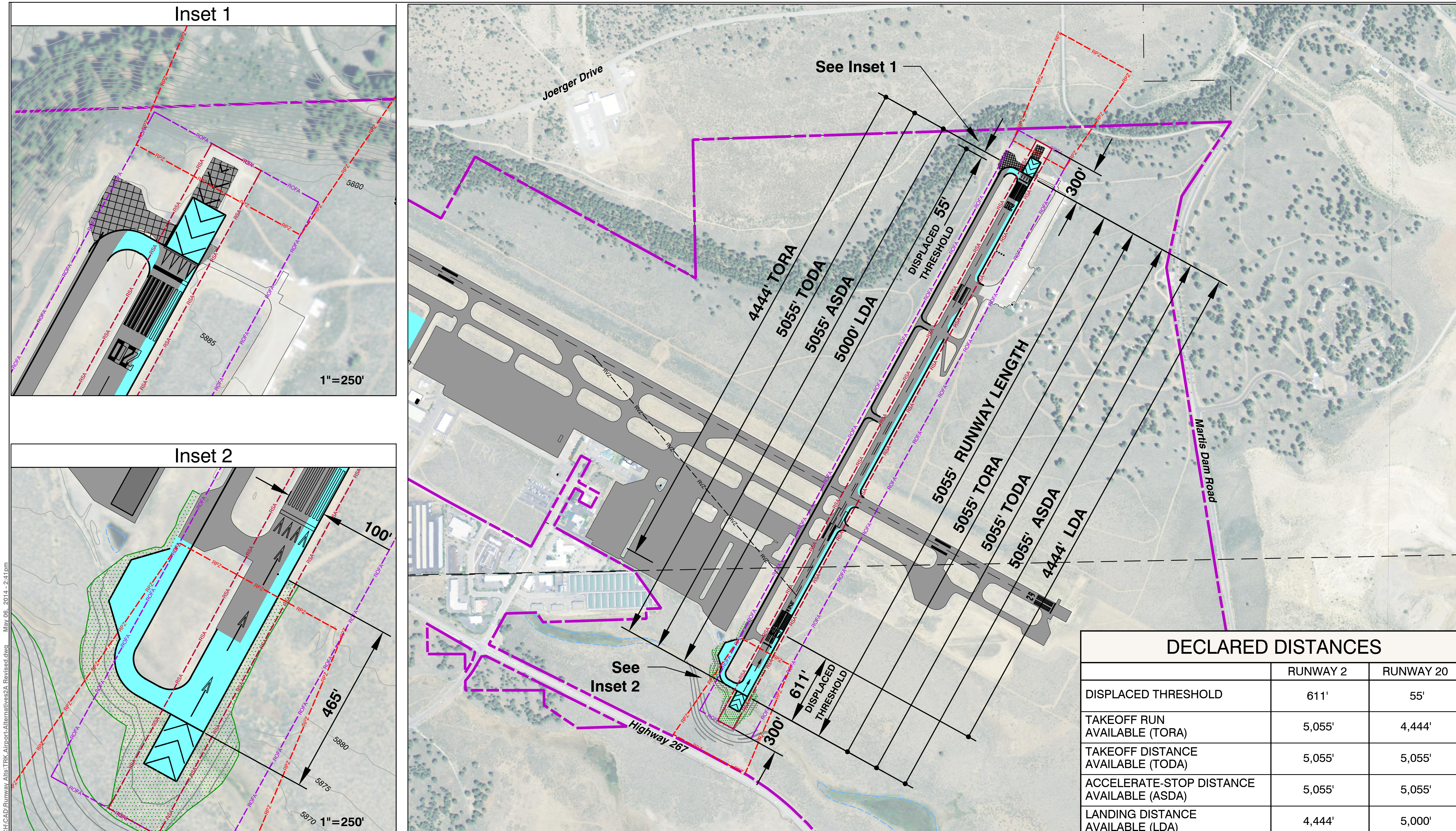
Source: FAA AC 150/5300-13A

Alternative 2 – Runway 2-20 Modifications

The purpose of Alternative 2 is to more evenly distribute air traffic between the two runways to reduce the number of noise events affecting residential areas west of the airport. The alternative involves physical improvements to make Runway 2-20 more attractive to aircraft operators. In this regard, two scenarios of improvements were considered: increase in length and width (2A) and width only (2B).

An upgrade to runway dimensions (length and width) is the most practical way to entice more operations on that runway. Alternative 2A considers widening Runway 2-20 to 100 feet, plus extending the runway to reach a landing distance available on Runway 20 of 5,000 feet (declared distances are used to accomplish this length – see side bar). General industry standards for charter companies cite 5,000 of runway length as a benchmark for being able to land and depart on.

To accomplish this, Runway 2-20 would be lengthened to the south. Lengthening to the north was considered but deemed impractical (see Dismissed Runway Options above) due to steep terrain at the approach end of Runway 20. Alternative 2A is presented in **Figure 4-19**. Alternative 2A extends Runway 2-20 465 feet to the south so total length of the runway equals 5,055 feet. The landing threshold for Runway 2 would be displaced 611 feet from the proposed runway end. The threshold displacement shifts the runway protection zone (RPZ) for Runway 2 north.



DECLARED DISTANCES

	RUNWAY 2	RUNWAY 20
DISPLACED THRESHOLD	611'	55'
TAKEOFF RUN AVAILABLE (TORA)	5,055'	4,444'
TAKEOFF DISTANCE AVAILABLE (TODA)	5,055'	5,055'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	5,055'	5,055'
LANDING DISTANCE AVAILABLE (LDA)	4,444'	5,000'

LEGEND

- RSA — PROPOSED FUTURE RSA
- RPZ — PROPOSED FUTURE RPZ
- ROFA — PROPOSED FUTURE OFA
- PROPOSED NEW PAVEMENT
- AIRPORT PROPERTY
- RVZ — PROPOSED RUNWAY VISUAL ZONE
- PROPOSED SAFETY AREA FILL

0 400 800 Feet

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Figure 4-19

Runway Alternative 2A

Truckee Tahoe Airport

Fig 4-19 (11x17)
Reverse Side

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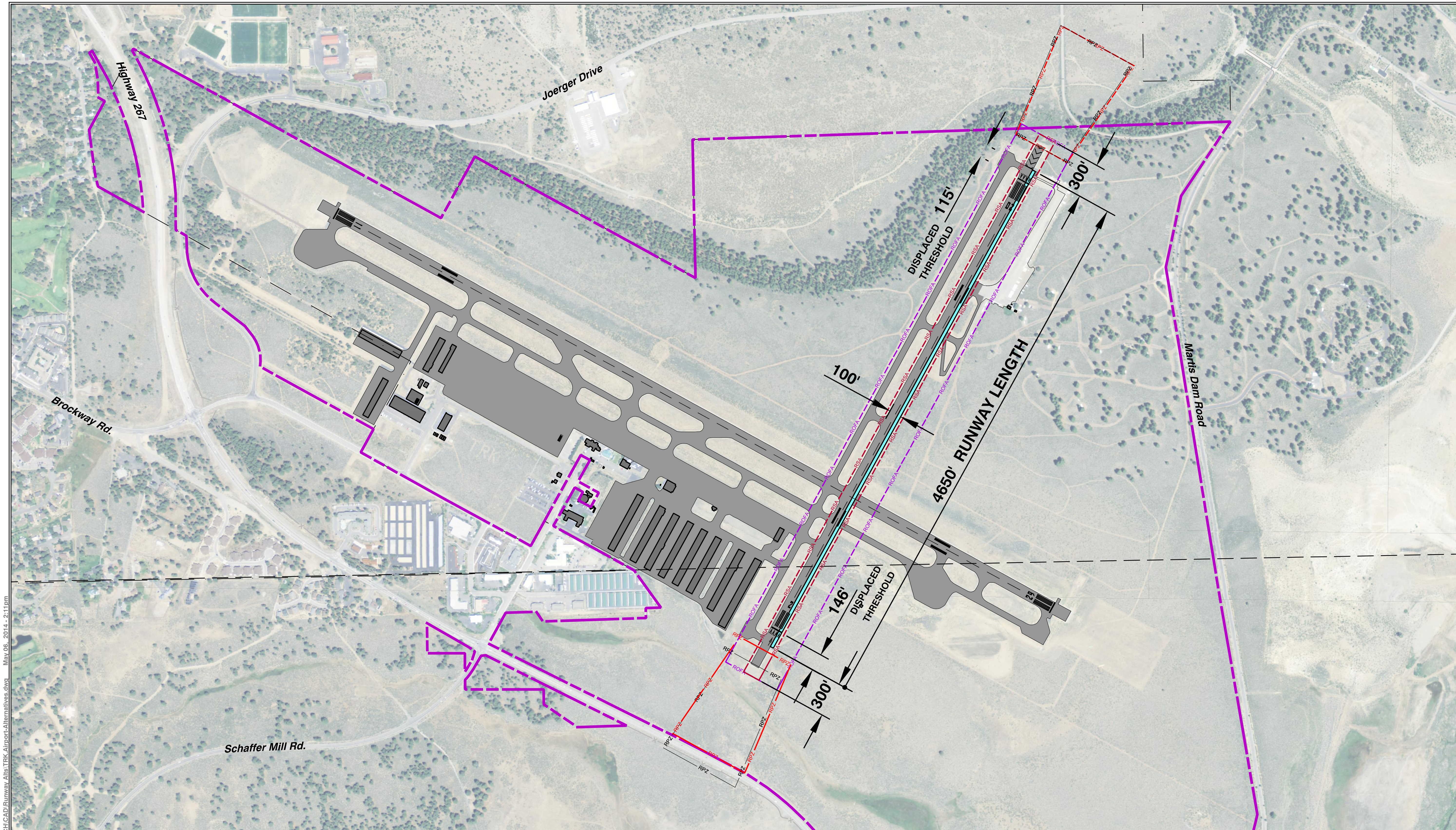

LEGEND

- AIRPORT PROPERTY
- PROPOSED FUTURE RSA
- EXISTING RPZ
- PROPOSED FUTURE RPZ
- PROPOSED FUTURE OFA
- PROPOSED NEW PAVEMENT

0 400 800 Feet

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Prepared By: Mead&Hunt www.meadhunt.com

Figure 4-20

Runway Alternative 2B

Truckee Tahoe Airport

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Fig 4-20 (11x17)
Reverse Side

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This results in the RPZ for Runway 2 avoiding Highway 267 and makes the RPZ compliant with current FAA design standards, as explained in Chapter 3.

Alternative 2B proposes only widening Runway 2-20 to 100 feet, with no lengthening. The objective remains to attract more aircraft to operate on Runway 2-20, but with less cost and environmental impact than Alternative 2A. The landing threshold for Runways 2 and 20 would remain in the same locations. Alternative 2A is presented in **Figure 4-20**.

VISUAL IMPACT OF RUNWAY EXTENSION

Maintaining scenic views of the Martis Valley area is of primary importance to the TTAD. Analysis was conducted to assess the visual impact of extending Runway 2-20 to the south. This would involve extending the graded runway safety area and realigning or culverting a drainage ditch off the south end of the runway.

A visual comparison between the existing configuration and extending the runway are shown below. **Figure 4-21** shows the view of the existing approach end of Runway 2 from Highway 267, looking northeast, and **Figure 4-22** shows the same view with proposed extension.

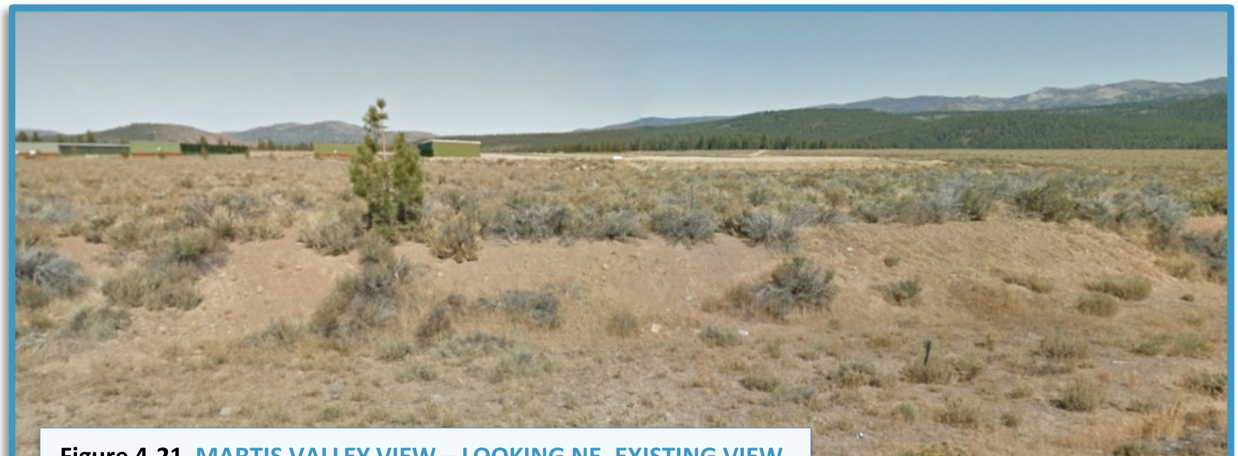


Figure 4-21 MARTIS VALLEY VIEW – LOOKING NE, EXISTING VIEW

Figure 4-22 MARTIS VALLEY VIEW – LOOKING NE, VIEW WITH RUNWAY EXTENSION

Figure **4-23** illustrates the view of the existing approach end of Runway 2 from Highway 267, looking northwest, and Figure **4-24** shows the same view with proposed extension.

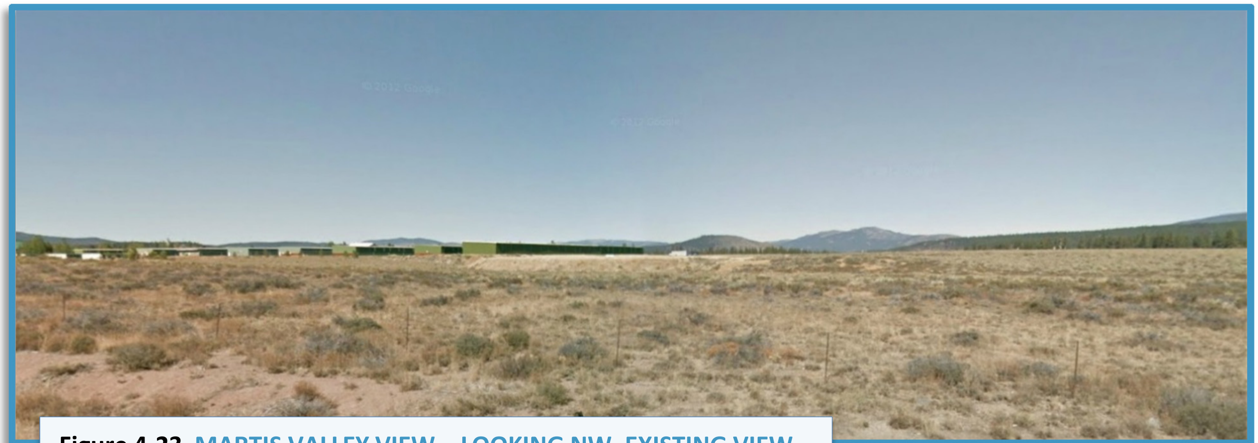


Figure 4-23 MARTIS VALLEY VIEW – LOOKING NW, EXISTING VIEW

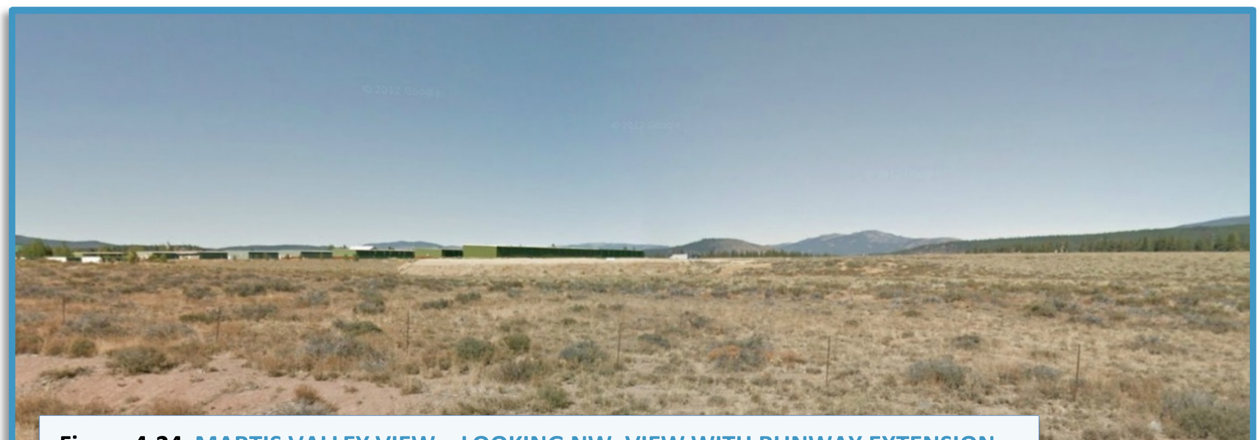


Figure 4-24 MARTIS VALLEY VIEW – LOOKING NW, VIEW WITH RUNWAY EXTENSION

To give some perspective, Google Earth imagery was utilized to provide a birds-eye view of the extension, from an elevation of about 50 feet above Highway 267. **Figure 4-25** shows the existing layout of the approach end of Runway 2, and **Figure 4-26** shows the proposed layout looking northwest.

The information was presented to the TTAD board and to the public during an open house session. The consensus was that the proposed extension would not significantly affect the scenic views of Martis Valley.

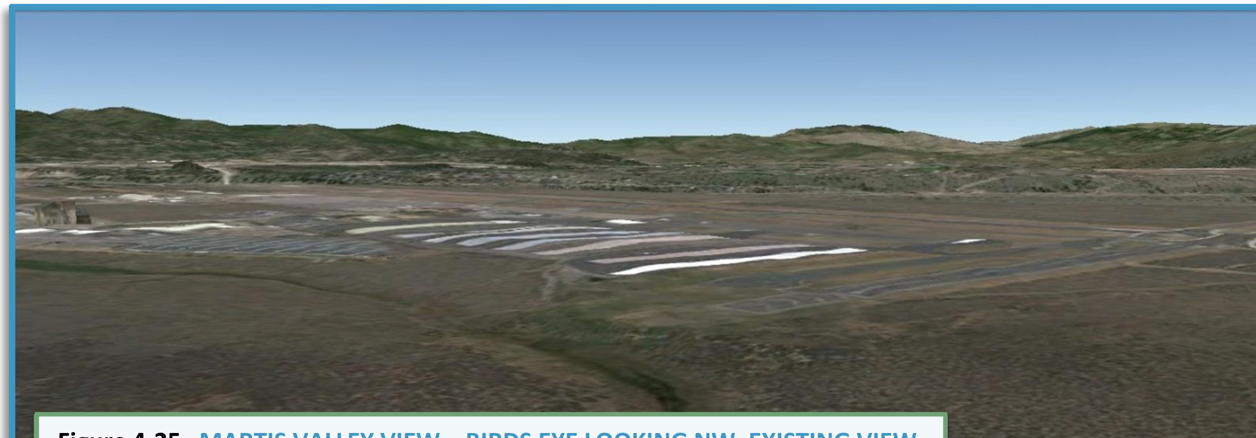


Figure 4-25 MARTIS VALLEY VIEW – BIRDS EYE LOOKING NW, EXISTING VIEW

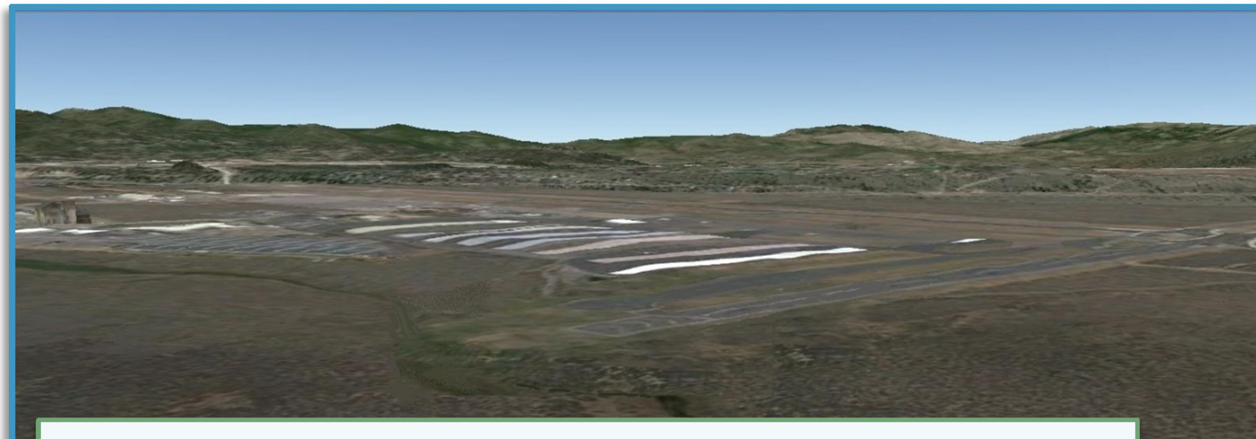


Figure 4-26 MARTIS VALLEY VIEW – BIRDS EYE LOOKING NW, VIEW WITH RUNWAY EXTENSION

PROJECTED RUNWAY UTILIZATION

Pilots have the final decision for determining the safe operation of their aircraft. Various factors go into choosing which runway to use at an airport with multiple runways. Discussions with local pilots determined the following priorities are typically used in runway selection at TRK:

- Pavement Strength
- Wind direction and velocity
- Runway length
- Instrument conditions/Approach availability
- Airport outreach/Local communication efforts
- Taxi distance
- On course/arrival direction
- Glider activity
- Runway width

Applying the above prioritization, an anecdotal analysis was conducted to assess runway utilization by aircraft classification by extrapolating known current activity to the two alternative scenarios (2A and 2B). **Tables 4-1** and **4-2** display the results of this analysis.

Table 4-1 Runway Utilization Percentages, Alternative 2A

		DEPARTURES				ARRIVALS			
		Existing		Alternative 2A		Existing		Alternative 2A	
		% of ops	Total Departures	% of ops	Total Departures	% of ops	Total Arrivals	% of ops	Total Arrivals
11	Piston	4%	357	---	357	4%	357	---	357
	Turboprop	4%	57	---	57	4%	57	---	57
	Turbo Jet	3%	23	---	23	3%	23	---	23
29	Piston	77%	6,865	58% ↓	5,171	66%	5,884	47% ↓	4,190
	Turboprop	88%	1,261	76% ↓	1,089	82%	1,175	64% ↓	917
	Turbo Jet	96%	735	88% ↓	674	94%	720	83% ↓	636
2	Piston	8%	713	16% ↑	1,426	8%	713	16% ↑	1,426
	Turboprop	2%	29	8% ↑	115	2%	29	8% ↑	115
	Turbo Jet	0.5%	4	6% ↑	46	1%	8	4% ↑	31
20	Piston	11%	981	22% ↑	1,961	22%	1,961	33% ↑	2,942
	Turboprop	6%	86	12% ↑	172	12%	172	24% ↑	344
	Turbo Jet	0.5%	4	3% ↑	23	2%	15	10% ↑	77

--- No Change in Data

Table 4-2 Runway Utilization Percentages, Alternative 2B

		DEPARTURES				ARRIVALS			
		Existing		Alternative 2B		Existing		Alternative 2B	
		% of ops	Total Departures	% of ops	Total Departures	% of ops	Total Arrivals	% of ops	Total Arrivals
11	Piston	4%	357	---	357	4%	357	---	357
	Turboprop	4%	57	---	57	4%	57	---	57
	Turbo Jet	3%	23	---	23	3%	23	---	23
29	Piston	77%	6,865	---	6,865	66%	5,884	---	5,884
	Turboprop	88%	1,261	85.5% ↓	1,225	82%	1,175	78% ↓	1,118
	Turbo Jet	96%	735	95% ↓	728	94%	720	91.5% ↓	701
2	Piston	8%	713	---	713	8%	713	---	713
	Turboprop	2%	29	3% ↑	43	2%	29	3% ↑	43
	Turbo Jet	0.5%	4	1% ↑	8	1%	8	1.5% ↑	11
20	Piston	11%	981	---	981	22%	1,961	---	1,961
	Turboprop	6%	86	7.5% ↑	107	12%	172	15% ↑	215
	Turbo Jet	0.5%	4	1% ↑	8	2%	15	4% ↑	31

--- No Change in Data

NOISE ANALYSIS

An analysis of noise impacts was performed for departures on Runway 2. This analysis looked at neighborhoods located north of the airport, including the Glenshire community, which aircraft departing Runway 2 may overfly.

Since lengthening Runway 2-20 is considered, it was essential to provide a noise analysis identical to that performed for Alternatives 1A and 1B. As with Alternatives 1A and 1B, TTAD specifically required an assessment of sound levels and event duration. The number of events was not specifically considered in the evaluation of this alternative.

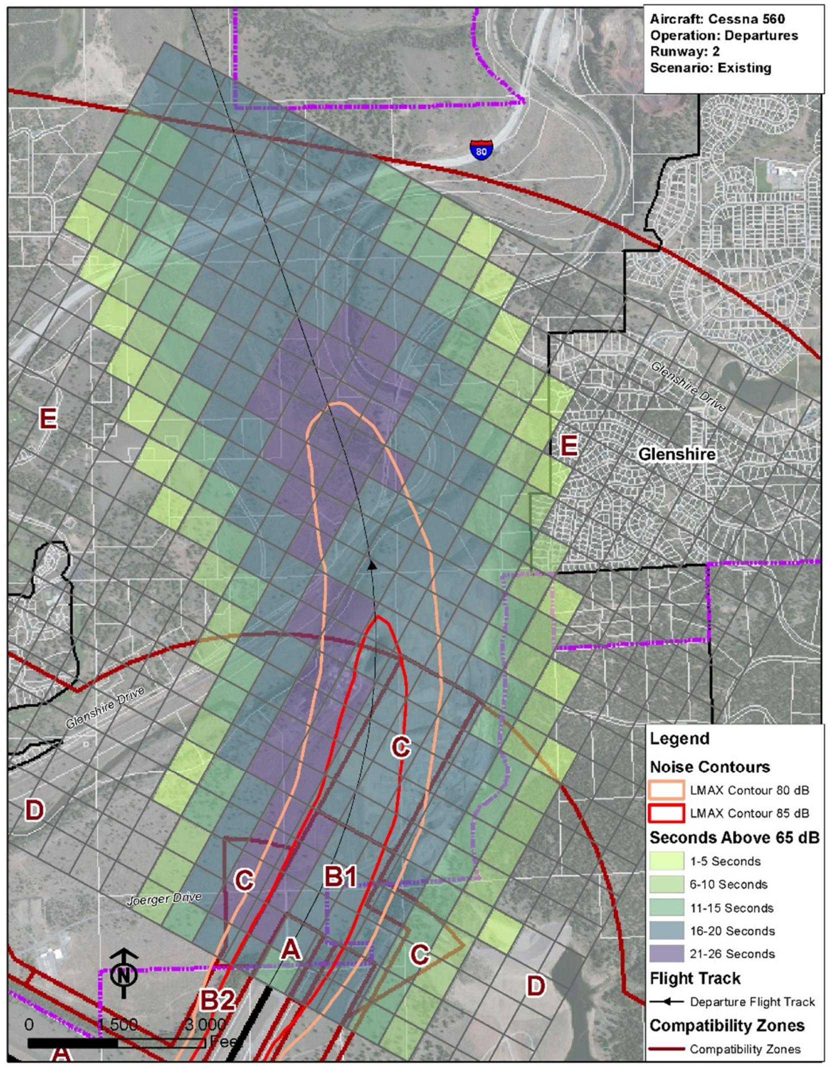


Figure 4-27 NOISE IMPACTS – CESSNA 560 DEPARTURE ON EXISTING RUNWAY 2

The analysis displayed maximum noise levels for individual flight operations as maximum noise contour lines. To assess annoyance related to duration, the grid-point analysis quantified time (in seconds above 65 decibels). Points were spread out at 600 feet intervals. The aircraft selected for evaluation was the turbo jet Cessna Citation V (560).

Figure 4-27 illustrates noise impacts for departures on existing Runway 2 from a Cessna Citation V and **Figure 4-28** for departures on the extended runway. Observing differences at common grid points between the two exhibits shows little change in time exposure above 65 decibels. It should also be observed that impacts from departures on the existing Runway 2 over Glenshire are minimal, since most aircraft follow the departure track shown in Figure 4-27 and turn left to avoid direct overflight of residences. It is anticipated this departure path will be retained in the future regardless of whether this alternative is implemented.

PRELIMINARY COSTS ESTIMATES

Costs to design and build Alternative 2A were calculated at $6.8 million and 2B at $3.4 million. These figures include design and environmental mitigation. Both alternatives would require new electrical work since the runway would be widened. Costs assume 2.5 months of nighttime work inside the RSA when Runway 2-20 would need to be closed at night. Nighttime closures are suggested, but add to the cost. Other construction timing and logistical options are available. A significant cost factor for 2A is acquiring fill for the southerly extension of the runway. If fill can be acquired from on site, the cost may be less.

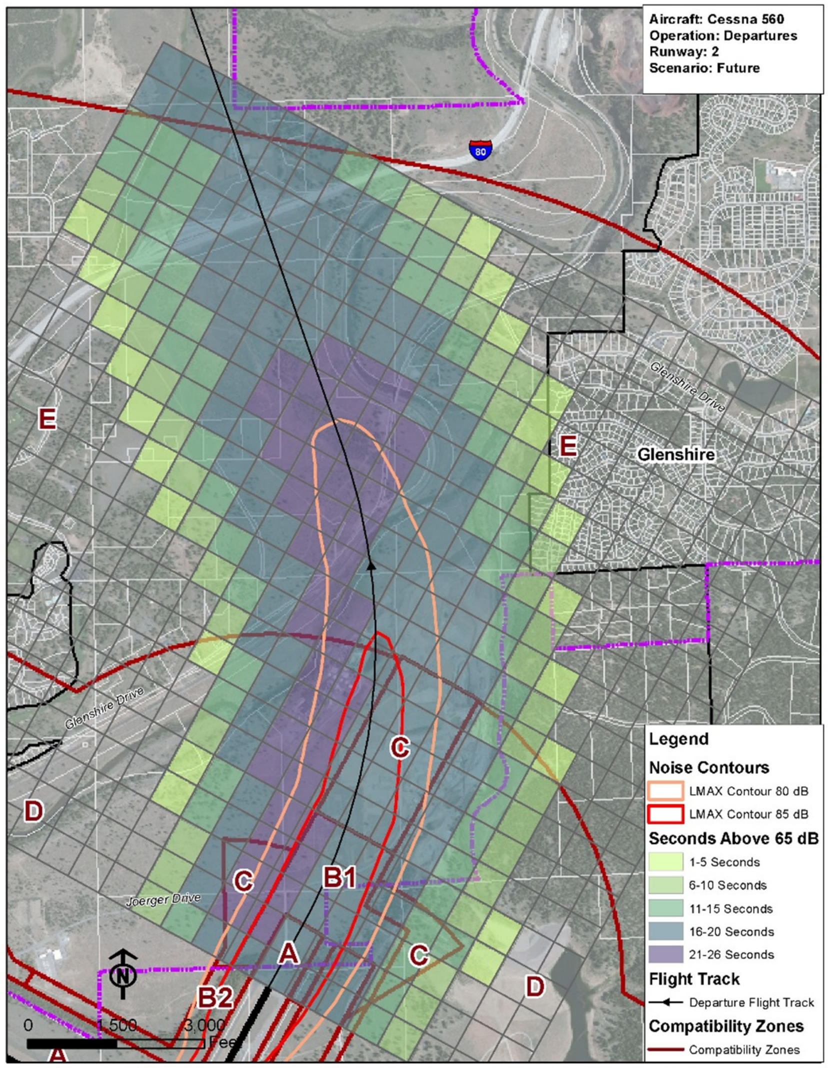


Figure 4-28 NOISE IMPACTS – CESSNA 560 DEPARTURE ON FUTURE RUNWAY 2

Alternative 2A and 2B Conclusions

Based on the conclusions drawn from the following criteria, Alternative 2A is recommended for planning and implementation purposes. Alternative 2B is not.

- **Scenic Impacts**:
  2A – Acceptable level of impact
  2B – Acceptable level of impact

- **Achieves Aircraft Dispersion Objectives**
  2A – Achievable with enhanced TTAD outreach and other airfield design upgrades.
  2B – No significant benefits.

SELECTED RUNWAY ALTERNATIVE

Alternative 2A is recommended for incorporation into the airport layout plan (ALP) and subsequent environmental and implementation plans. Extending Runway 2-20 to 5,055 feet and widening to 100 feet offers the best possibility for dispersing traffic. Detailed technical analysis for Runway 2-20 runway length requirement is provided in Appendix D. To fully achieve the dispersion objectives, Runway 2-20 should also incorporate RDC B-II design upgrade. The following actions are required to widen and lengthen Runway 2-20:

- **410 feet of additional of pavement for runway extension, plus 25 feet over the entire length to widen.**
- **62,500 cubic yards of fill.**
- **Drainage ditch realignment or culvert.**
- **New electrical on east side of Runway.**
- **New electrical on Taxiway G.**

To bring Runway 2-20 into conformance with B-II design standards, the following are required:

- **Widen the runway safety area (RSA) to 150 feet in width and extend 300 feet beyond each end.**
- **Offset the parallel taxiway (G) Runway to 240 feet from runway centerline (180 feet today).**
- **Offset the runway hold lines on connector taxiways to 200 feet from runway centerline (125 feet today).**
- **Increase runway object free area width to 500 feet.**

Offsetting Taxiway G is addressed in Section 3. By realigning Taxiway G to 240 feet from Runway 2-20 centerline, the hold lines and runway OFA non-standard conditions would also be alleviated.

2.2 Enhanced Flight Control / Advisory Options

The objective of this alternative is to reduce overflight frequency impacts by alternating runway usage, complimented by enhancing air-ground communications. Currently, no FAA standards exist that guide UNICOM communication to pilots, therefore there is no current standard for airport personnel to communicate to pilots. Rather, pilots are responsible for making these decisions at a non-towered airport. Several options are potentially available for enhancing flight control and advisory communications:

1. **Enhanced UNICOM** – modify TTAD communication procedures to include preferential runway-use advisories, possibly by adding qualifiers such as "conditions permitting". These instructions would augment wind and traffic advisories.
2. **Remote Monitoring/Control** – changes in air traffic control standards may enable remote air traffic control and/or advisory services using a combination or surveillance and communication equipment. This would eliminate TTAD's direct involvement with air traffic advisory support.
3. **Seasonal/Temporary Air Traffic Control Tower (ATCT)** – during peak activity periods, TTAD could implement air traffic control. Two options may be considered by TRK: a temporary tower that is used during peak seasonal activity (summer), and a permanent tower seasonally staffed (also only during summer). The temporary tower would be installed with the idea that if this successfully helps direct traffic and decrease residential overflight, a permanent seasonal tower would then be considered. Although the physical placement of structure may not be necessary to enhance situational awareness and help disperse overflight. A site is proposed here for planning purposes.

4. **NextGen** – The FAA is developing the Next Generation Air Transportation System (NextGen) to transition from ground-based NAVAIDs, radar surveillance and voice communication to a more self-contained (i.e. on board) system using GPS and computer communication. In the new model, aircraft operators will be able to assess traffic and surface conditions independently. "Text" data broadcasts could supply runway advisory information. NAVAID development is occurring simultaneously with improvements in aircraft onboard avionics. The higher precision afforded as part of NextGen is planned to reduce congestion, improve efficiency, and increase safety. As the NextGen system develops, many ground-based NAVAIDs will be decommissioned at the end of their useful lives with only some remaining as ground-based backup.

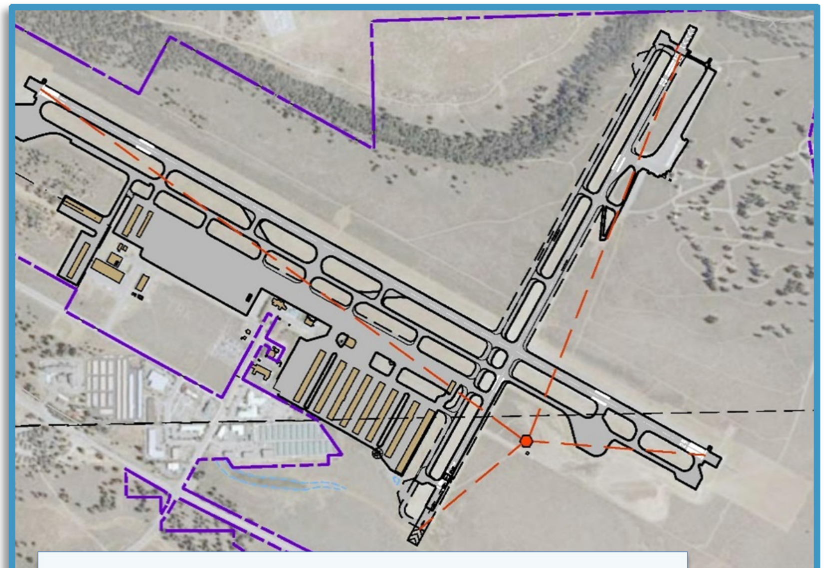


Figure 4-29 PROPOSED TEMPORARY ATCT LOCATION

For planning purposes, this plan identifies **(Figure 4-29)** an acceptable location for a temporary air traffic control tower (ATCT). When siting an ATCT, it is important to consider the line of sight between a controller or camera's "eye" and each runway end. The plan also includes this site for purposes of avoiding obstructions of these views.

2.3 Other Policy/Incentive Programs

Other options besides physical changes to the runway system configuration are available to help reduce and mitigate annoyance resulting from aircraft overflights of residential areas. These include monetary incentives that dissuade pilots form operating at night.

TTAD and community outreach found that reducing night operations should be a focus of this plan. Night operations are a small percentage of total operations at TRK. However, these operations generally produce the most noise complaints. Night operations are defined by the FAA as those that occur between 10:00 PM and 7:00 AM. Federal studies find that night operations seem to be louder than daytime operations. The perception results from the reduced ambient noise at these times and thus an increase in human sensitivity. Most people are at home or sleeping at these times. This increase in sensitivity creates a perceived notion that aircraft are louder and more disruptive at night. This is particularly true during early morning hours (4:00 AM – 7:00 AM), when the majority of noise complaint calls are made at TRK.

TTAD currently has a program of incentives for hangar tenants at TRK that intended to discourage night operations and residential overflight. The effectiveness of the program is monitored using a camera system. Operators of aircraft that takeoff during nighttime hours are given warnings and hangar fee reductions may be revoked.

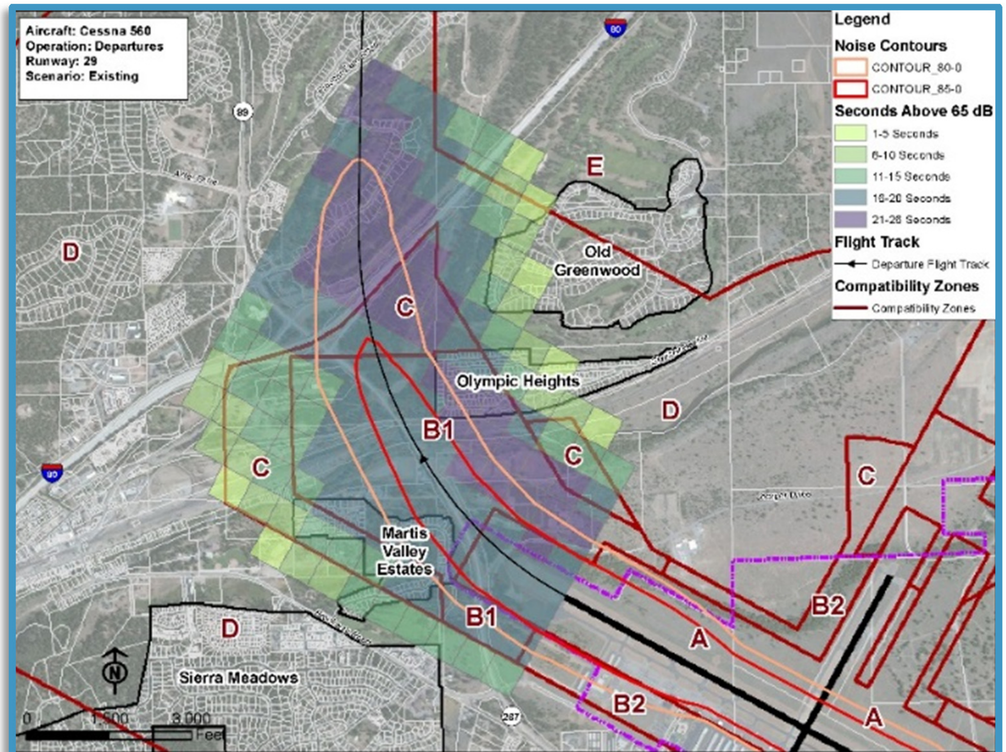
Today, TRK is addressing and engaging in outreach to pilots of aircraft that are not based at the airport. Transient aircraft may arrive during nighttime hours and the pilots may not be aware of the current fly quiet program in place. These pilots may also be unaware of where residences are located and may unknowingly overfly homes. Options for TTAD to consider in the near future to help dissuade night operations include:

- **Continue to monitor night operations. If Runway 2-20 is extended and enhanced flight control is implemented, there is a possibility these actions could help reduce night operations (over residences). The incentive program may be redesigned at that time.**
- **Explore expanding the incentive program. This may include incentives to "regular" transient aircraft operators, including charter operators that utilize TRK often but are based elsewhere.**
- **Consider outreach to pilots at airports in the Bay Area, Southern California, and other areas where many transient aircraft flights originate. Communicating with these pilots about TRK's fly quiet program may help contain residential overflight and night time operations.**
- **Study the implications of possibly restricting night operations.**

2.4 Off-Airport Mitigations

During public open houses and discussion with TTAD, it was found that additional off-airport mitigation may be necessary to alleviate noise impacts to residences located directly west of TRK. Initial analysis looked at aircraft departures on Runway 29 and modifying the recommended procedure. Today, aircraft departing Runway 29 are asked to make a 10 degree right turn and fly over Highway 267 to the Interstate 80 interchange before turning east or west. Jets make this same turn and head towards the TRUCK or POWDR fixes to the north.

Figures 4-30 and **4-31** display the noise impacts of rerouting aircraft from today's procedure over Highway 267 to a straight-out departure. Much like the analysis for runway Alternate 1, impacts are calculated in time above 65 decibels with single-event noise (Lmax) contours illustrated for neighborhoods west and northwest of the airport. A comparison of a Cessna 560 jet aircraft event for current departures and straight-out departures is shown in Figure 4-30. A piston aircraft (Cessna 172) departing the current procedure and proposed straight-out departure is illustrated in Figure 4-31.



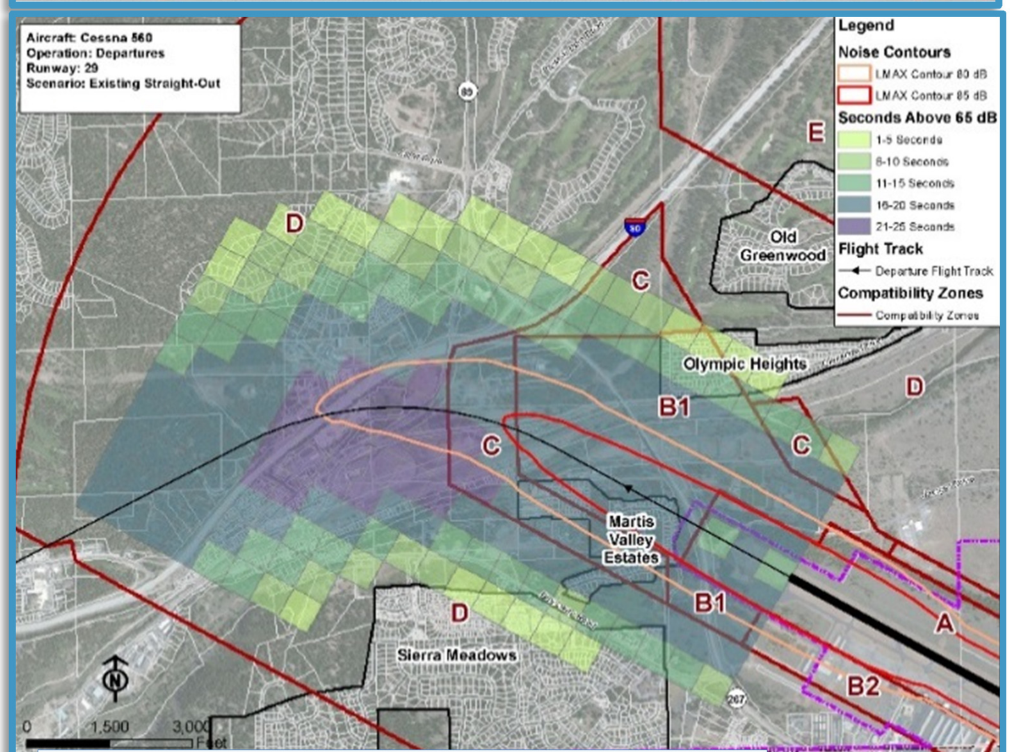


Figure 4-30 NOISE IMPACTS – CESSNA 560 DEPARTURE, CURRENT AND PROPOSED STRAIGHT-OUT

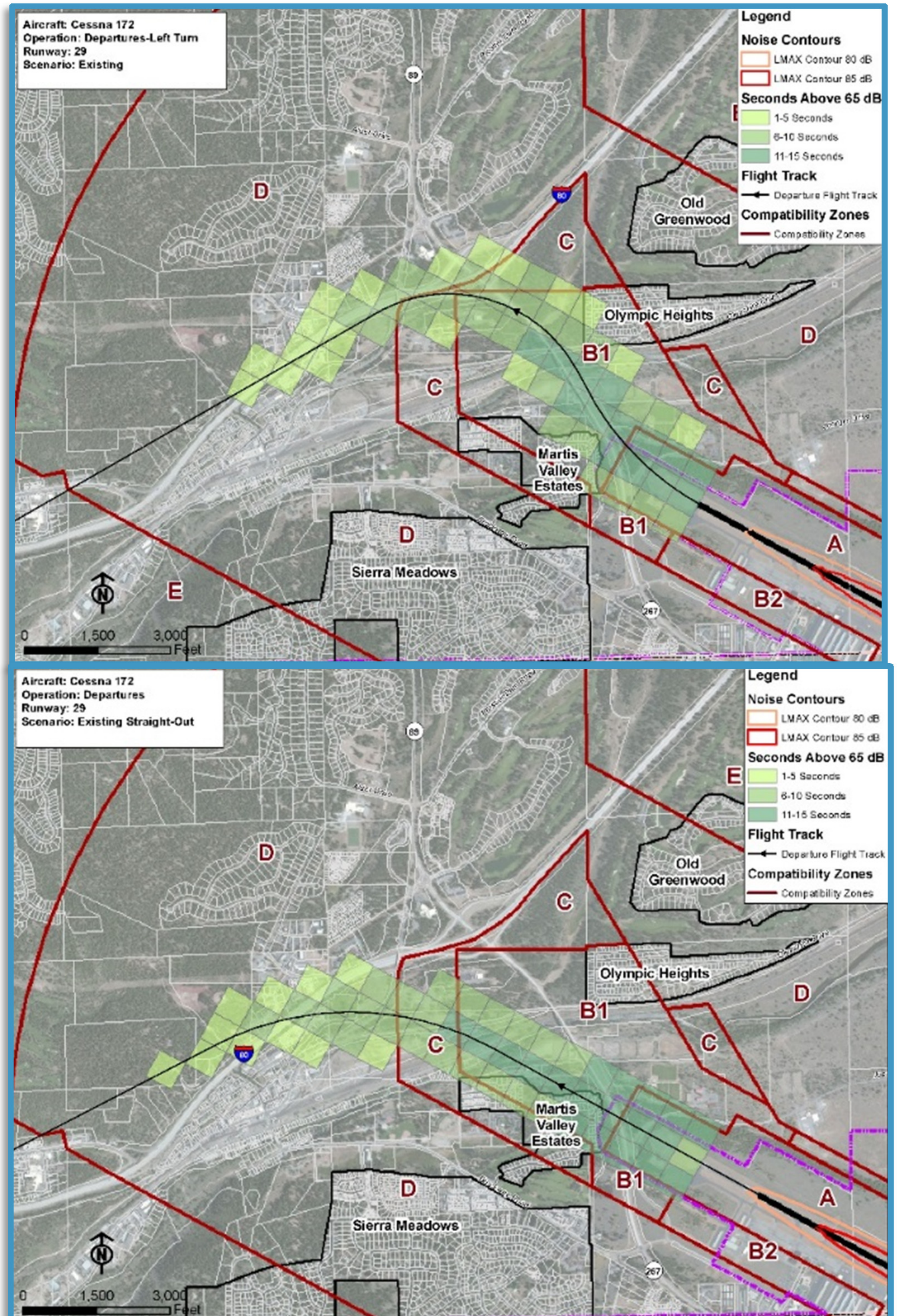


Figure 4-31 NOISE IMPACTS – CESSNA 172 DEPARTURE, CURRENT AND PROPOSED STRAIGHT-OUT

Closer examination of the proposed straight-out departure procedure reveals this would have no significant change on residences located directly west or northwest of TRK. It is anticipated that even with alternatives and policies recommended in the plan that focus on aircraft operations, there will still be impacts to residences directly west of Runway 11-29.

This plan recommends that TTAD continue to study and develop specific off-airport mitigation programs that will help further reduce annoyance impacts on these residences. Funding is advocated for a program(s) similar to what is currently in place for TTAD's open space property acquisition. It is recommended that TTAD focus primary mitigation efforts on residences in the area west of TRK within Zone B1 of the current airport land use compatibility plan. This area is shown in **Figure 4-32**.

To help mitigate impacts, TTAD may introduce the following:

- **Community Outreach Programs**
- **Home Sound Proofing Programs**
- **Land Acquisition Programs**

Developing off-airport mitigation policies would be consistent with FAA methodology for reducing community noise exposure. There are also advantages versus major runway changes: lower total cost, phased implementation, greater overall success, and fewer construction (runway) impacts.

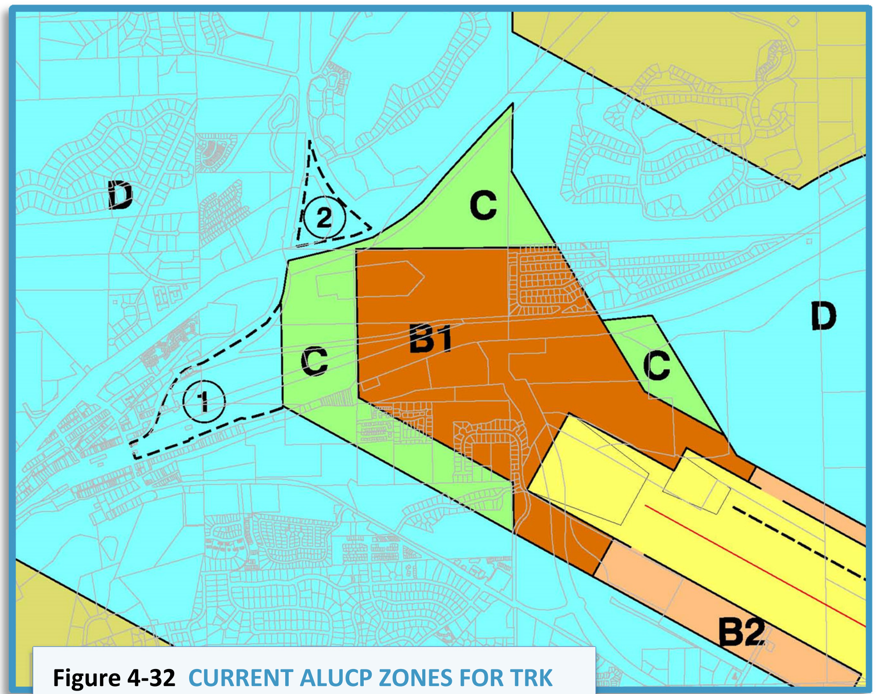


Figure 4-32 CURRENT ALUCP ZONES FOR TRK

3. TAXIWAY AND APRON CONCEPTS

Chapter 3 identified non-standard conditions on existing taxiways and taxilanes. Because the FAA's design standards are safety related, not activity driven, it is recommended that the TTAD perform the required upgrades. It should be noted that the FAA made significant changes to taxiway design standards in recent years. These changes most directly affect runway entrance / exit taxiway placement and taxiway orientation and intersections. The primary purposes of the changes are to 1) reduce the potential of inadvertent runway access and 2) simplify intersection directional choices. Proposed alignments that would bring taxiways and taxilanes up to standards are presented below.

3.1 Taxiway G Realignment

Parallel Taxiway G is too close to Runway 2-20. The standard centerline-to-centerline separation for runway design code (RDC) B-II is 240 feet. To comply with the standard, Taxiway G must be relocated 44 feet to the west. The realigned Taxiway G and object free area (TOFA) are illustrated in **Figure 4-33.**

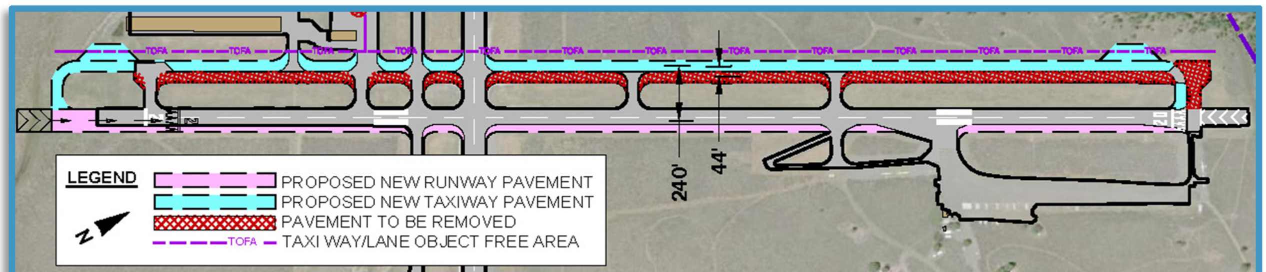


Figure 4-33 TAXIWAY G REALIGNMENT

3.2 Apron and Connector Taxiways

Chapter 3 identified non-standard conditions associated with several runway exit taxiways, specifically the acute angled exit Taxiways D and F and the length of Taxiways C and E. Acute angled exits are only to be used for high speed exits, but there is insufficient separation between Runway 11-29 and Taxiway A available to decelerate from high speed. Removing segments of Taxiways C and E reduces the potential for accidental runway incursion by forcing a turn between a parking apron and the runway. The realigned taxiways are presented in **Figure 4-34.**

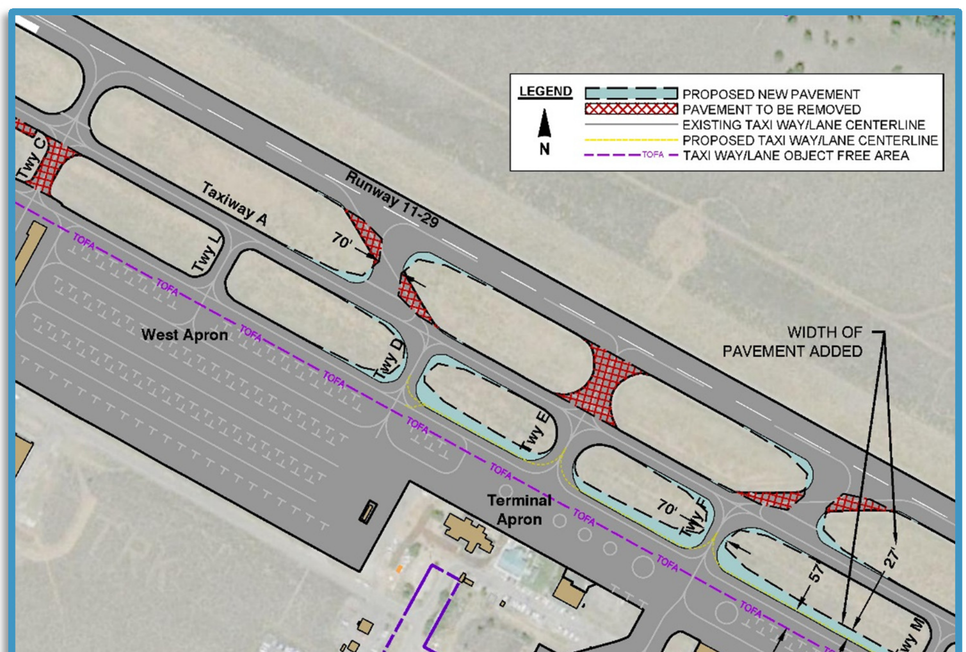


Figure 4-34 APRON AND CONNECTOR TAXIWAY IMPROVEMENTS

APRON TAXILANE AND PARKING POSITIONS

Chapter 3 revealed that aircraft parked on tie-downs on the terminal and east aprons penetrate the taxilane object free area. This creates a challenging situation for aircraft taxiing on the apron edge taxilane, especially during times of peak activity when the apron is full.

Expanding the apron edge closer to Taxiway A by adding a band of pavement approximately 27 feet wide from Taxiway D to Taxiway M allows the apron edge taxilane to shift closer to Taxiway A and away from the apron parking positions. This is acceptable because the distance between the apron edge taxilane and Taxiway A is greater than standard. The proposed concept of the apron edge taxilane realignment is shown in Figure 4-34.

4. ON AIRPORT LAND USE

Forecasts show minimal to moderate growth of aviation activity at TRK during the life of this plan. It is important to designate appropriate amounts and locations of land that will accommodate this growth. Surplus airport property, which is land not necessary to accommodate future aviation facilities, may be assigned for potential non-aviation uses and may be 'released' from federal conveyance or grant restrictions, if eligible. This section helps illustrate ultimate land use on airport property while considering future aviation related needs.

4.1 Development Suitability by Location

Numerous alternatives can be defined that will meet the various building area facility requirements. The purpose of the analysis that follows is to give some structure to the myriad of possibilities. Rather than attempting to identify a precise plan for development, the intent here is to establish a framework within which individual facility requirements can be accommodated over the lifespan of the Master Plan.

TRK has the advantage of having over 200 acres of land potentially usable for building area development with less than 20% of it built upon. Not all of this land is equal, however. To help assess which areas are best suited for what functions, **Figure 4-35** divides the building area into 10 blocks of land each having relatively uniform physical characteristics. **Table 4-3** lists the apparent development opportunities for each block together with the constraints and other design factors affecting the realization of those opportunities.

A review of Table 4-3 reveals that none of the land blocks is best for all things. Each offers development opportunities, but each also has significant constraints. Conclusions reached regarding the optimum usage of each block, both within and beyond the 12-year master planning time frame are as follows:

- **Block A (Existing core area aviation facilities)—**With excellent road and taxiway access, this location provides the core aviation facilities and services for based and transient aircraft owners and airport visitors and will continue in this capacity. The major portion of the area consists of aircraft parking apron and T-hangar buildings. There is likely a need to reconfigure parts of the apron layout to better accommodate larger aircraft, but for the most part the overall layout of Block A is expected to remain as is.
- **Block B (Adjacent to West Ramp)—**Lying between the existing aircraft apron and Soaring Way, this 22-acre block consists mostly of vacant land. The only present uses are for automobile rental and long-term parking. Its central location, high visibility, road access, utilities availability, and flat terrain make the site a prime candidate for future development, either aviation-related on nonaviation. Taxilane circulation through Block A would need to be modified to enhance the usability of this site for aviation-related uses, particularly ones involving large aircraft. Nonetheless, to the extent that the site is the best location for aviation-related development, such usage should have priority. If not fully needed for aviation-related functions, revenue-producing nonaviation development would be appropriate.

- **Block C (Southwest corner)—**Like Block B, Block C also provides an opportunity for expansion of the core aviation area or, alternatively, for nonaviation development. The site consists of approximately 36 acres of vacant, generally level land with good taxiway and road access. An important constraint is the site's proximity to the approach end of Runway 11—locations adjacent to runway ends have moderately high risks of aircraft incidents that warrant avoiding high-intensity uses. For this reason, many types of nonaviation development would be precluded.
- **Block D (Upper north side)—**While relatively flat, this linear 55-acre block has development constraints, most notably limited taxiway access, no adjacent road access, and no nearby utilities. However, acquisition of land north of the approach end of Runway 11 would bridge existing airport property to Joerger Drive, provide road access and increase the potential for aviation related use.
- **Block E (North bluff)—**This strip of land forms the edge of Blocks D and G, but differs in that it consists of steep, mostly wooded terrain. No development use is likely to be practical.
- **Block F (Lower north side)—**Sometimes referred to as the "North 40," this roughly 52-acre site is separated from the remainder of the airport by a 100-foot elevation difference created by the bluff in Block E. Aviation-related usage would be impractical. Nonaviation use is a possibility, but limited road accessibility and lack of utilities are significant impediments to most such uses.
- **Block G (Northeast corner)—**This block contains the sailplane apron and associated facilities, but is otherwise vacant. There are no defining features separating the area from Block H, the distinction is made for planning purposes. The sailplane facilities are expected to remain and could expand if the demand warrants, but no other uses are identified. Limited road access and utilities make most types of development difficult.
- **Block H (East side)—**This nearly 300-acre tract wraps around the approach end of Runway 29 and adjoins the approach end of Runway 2. Taxiway access is available to part of the area and it potentially could be suitable for future aircraft hangars if the demand should warrant as was once envisioned. Current planning assumes the area to remain as open space.
- **Block I (Runway 2 Approach and Hwy 267)—**This triangular 28-acre area has excellent road access, but limited taxiway access. The most suitable uses appear to be for nonaviation development. However, despite the flatness of the site, wetlands through the center are a constraint for future construction.
- **Block J (Airport Road / Hwy 267 Intersection)—**These three small parcels are airport-owned, but not contiguous to the remainder of the airport. Nonaviation usage is the only development possibility. The small size and irregular shape limits the options, however.

A key conclusion that can be gleaned from the preceding analysis is that essentially all of the reasonably foreseeable aviation-related development needs over the next 12+ years can be met within the airport's west quadrant (Blocks A, B, and C). Furthermore, substantial amounts of land can reasonably be made available for other purposes. The decisions to be made involve what types of development should go where, as well as what land would be best preserved in an undeveloped state.

Despite an ample amount of vacant acreage on the airport, there are competing demands for the prime land near the existing airport core area. At the center of this issue has been the debate over making land available for nonaviation development and, if so, where. Answering this question also means determining the amount of land likely to be needed in the foreseeable future for aircraft hangars and other aviation-related development and selecting the best locations for these uses.

Table 4-3 BUILDING AREA DEVELOPMENT SUITABILITY

BLOCK	LOCATION	POSITIVE FEATURES	DEVELOPMENT CONSTRAINTS
A	***Existing core area aviation facilities*** *(67.2 acres)*	▪ Excellent taxiway and road access ▪ Utilities available ▪ Continue as focal area for visitors by air and ground ▪ Primary area for based aircraft hangars and apron ▪ Existing FBO facilities	▪ Limited apron width on east end can restrict movement of some aircraft ▪ Minimal vacant land for FBO expansion and other facilities due to need for apron parking during peak operation times and snow storage during winter months
B	***Adjacent to West Ramp*** *(22.5 acres)*	▪ Location well-suited to extension of core aviation area (Block A) ▪ Soaring Way frontage suitable for nonaviation ▪ High-visibility site next to main airport entrance road ▪ Utilities already provided to site ▪ Flat site	▪ Existing functions on all sides limits expansion ▪ Competing potential uses, aviation and nonaviation ▪ FAA release required for nonaviation use
C	***Southwest corner*** *(35.9 acres)*	▪ Potential extension of existing core aviation area ▪ Suitable for nonaviation uses ▪ Good airfield access to eastern portion ▪ Good road access ▪ Utilities nearby, but not adjacent ▪ Flat site	▪ Taxiway extension needed for access to western half of site ▪ Existing hangar limits aircraft access to south side of area ▪ Utility extensions required ▪ Competing potential uses, aviation and nonaviation ▪ Safety-related compatibility constraints due to proximity to runway end (more so if Runway 11 approach end moved eastward) ▪ Soaring Way frontage not currently airport owned
D	***Upper north side*** *(55.6 acres)*	▪ Adjacent to primary runway ▪ Taxiway access on east edge ▪ Generally flat terrain	▪ Parallel taxiway required on south side for aviation use ▪ Difficult to provide road access ▪ No utilities ▪ West end not currently owned by Airport ▪ FAA release required for non-aviation use
E	***North bluff*** *(33.8 acres)*	▪ Separates airport from adjacent property	▪ Steep, wooded terrain, not suitable for development
F	***Lower north side (North 40)*** *(52.2 acres)*	▪ Generally flat terrain with minimal vegetation	▪ 100-foot elevation difference from airfield makes site unsuitable for aviation use ▪ Not adjacent to public road (1,000 feet across non-airport property to Joerger Drive) ▪ Access easement limitations ▪ No utilities
G	***Northeast corner*** *(64.4 acres)*	▪ Western side currently used for sailplane activities ▪ Adjacent to parallel taxiway for secondary runway ▪ Road access on eastern edge ▪ Generally flat terrain with minimal vegetation ▪ Undeveloped portions potentially suitable for aviation and nonaviation uses	▪ Distant from core aviation area ▪ Lengthy road access from Hwy 267 ▪ Martis Dam Road not open year-round ▪ Limited utilities ▪ FAA release required for non-aviation use
H	***East side*** *(284.7 acres)*	▪ Edges of area adjacent to parallel taxiways ▪ Road access on south and east sides ▪ Highly visible from adjacent roads ▪ Largest contiguous block of undeveloped land on airport ▪ Generally flat terrain with minimal vegetation	▪ Partly within runway approach ▪ Limited utilities availability on edges only ▪ Wetlands south of Runway 29 approach end and east of Runway 2 approach end
I	***Runway 2 Approach and Hwy 267*** *(27.7 acres)*	▪ Highly visible site adjacent to Hwy 267 and airport access road ▪ Utilities available along roads ▪ Suitable for nonaviation use	▪ Triangular shape with taxiway access only on one side ▪ Wetlands through center of site ▪ FAA release required for non-aviation use
J	***Airport Road / Hwy 267 Intersection*** *(9.9 acres)*	▪ Three highly visible sites adjacent to Hwy 267 and airport access road ▪ Utilities available along roads ▪ Suitable for nonaviation use	▪ Sites are relatively small and odd-shaped.

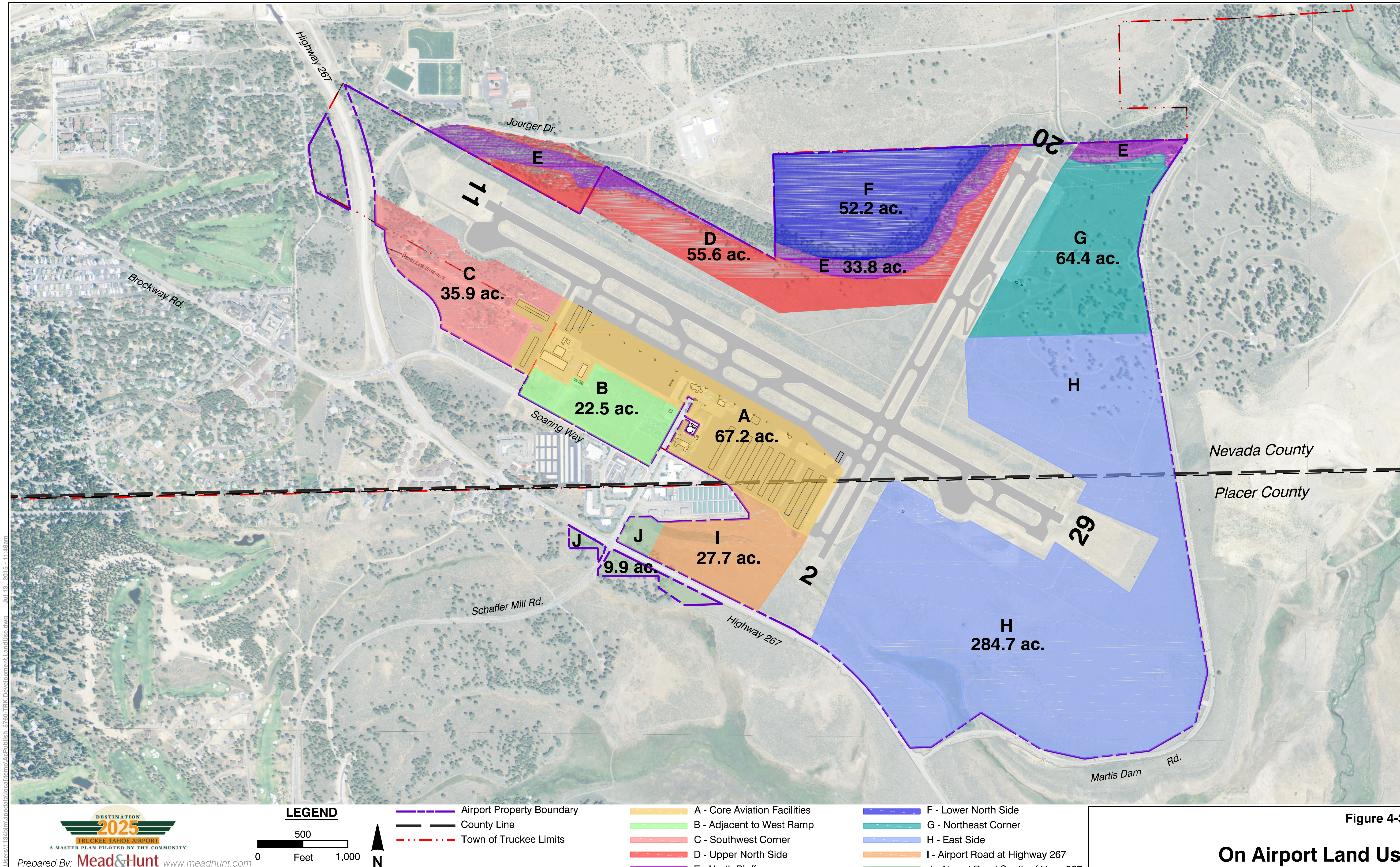


Figure 4-35

On Airport Land Use

Truckee-Tahoe Airport

Fig 4-35 (11x17)
Reverse Side

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4.2 *Hangars*

Hangar requirements were identified in Chapter 3. The forecasts in Chapter 2 indicate that the number of aircraft based at TRK is expected to increase during the planning period, dictating a need for 18 executive hangars. Hangars required to house these aircraft are proposed to be located on the west side of the airfield, west of the executive hangars in Row L. This area is best situated for hangar development because it has access to airfield pavements, it provides efficient aircraft movement, corresponds with other planned airfield development, and has access to existing roadways. The proposed layout of executive hangars is detailed in **Figure 4-36**. An additional six hangars are illustrated for a total of 24. This planning concept reserves additional land for hangars should demand for hangars outpace what is actually projected.

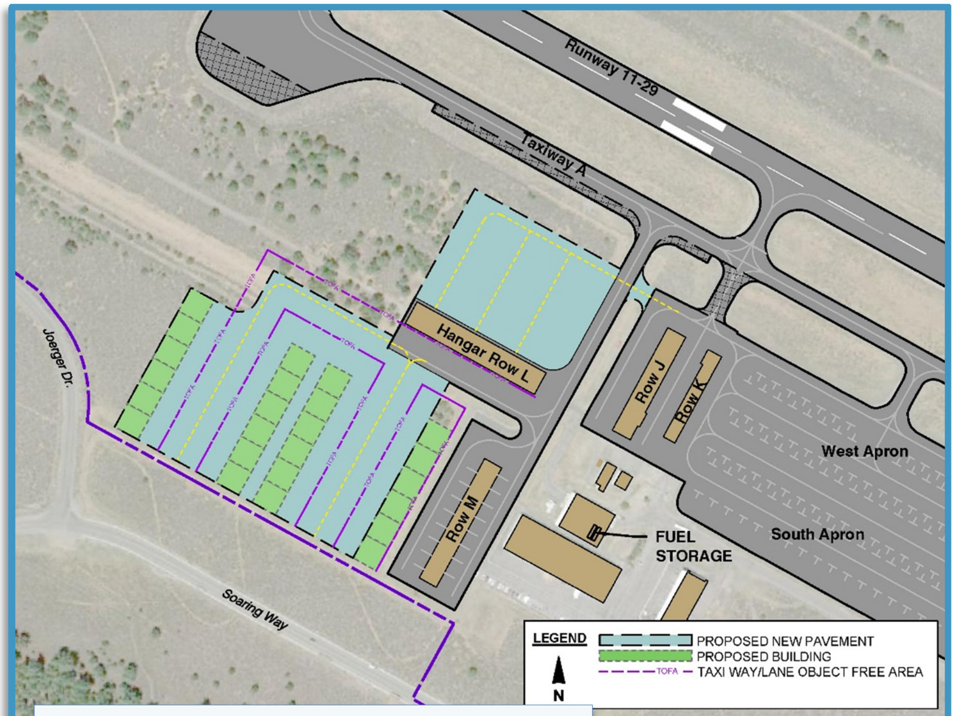

Figure 4-36 PROPOSED HANGAR LOCATIONS

4.3 *Multi-Use Hangar Location*

TTAD and community outreach indicated potential demand for a large executive hangar that could double as a structure to host community events. This multi-use hangar would be able to house aircraft during winter peak activity to shelter them from bad-weather conditions. Features of the multi-use hangar should include:

- **Capacity to hold multiple aircraft of different sizes that typically operate at TRK,**
- **Basic facilities to host community functions (kitchen, bathrooms, etc.), and**
- **Deicing capabilities (thermal, not chemical) may be included in the facility.**

Multiple locations were investigated for the multi-use hangar site. These are detailed on **Figure 4-37**. For planning purposes, a conceptual size of the hangar was determined to be 80' x 100'. An example of multiple aircraft parked within an 80' x 100' hangar is included in Figure 4-37.

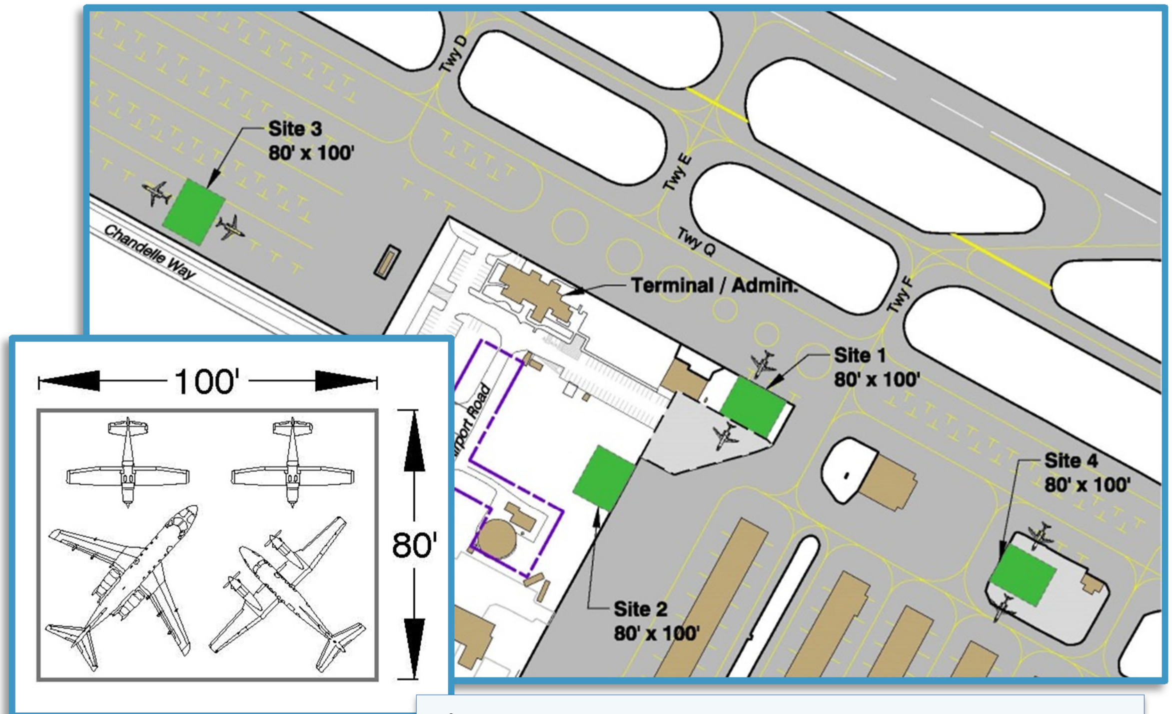

Figure 4-37 PROPOSED MULTI-USE HANGAR SITE OPTIONS

Table 4-4 Multi-Use Hangar Sites	
Site Location	**Site Features**
Site 1	Provides 'taxi-through' capabilities. Provides immediate access to roads and parking. Utilizes land near terminal apron.
Site 2	Provides immediate access to roads and parking. Utilizes land near terminal apron. Not able to accommodate taxi-through capabilities
Site 3	Provides 'taxi-through' capabilities. Immediate access to roads. Would displace existing tie-downs.
Site 4	Provides 'taxi-through' capabilities. Utilizes unused land near runway intersection. Poor access to roads and parking

TTAD and community outreach determined Site 1 was the best location. This site is near the administration building, offers direct access to the terminal apron, and has adequate landside access to Airport Road.

4.4 *Landside Access Concept*

Discussions with the TTAD board and the public at an open house session revealed a potential need to consolidate multi-modal transportation options at TRK. Today, there is a bus stop located on Truckee-Tahoe Airport Road. The transit-hub concept would expand this facility and consolidate rental car facilities. This would provide multiple options of access for people using TRK to fly in or out of the region. A conceptual transit facility with parking is exhibited in **Figure 4-38**.

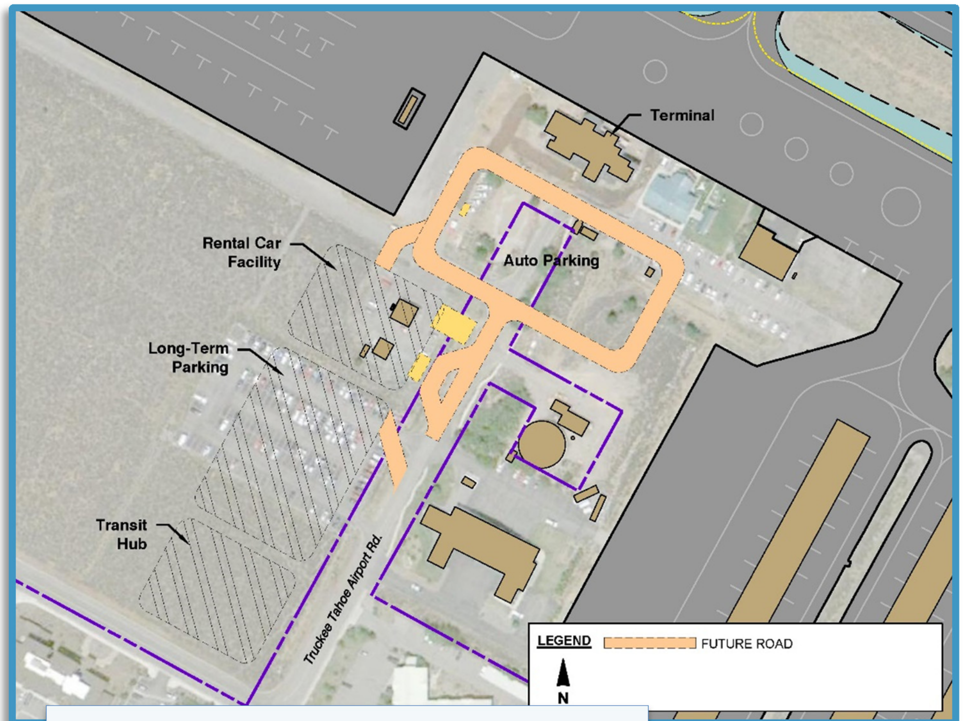

Figure 4-38 CONCEPTUAL TRANSIT-HUB FACILITY

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MASTER PLAN

Chapter 5

Adoption & Implementation

MASTER PLAN

CHAPTER 5 # Adoption and Implementation

1. OVERVIEW

This chapter addresses how the master plan projects and strategies can be implemented. The first section of this chapter presents a proposed Capital Improvement Program (CIP) and actions required to be taken in conjunction with the Master Plan approval are discussed. This includes short-term environmental impacts and the noise contours associated with operations projected in Chapter 2. Lastly, potential sources available to Truckee Tahoe Airport District (TTAD) for funding these improvements are presented. This chapter (and master plan) should be viewed as a planning tool and does not mandate action by the TTAD Board of Directors.

To help determine what projects the airport should focus on in the future, the TTAD conducted a comprehensive outreach program throughout the master plan process. Many comments, concepts, and ideas were received, considered, and in many cases incorporated into the master plan. It is acknowledged that the master plan is not inclusive of all comments received. More than 3,300 comments were received from the Master Plan Workshops, Godbe survey, and online surveys. This input is summarized in the Master Plan Community Outreach Summary Report and is included in Appendix A of this master plan. The TTAD values this information and is committed to continue utilizing the public outreach information received. Many of the ideas, if not captured in the master plan may be found in the TTAD Strategic Plan, Capital Facility Plans, Forest Management Plans, Trails Master Plan, and other guiding documents produced and maintained by TTAD. These documents can be found on the TTAD's website at www.truckeetahoeairport.com or by contacting the TTAD directly.

2. CAPITAL IMPROVEMENT PLAN

The recommended master plan projects and 11-year project schedule are detailed below. The listed projects include the proposed improvements as described in previous chapters as well as recommended major maintenance work for the airfield, most of which has been previously programmed by TTAD. The total anticipated investment over the next 11 years is approximately $25.3 million with a local contribution of about $12.8 million. The remaining $12.5 million would likely be eligible for Federal Aviation Administration (FAA) grant funding. Depending upon funding availability, demand, unanticipated events, requirements of other capital funding plans (CFP) and other factors, some of the short-range projects could slip into the mid ranges, or vice-versa.

The timing of individual improvements listed in the CIP is based upon the forecasts presented in Chapter 2. It is important to emphasize, though, that the general sequence of development indicated in the CIP is more significant than the precise timing. The actual timing of major improvements will be driven by demand and the TTAD Board of Directors, not by the calendar. If the growth rate of projected aviation activity is not realized, then each phase of development would extend over additional years. On the other hand, demands for construction of certain facilities could arise more quickly than the staging plan anticipates. Other factors that could affect timing and implementation are demands of the community outreach initiatives, forest management CFP, utilities CFP, facilities CFP, and the pavement management plan.

Projects listed are grouped into two phases of development matching the time horizon of this Master Plan:

- **Short-term (within 5 years – 2015-2019)**
- **Mid-term (approximately 5 to 11 years – 2020-2025)**

Figure 5-1 depicts the ultimate airport vision with the location of each of the proposed major improvements and the anticipated time frame of construction. Figure 5-1 includes long-term projects (executive hangars) identified in this master plan that are expected beyond 2025, but not included in the CIP.

2.1 Short-term (0-5 Years) Improvements

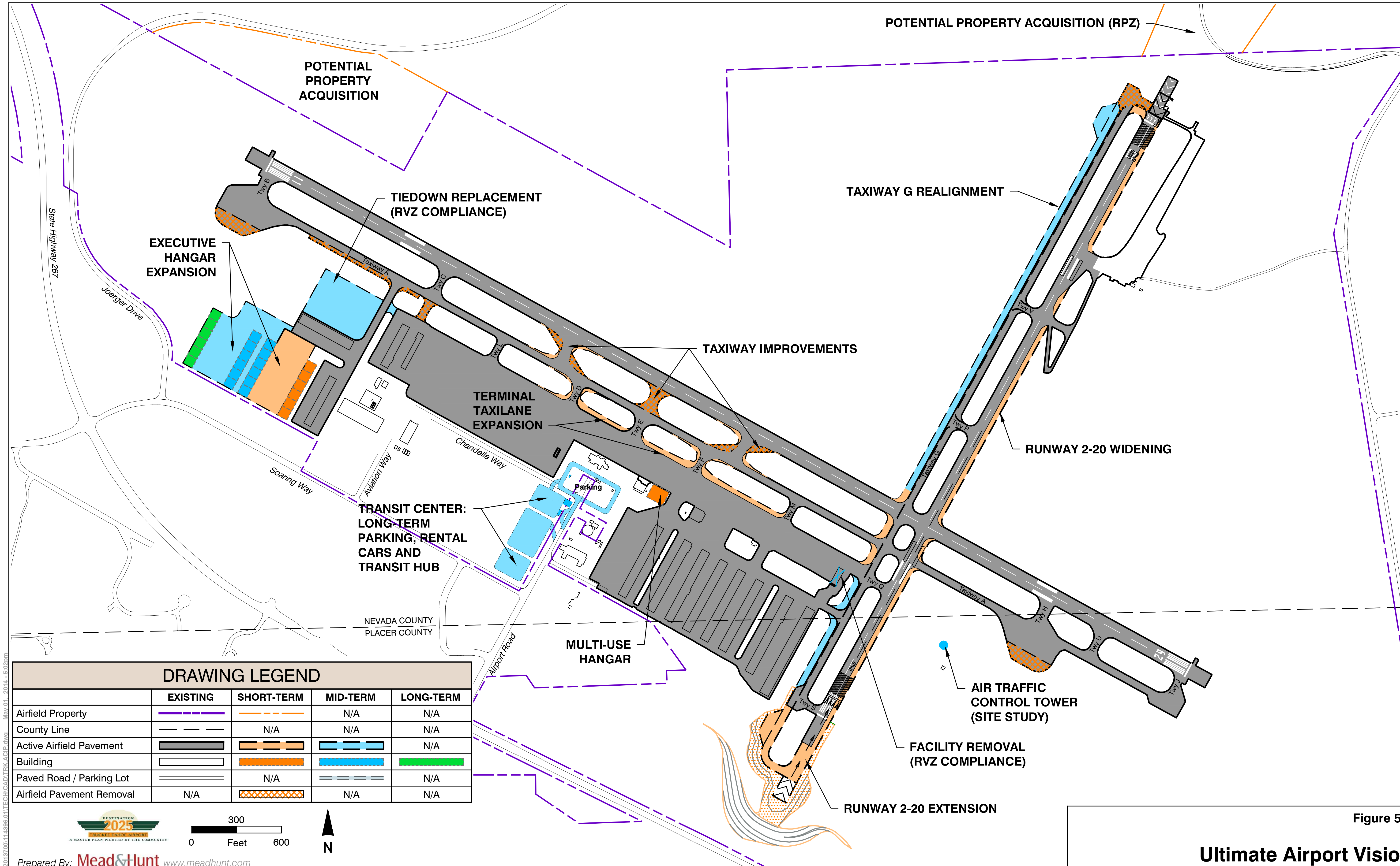
The projects highlighted for inclusion in the next 5 years are projects discussed in Chapter 4 of this master plan report and summarized here.

MULTI-USE HANGAR

The addition of a multi-use hangar facility near the administration building is proposed. The facility is intended to meet the needs of the airport for aviation uses and, when not needed for those purposes, would also be available for community activities. A separate study was commissioned to evaluate the potential size and cost of this facility. A further study is being performed.

TEMPORARY/SEASONAL AIR TRAFFIC CONTROL TOWER

A temporary air traffic control tower (ATCT) is proposed to be acquired, leased or rented and potentially used during peak operation times at the discretion of the TTAD Board. A temporary tower is a model unit that can be moved around and stored at the airport.



DRAWING LEGEND

	EXISTING	SHORT-TERM	MID-TERM	LONG-TERM
Airfield Property			N/A	N/A
County Line		N/A	N/A	N/A
Active Airfield Pavement				N/A
Building				
Paved Road / Parking Lot		N/A		N/A
Airfield Pavement Removal	N/A		N/A	N/A

Figure 5-1

Ultimate Airport Vision

Truckee Tahoe Airport

Fig 5-1 (11x17)
Reverse Side

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OFF-AIRPORT PROGRAMS

Various methods to help reduce noise impacts near the airport were discussed in the Alternatives Chapter. Among the off-airport programs the TTAD may consider to reduce noise are:

- **Community Outreach Programs**
- **Home Sound Proofing Programs**
- **Land Acquisition Programs**

The exact process and program TTAD may consider should be vetted by the Board and landowners before implementation. The exact funding timeline for this varies depending on the type of program and scale.

PROPERTY ACQUISITION

Two parcels of land are proposed for potential acquisition. One parcel is located north of the approach end of Runway 11, near Joerger Road. Acquisition of this parcel would serve two purposes. The first is to provide landside access to the north side of Runway 11-29, should demand for aviation development expand to this side of the runway. The other reason is more immediate: acquiring this parcel will help the airport limit growth of vegetation that may penetrate critical airspace surfaces near the approach to Runway 11.

The other parcel is land located within the runway protection zone (RPZ) at the approach end of Runway 20. FAA policy strongly encourages fee simple acquisition of land within RPZs. Airport control of this land is considered necessary to limit any potential development, especially non-conforming land uses.

TERMINAL TAXILANE EXPANSION

As discussed in the Facility Requirements Chapter, the Terminal Apron edge taxilane is located too close to aircraft parked on the apron. Adding approximately 20 feet of pavement to the edge will shift the taxilane away from the current parking area and provide adequate wingtip clearances.

TAXIWAY IMPROVEMENTS

Taxiways C, D, E and F each provide direct apron to runway access, and Taxiways D and F are at 45 degree angles from the runway. Each of these configurations are no longer standard and it is proposed that pavement be removed to correct this. This project should be undertaken when rehabilitation work is required on each taxiway. Additionally, Taxiways D and F are proposed to be increased to 70 feet in width since a portion of Taxiway E is proposed to be eliminated. As part of these improvements and the terminal taxilane expansion, proper fillets will be constructed to allow for larger aircraft to make turns on the realigned taxiways.

RUNWAY 2-20 EXTENSION AND WIDENING

Lengthening and widening of Runway 2-20 to the south is the preferred runway modification to help enhance safety and usability or runway by projected fleet mix. This project would require a significant amount of fill to extend the runway to the south. Another major element of this project is relocating electrical conduit and lights to offset the new runway edge, including a new precision approach path indicator (PAPI) to replace the existing visual approach slope indicator (VASI) on Runway 20. Included in this project are two sections of Taxiway G: the southerly extension to the new approach end of Runway 2 and realignment near the intersection of Runway 11-29. It was determined to be advantageous to realign a section of Taxiway G at this time near the runway intersection, since this work (within the runway safety areas) will require closure of both runways for a short amount of time.

EXECUTIVE HANGAR EXPANSION

Phasing of hangar construction is proposed based on forecasts for based aircraft in Chapter 2. The recommended size of each hangar is 60 or 65 feet square. Hangars are proposed to be built in three phases based on projected demand from the forecasts: 6 in short-term, 12 in mid-term, and 6 more in long-term. Before the TTAD moves forward with executive hangar construction, a cost modeling and revenue study is recommended.

2.2 *Mid-term (5-11 Years) Improvements*

The projects selected for inclusion that are expected to occur in 5 to 11 years' time (through 2025) were chosen from the critical projects identified in this master plan report and through an evaluation of the airport's current CIP.

TAXIWAY G REALIGNMENT

Realigning Taxiway G to 240 feet from Runway 2-20 (centerline to centerline) will be required as aircraft activity increases on Runway 2-20 and the runway design codes changes to B-II.

FACILITY REMOVAL

The area at the east end of the East Apron near the runway intersection currently contain aircraft tie-down parking and a building. These objects are located within the runway visibility zone, which needs to be clear of all fixed or movable objects.

TIE-DOWN REPLACEMENT

Tie-downs and aircraft parking on the East Apron that need to be removed for RVZ compliance are anticipated to be relocated to a new apron, west of the existing West Apron. This apron will also provide additional tie-downs to accommodate aircraft during peak operations.

TRANSIT CENTER

A transit center is proposed that will include an expanded rental car facility, public transportation hub, and short and long-term parking with a potential automobile parking lot. This facility will be located on Truckee-Tahoe Airport Road in the vicinity of the present long-term parking lot.

SEASONAL AIR TRAFFIC CONTROL TOWER

A permanent air traffic control tower (ATCT) was proposed as part of alternative analysis to help assist pilots and potentially help decrease overflight of residences. This ATCT would likely be operated seasonally, but would have potential to be operational year-round depending on TTAD direction. A basic, preliminary site selection was performed as part of this master plan. The optimum site was identified as being near the existing automated weather observing system (AWOS) facility, southeast of the runway intersection and outside of the runway visibility zone. A complete line-of-sight study is recommended as part of ATCT design, if the TTAD decides to construct a permanent tower.

2.3 *Other Airfield Improvements*

RUNWAY 11-29 REHABILITATION

In 2012, Runway 11-29 was reconstructed from the approach end of Runway 11 to Taxiway G, and the remaining portion (Taxiway G east to Runway 29 approach) was reconstructed in 2009. The runway is expected to remain in good condition through the life of this master plan, with rehabilitation tentatively scheduled for 2026.

OTHER PAVEMENTS REHABILITATION

Future pavement enhancement projects include (in order of anticipated need):

- **Reconstruction of Taxiways B, C, D and H**
- **Reconstruction of Aprons A3 and A4 (Terminal Apron)**
- **Reconstruction of Runway 11-29 East Blast Pad**
- **Rehabilitation of Taxilanes near Hangar Rows A through H and warehouse area**
- **Reconstruction of Taxiways A, E, F, H, U and J**

2.4 *Cost Estimates*

The proposed 11-year CIP for projects presented in this master plan are detailed in **Table 5-1** below. Projects listed are new projects analyzed in this master plan, and not all projects are FAA grant eligible. Table 5-1 is a planning tool to help guide the TTAD Board of Directors and airport staff in decision making. It does not guarantee funding, projects, timelines, or long-term priorities and may be updated annually by the TTAD to reprioritize projects.

The project costs listed in the CIP represent order-of-magnitude estimates in 2014 dollar values and include design engineering and other related cost contingencies. The estimates are intended only for preliminary planning and programming purposes. More detailed engineering design and, in some cases, market analysis should be performed before proceeding with projects.

DESTINATION 2025 TRUCKEE TAHOE AIRPORT
A MASTER PLAN PILOTED BY THE COMMUNITY

Table 5-1 Master Plan Projects and Airport Capital Improvement Plan (ACIP) Summary [1]					
Year [2]	Project	Description	Total Cost	Federal Share[3]	Local Share
2015	Multi-Use Hangar	Construction (60%)	$1,740,000	N/A	$1,740,000
	Community Outreach	Off Airport Alternatives – General Programs	$100,000	N/A	$100,000
	Land Acquisition	Off Airport Alternatives – General Programs	$200,000	N/A	$200,000
	2015 TOTALS		**$2,040,000**	**$0**	**$2,040,000**
2016	Multi-Use Hangar	Construction (40%)	$1,160,000	N/A	$1,160,000
	Executive Hangars	Feasibility Study and Market Analysis	$30,000	N/A	$30,000
	Community Outreach	Off Airport Alternatives – General Programs	$100,000	N/A	$100,000
	Land Acquisition	Off Airport Alternatives – General Programs	$200,000	N/A	$200,000
	2016 TOTALS		**$1,490,000**	**$0**	**$1,490,000**
2017	Airport Property Acquisition	Rwy 11 Approach Protection and Rwy 20 RPZ	$200,000	$180,000	$20,000
	Executive Hangar Taxilane	Executive hangar taxilane (east) – Design	$100,000	$90,000	$10,000
	Executive Hangars	Six 60' x 60' hangars – Design	$150,000	N/A	$150,000
	Community Outreach	Off Airport Alternatives – General Programs	$100,000	N/A	$100,000
	Land Acquisition	Off Airport Alternatives – General Programs	$200,000	N/A	$200,000
	2017 TOTALS		**$750,000**	**$270,000**	**$480,000**
2018	Executive Hangar Taxilane	Executive hangar taxilane (east) - Construction	$1,160,000	$1,044,000	$116,000
	Executive Hangars	Six 60' x 60' hangars – Construction	$1,500,000	N/A	$1,500,000
	Runway 2-20 Improvements	Runway extension and widening – Design	$400,000	$360,000	$40,000
	Terminal Taxilane Expansion and Taxiway Improvements	Add taxiway pavement at terminal apron edge. Removal of non-standard connectors – Design	$50,000	$45,000	$5,000
	Community Outreach	Off Airport Alternatives – General Programs	$100,000	N/A	$100,000
	Land Acquisition	Off Airport Alternatives – General Programs	$200,000	N/A	$200,000
	2018 TOTALS		**$3,410,000**	**$1,449,000**	**$1,961,000**
2019	Runway 2-20 Extension and Widening	Runway 2-20 extension and widening – Construction	$4,990,000	$4,491,000	$499,000
	Terminal Taxilane Expansion and Taxiway Improvements	Addition of new taxiway pavement along the terminal apron and demolition of existing taxiway connectors – Construction	$534,000	$480,600	$53,400
	Community Outreach	Off Airport Alternatives – General Programs	$100,000	N/A	$100,000
	Land Acquisition	Off Airport Alternatives – General Programs	$200,000	N/A	$200,000
	2019 TOTALS		**$5,824,000**	**$4,971,600**	**$852,400**
2020 – 2025	Environmental Assessment	Taxiway G, Apron and hangar taxilanes	$150,000	$15,000	$135,000
	East Apron Facility Removal	Runway visibility zone compliance	$60,000	$54,000	$6,000
	Air Traffic Control Tower	Line of site / location study and design	$80,000	N/A	$80,000
	Taxiway G Realignment	Reconstruct – Design	$290,000	$261,000	$29,000
	Taxiway G Realignment	Reconstruct – Construction	$3,163,000	$2,846,700	$316,300
	Apron (Tie-Down Relocation)	General aviation apron and taxilanes on west side of airport – Design	$170,000	$153,000	$17,000
	Apron (Tie-Down Relocation)	General aviation apron and taxilanes on west side of airport – Construction	$2,145,000	$1,930,500	$214,500
	West Hangar Taxilane	West hangar taxilane - Construction	$975,000	$585,000	$390,000
	Executive Hangars	12 60' x 60' hangars – Design and Construction	$3,000,000	N/A	$3,000,000
	Community Outreach	Off Airport Alternatives – General Programs	$600,000	N/A	$600,000
	Land Acquisition	Off Airport Alternatives – General Programs	$1,200,000	N/A	$1,200,000
	2020 – 2025 TOTALS		**$11,833,000**	**$5,845,200**	**$5,987,800**
	2015 – 2025 GRAND TOTAL		**$25,347,000**	**$12,535,800**	**$12,811,200**

1. Table 5-1 is a planning tool to help guide the TTAD Board of Directors and airport staff in decision making. It does not guarantee funding, projects, timelines, or long-term priorities. Table may be updated annually to reprioritize projects. All costs are in 2014 $.
2. Fiscal Year is October 1 - September 30; indicated year is the calendar year in which the fiscal year ends.
3. N/A – Federal funding not applicable to this project. Assumes project is not AIP eligible.

3. MASTER PLAN ADOPTION PROCESS

3.1 FAA Coordination

It is expected that the level of coordination between the TTAD and the FAA will increase significantly within the first two years following the adoption of the master plan. This coordination will be necessary in order to ensure maximum FAA funding of grant eligible projects.

3.2 Environmental Impacts

Only a limited evaluation of environmental factors has been conducted as part of this Master Plan study. The focus has been on how the airport affects the surrounding community through impacts such as noise. On-site environmental constraints such as the presence of wetlands have also been taken into account in the plan development. These factors are noted in the alternatives discussion in Chapter 4.

A comprehensive assessment of the environmental impacts associated with implementation of the Master Plan will be required in accordance with California Environmental Quality Act (CEQA) guidelines prior to when the plan is formally adopted by the TTAD Board. Modifications to this draft plan may result from that analysis as well as from the public review process of both the draft plan and the CEQA document. Based on the types of airport improvements that are contemplated and the environmental analyses done to date, it is anticipated that an Initial Study and Mitigated Negative Declaration will suffice for CEQA purposes and that adoption of the Master Plan will not necessitate preparation of a full Environmental Impact Report (EIR).

Among the topics that will require special attention in the Initial Study are the following:

- **Noise Impact Analysis: New noise contours and other data describing the noise impacts associated with proposed airport improvements have been prepared as part of the Master Plan study and will need to be brought forward into the CEQA document. Please see Noise Contours Section below.**
- **Sensitive Habitats: Field surveys will be required to identify and map wetlands and other sensitive habitats occupied by protected plant and animal species within areas proposed for new construction.**
- **Cultural Resources: Areas affected by proposed development will need to be surveyed for the presence of historic and prehistoric cultural resources.**
- **Air Quality Impacts: Calculation of emissions from existing and projected aircraft operations will be required and their significance determined. Greenhouse gasses will also be evaluated.**
- **Traffic Impacts: To the extent that aviation-related and non-aviation facility improvements indicated in the Master Plan may generate additional vehicular traffic, the impacts on nearby roads and intersections will need to be examined.**
- **Relationship to Local Plans: The relationship to, and any potential conflicts with, the general plans of Nevada and Placer counties and the Town of Truckee should be described. Additionally, the Master Plan will trigger a need to update the airport land use compatibility plan for the airport as outlined in the next section. The nature of these changes should be described in the CEQA document.**

NOISE CONTOURS

Airport noise contours are developed using the computer program the Integrated Noise Model (INM). The INM is developed by the FAA and is the standard model for computer analysis of aircraft noise. Detailed operational data is required for input into the INM for the program to generate the contours. This data includes specific aircraft fleet mix and number of operations for each, time of day that aircraft operate, runway use percentages, and the dispersal of flight tracks - the paths aircraft use when approaching or departing a particular runway. This detailed information is provided in Appendix B.

Noise generated by the operation of aircraft to, from, and around an airport is generally measured in terms of cumulative noise levels of all aircraft operations. Cumulative noise level metrics provide a single measure of the average sound levels in decibels for any point near an airport when exposed over the course of a day (in this case, an average day during the peak month of operations). A variety of cumulative noise level metrics have been formulated to provide a single measure of continuous or multiple noise events over an extended period of time. The standard metric used in California to measure noise from aircraft is the Community Noise Equivalent Level (CNEL) metric. The CNEL metric recognizes that frequent medium-intensity noise events are more bothersome than less frequent high-intensity noises events.

The CNEL penalizes any activity which takes place in the evening (7:00 PM – 10:00 PM) and nighttime (10:00 PM – 7:00 AM) by increasing the decibel level by 5 and 10 decibels, respectively. Since the decibel scale uses a base-10 logarithm, each nighttime operation is equivalent to 10 daytime operations. The rationale for this adjustment is based on the reduced ambient noise at these times, and thus the increase in sensitivity to the human ear. This increase in sensitivity creates a perceived notion that aircraft are louder and more disruptive at night.

CNEL and Lmax Single Event Definitions

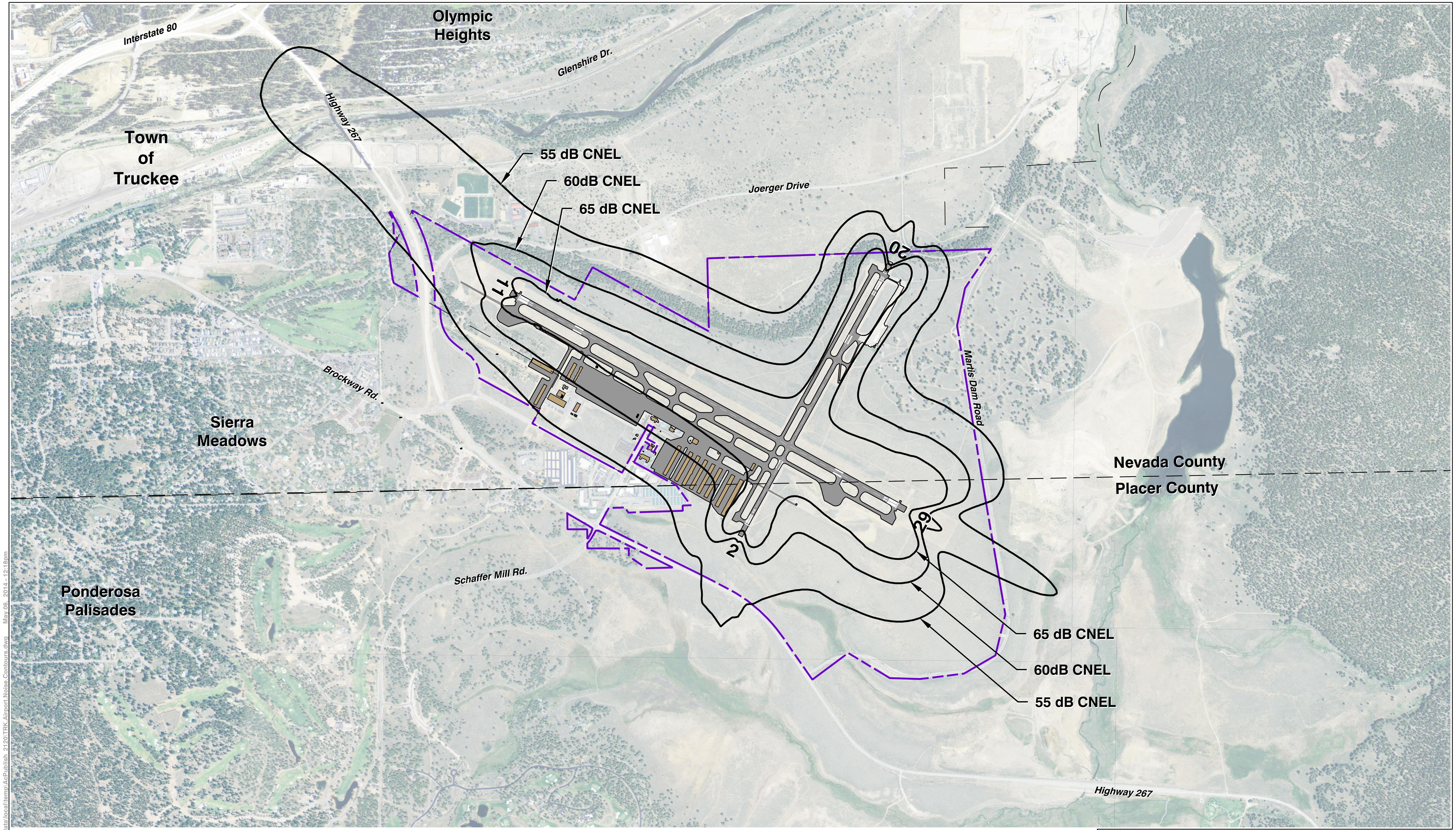
Lmax (maximum sound level). This is the loudest sound measured at a location during an aircraft's operation. It is useful for determining detectable noise changes. A 3 dB increase in Lmax is "barely perceptible," while a 5 dB increase in Lmax is "clearly perceptible."

Community Noise Equivalent Level (CNEL). Day Night Average Sound Level (DNL) is the standard Federal metric for determining cumulative exposure of individuals to noise. In 1981, FAA formally adopted DNL as its primary metric to evaluate cumulative noise effects on people due to aviation activities. DNL is the 24-hour average sound level in decibels (dB). This average is derived from all aircraft operations during a 24-hour period that represents an airport's average annual operational day.

While DNL is the primary metric FAA uses to determine noise impacts. FAA accepts the CNEL when a state requires that metric to assess noise effects. Only California requires use of CNEL; Like DNL, CNEL adds a 10 dB penalty to each aircraft operation between 10:00 PM and 7:00 AM, but CNEL also adds a 5 dB penalty for each aircraft operation during evening hours (7:00 PM to 10:00 PM). This evening noise penalty accounts for people's sensitivity to noise during evening hours when they may be outside and fewer noise producing activities occur.

The CNEL contour is the required metric in California for airport land use compatibility plans (see next section), plus the FAA recognizes CNEL as the primary metric to determine noise impacts in California past and present research by the Federal Interagency Committee on Noise (FICON) verified that the CNEL metric provides an excellent correlation between the noise level an aircraft generates and community annoyance to that noise level (FAA Environmental Desk Reference for Airport Actions, Chapter 17, pages 1 and 2). For these reasons, CNEL contours were generated and presented here. Noise contours were modeled for three scenarios at the airport:

- **Base Year (2013): This scenario shows 2013 aircraft activity on the existing runway configuration. These contours are illustrated in Figure 5-2.**



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LEGEND
- Airfield Property
- Truckee Town Limits
- County Line
- Noise Contour

Figure 5-2
Noise Contours: Base Year (2013)
Truckee Tahoe Airport

Fig 5-2 (11x17)
Reverse Side

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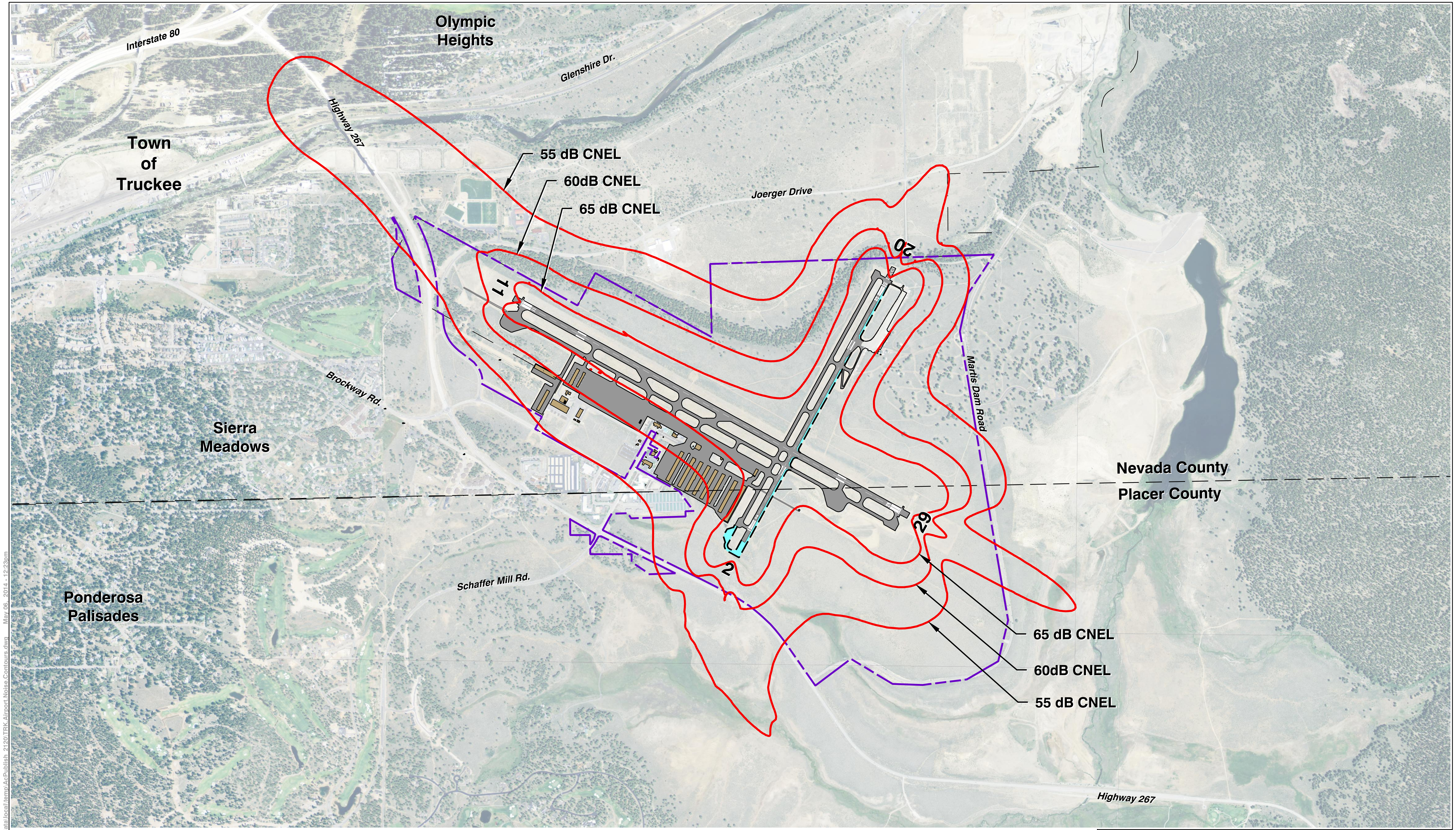

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LEGEND
- Airfield Property
- Truckee Town Limits
- County Line
- Runway Extension
- Noise Contour

Prepared By: Mead&Hunt www.meadhunt.com

Figure 5-3

Noise Contours: Extend Runway 2-20 (2025)

Truckee Tahoe Airport

Fig 5-3 (11x17)
Reverse Side

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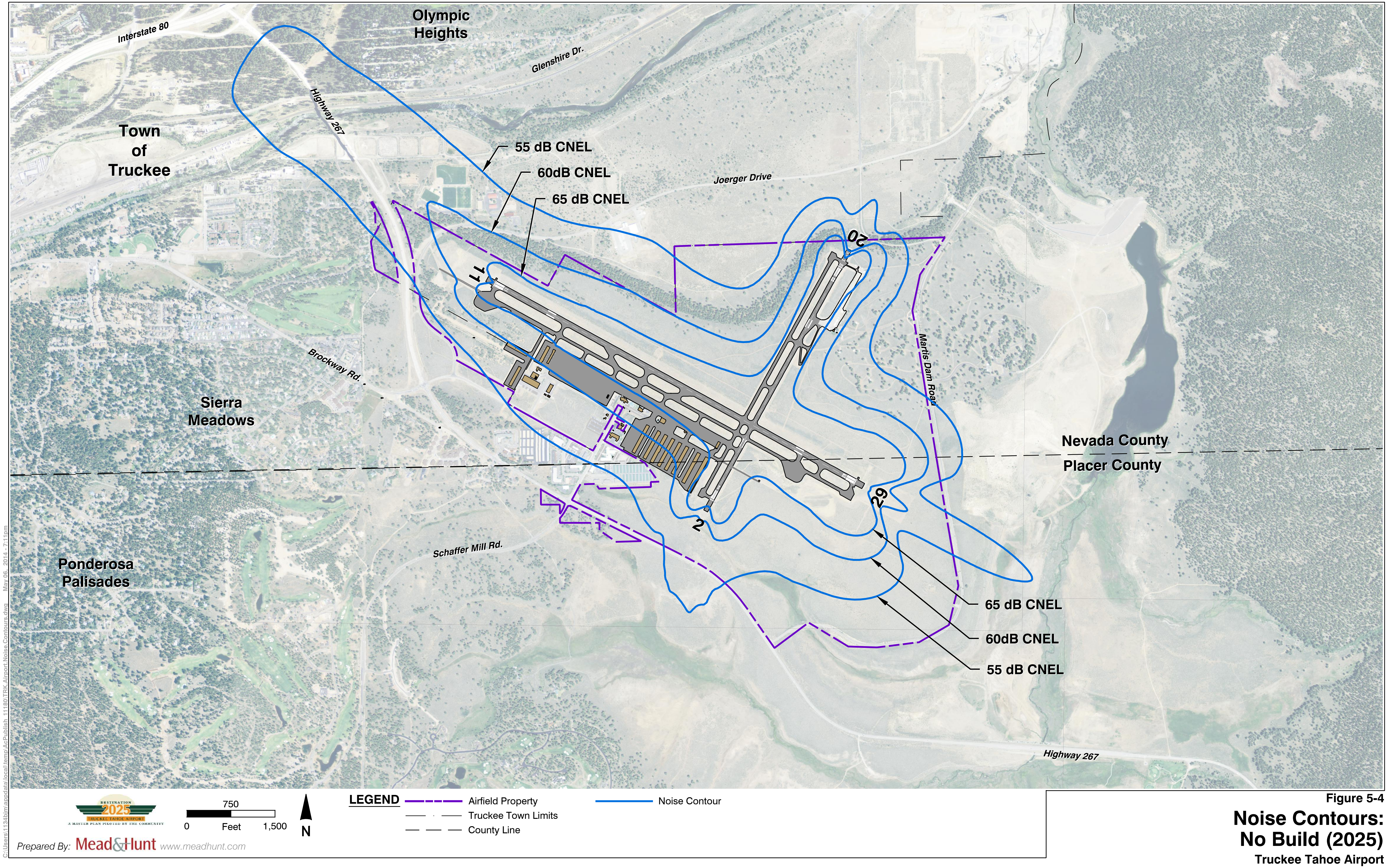

Figure 5-4
Noise Contours: No Build (2025)
Truckee Tahoe Airport

Fig 5-4 (11x17)
Reverse Side

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- **Extend Runway 2-20 (2025): Contours for this scenario represent noise from 2025 activity on the future runway configuration. This scenario assumes the runway utilization changes projected in Table 4-1 in the Alternatives Chapter. Extend Runway 2-20 scenario contours are presented in Figure 5-3.**
- **No Build (2025): This scenario also shows 2025 activity, but on the existing runway configuration. Without the extension to Runway 2-20, runway use percentages do not change from 2013. The No Build scenario contours are shown in Figure 5-5.**

The 55, 60 and 65 dB CNEL contours are illustrated in each Figure. The CNEL noise contours in these Figures represent an average day of noise during the peak summer month – July. Please see Table 2-24 in the Forecast Chapter for more data on peak summer operations. Detailed INM input data can be view in Appendix B.

Analysis performed in Chapter 4 on runway extension and off-airport noise impacts use a supplemental metric to quantify noise: single event Lmax contours. Definitions for CNEL and Lmax are provided in the sidebar on page 5-10. Someone observing a CNEL contour versus an Lmax contour will notice the significant difference in size. This is because the noise metrics measure two distinctly different actions: Lmax is noise exposure from a single flight (arrival or departure), while CNEL is the cumulative measure of noise exposure over a day. An analogy to help understand this is single event Lmax is an indication of the current weather, while CNEL is like the climate.

3.3 Airport Land Use Compatibility Planning

California state law (Public Utilities Code Section 21670 et seq.) requires local preparation of an airport land use compatibility plan (ALUCP) for essentially all public-use and military airports in the state. In most counties, this obligation rests with a countywide airport land use commission (ALUC) which has responsibility for all of the airports in the county. Truckee Tahoe Airport (TRK) is unique among airports in the state in that it physically straddles the boundary between two counties, Nevada and Placer. As enabled by the law, an ALUC with representation from both counties has been established to conduct compatibility planning solely for TRK. Staff for the ALUC is provided by the Nevada County Transportation Commission (NCTC).

The relationship between an airport master plan adopted by the airport owner and the ALUCP adopted for the same airport by the ALUC is circular. The ALUCP is required to be based upon a plan adopted by the airport owner—generally a master plan, but sometimes just an airport layout plan drawing. Additionally, the ALUCP must reflect the anticipated growth of the airport during at least the next 20 years. Typically, this means that activity forecasts must be adjusted as appropriate to extend them to the required time horizon. An ALUC, though, cannot assume changes in airport features or role that are not contemplated by the airport owner.

What makes the relationship circular is that, prior to adoption by the airport owner, a new master plan must be referred to the ALUC for a determination as to its consistency with the ALUCP. If the master plan proposes changes to the airport that differ from the assumptions on which the previously adopted ALUCP was based, an inconsistency will occur. To resolve this circularity, ALUCs often will find a master plan consistent with the ALUCP on the basis that the ALUCP will be updated in the near-term to be based upon the new master plan. The master plan must clearly identify the physical or operational changes that will necessitate modification of the ALUCP. Also, to the extent that these changes result in greater off-airport noise or safety impacts than had been indicated in the ALUCP, the master plan must identify what measures will be taken to mitigate those impacts.

Several facets of the present Truckee Tahoe Airport Master Plan place it in this situation. The current ALUCP for the airport was adopted by the ALUC in December 2004. (At that time, the multi-county Foothill ALUC, staffed by the Sierra Planning Organization, served as the ALUC for seven airports, including TRK.) The 2004 ALUCP was based upon the Truckee Tahoe Airport Master Plan adopted by TTAD in October 2000 and amended in December 2001. That Master Plan includes a variety of features having off-airport land use compatibility implications which are changing or are no longer being included in the present Master Plan. Among these differences are:

- **Continuation of the primary runway (now 11-29 but then designated 10-28) as a runway design code (RDC) B-II facility rather than upgrading it to category C-II. The latter requires greater set-back distances around the runway and larger runway protection zones.**
- **Elimination of a new 5,650-foot runway proposed to parallel the existing primary runway.**
- **Elimination of a turf 2,000-foot runway proposed to parallel the crosswind runway (2-20) for use by sailplanes.**
- **Upgrading Runway 2-20 to RDC B-II in the future.**
- **Eliminating the proposed instrument approach to Runway 29.**
- **Reduction in projected aircraft operations in the future.**

4 FUNDING SOURCES

There are a variety of resources from which funding and financing for general and commercial aviation airport facilities and improvements can be obtained by airport sponsors. These resources include federal grants, state financial assistance, bonds, airport sponsor self-funding, and private investment.

4.1 Federal Aviation Administration Grants

Currently, the most common source of federal aid for public airport facilities is the Airport Improvement Program (AIP) administered by the FAA. The current AIP is the latest evolution of a funding program originally authorized by Congress in 1946 as the Federal Aid to Airports Program (FAAP). The AIP is based upon a user trust fund concept, allocating aviation-generated tax revenues for specified airport facilities on a local matching share basis. For small primary, reliever and general aviation airports, the program currently provides for 90 to 95 percent federal participation (based on statutory requirements) on eligible airport projects.

Under the AIP, there are both entitlement and discretionary grants. There are two types of entitlement grants in the current program: one for general aviation airports and one for commercial service airports. TRK qualifies for entitlement funding under the general aviation airport classification. The airport is currently eligible for $150,000 in annual entitlement funds. Discretionary grants are awarded by the FAA on a competitive basis based upon need. Only under very specific circumstances may entitlement or discretionary grant funds be used to develop revenue-producing facilities.

4.2 Passenger Facility Charges

In addition to AIP funding, commercial airports controlled by public agencies are permitted to collect a Passenger Facility Charge (PFC) of up to $4.50 for every boarded commercial passenger. Since TRK is not a commercial airport in this sense, PFC revenues cannot be collected or used at the airport.

4.3 State Aviation Grants and Loans

Grants and loans from the California Department of Transportation Division of Aeronautics fund projects for safety, maintenance, and capital improvements at airports and also fund the preparation of airport land use compatibility plans, when such funds are available.

4.4 Caltrans Division of Aeronautics Grants

The Division of Aeronautics operates several grant programs similar in concept to the Federal AIP program:

State Annual Credit Grant: General aviation airports such as TRK are eligible to receive a $10,000 annual credit grant. These funds can be used for airfield maintenance and construction projects, as well as airfield and land use compatibility planning. It is possible to accumulate these funds for up to five years.

AIP Matching Grant: This is a state grant designed to assist an airport sponsor in meeting the local match for an AIP grant from the FAA. In the past, the state provided approximately half of the sponsor's AIP matching amount (about 5% of the total grant). However, due to state's fiscal constraints, state AIP matching grant funds are limited.

Acquisition and Development (A&D) Grant: This grant program is designed specifically for the "acquisition and development of airports." The grants are subject to allocation by the California Transportation Commission (CTC). Grants typically range between $20,000 and $500,000 annually for a given airport. The match rate has been 90 percent state and 10 percent local, although the match rate has varied between 10 and 50 percent at CTC's discretion. However, due to the state's current fiscal constraints, the state has been unable to fund the majority of acquisition and development projects in recent years.

4.5 State Loan Program

The Division of Aeronautics also administers a revolving loan program. Two types of loans are available: Revenue Generating loans and Matching Funds loans. These are typically low-interest loans, repayable over a period not to exceed 25 years. Loans from this program are discretionary and are available to provide funds to match AIP grants or develop revenue-producing facilities (e.g., aircraft storage hangars, fueling facilities, utilities, etc.) on GA airports. No local match is required for a state loan. The interest rate for these loans is based on the most recent issue of State of California bonds sold prior to approval of the loan. Despite the state's current fiscal constraints, state loans to airports remain available for qualifying projects.

4.6 Other Grant Programs

Airport projects can also sometimes qualify for grant funding from non-aviation sources. Although not commonly available, airports have received grants from a variety of federal and state programs, including: economic development, community development, and rural infrastructure.

4.7 Bonds

Bond funds are a potential source of revenue to support development of larger projects. Those projects with a reliable revenue stream (e.g., paid parking lots and tenant space in the terminal) are the most likely candidates for bond funding. Where suitable projects exist, airports are sometimes able to participate in bonds being issued by local or regional agencies for other non-airport projects.

Since TTAD is a California special district with taxing power, it is able to issue bonds in two varieties: general obligation bonds that use tax revenue to repay debt service requirements, and revenue bonds that repay bond holders from revenue generate by a specific project (rather than tax dollars).

4.8 Commercial Loans

Although uncommon, commercial loans have been used to fund some airport development projects. Typically these would be revenue-generating projects such as a fuel system or hangars.

4.9 Airport Sponsor Self-Funding

At many general aviation and commercial service airports, sponsor self-funding is provided by a combination of airport-generated income and retained earnings. Funding of airport improvements that are not grant eligible and providing the local matching share for grants-in-aid from these sources are the simplest and often most economical methods because direct interest costs are eliminated. TTAD receives revenues from taxes collected on property in the District. The revenue generated is then directly reinvested in the airport, by upgrades to aviation related or community related facilities.

4.10 Private Investment

Private sector investment is an important source of funding for some types of airport improvements. Private developer funding may be used to construct infrastructure improvements to support such revenue-producing facilities as aircraft storage hangars, fixed base operator facilities, and commercial/industrial real estate development. To date, TTAD has not used private funding for aviation-related improvements. In the future, however, this source may be worth investigating for large facilities such as corporate hangars or non-aviation development.

The most common sources of funding for private sector development are commercial lending institutions and insurance companies. In the case of private development on public lands, these types of financing may be difficult and expensive to obtain because the borrower can encumber only the improvements as loan collateral, not the land itself. As a consequence of this, many developers enter into agreements with private investors for the funds needed to develop their facilities.

MASTER PLAN

Appendix

Appendix A. **Master Plan Community Outreach Summary**

MASTER PLAN

TRUCKEE TAHOE AIRPORT DISTRICT MASTER PLAN UPDATE PROCESS

MAY 2013

Community Outreach Summary Report

DESTINATION 2025
TRUCKEE TAHOE AIRPORT
A MASTER PLAN PILOTED BY THE COMMUNITY

DESTINATION 2025
TRUCKEE TAHOE AIRPORT
A MASTER PLAN PILOTED BY THE COMMUNITY

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Table of Contents

This community outreach report serves as one of the critical elements informing the update of the Truckee Tahoe Airport master plan, a guiding document for the future of the airport.

1. About This Report

Master Plan Outreach Committee, February 2013

Introduction

This document summarizes the results of the Truckee Tahoe Airport master plan outreach process, a master plan piloted by the community that took place between December, 2012 and May, 2013. The process utilized a variety of strategies including community workshops, meetings with community organizations, a website and an online survey. This report summarizes the key themes that came out of the input process.

This report will serve as one of the critical elements informing the update of the Truckee Tahoe Airport master plan. Additionally, this report will be used as a benchmark thoughout the master plan update process to ensure that the future direction set for the Truckee Tahoe Airport District is aligned with community values.

It seems that the Truckee Tahoe Airport is really trying to work with the community to get some genuine input and to be community friendly.

-Online survey comment

Background Info

The purpose of a master plan is to create a road map for future planning of the airport. Elements included in an airport master plan traditionally include the following:

- Growth: Airport role and activity forecast
- Airfield design to meet growth and forecast
- Building area development
- Environmental and financial considerations

The current master plan for the Truckee Tahoe Airport District was created in 1998 and no longer serves as an appropriate guide for the future of the airport. The new master plan process, kicked-off in December of 2012, is divided into two distinct phases:

Phase 1

Comprehensive Community Outreach (December 2012 - May 2013): This phase will focus on soliciting input from all communities in the District on the future of the airport. A total of eight open houses and one wrap-up meeting will take place between April and May.

Phase 2

Technical Investigations (June 2013 - November 2013): Information obtained during the outreach phase will be used to identify future needs, alternatives for accommodating those needs, and plan documentation. Final plan documents will include a "Decision Document" depicting the phased development and rationale.

Committees & Process

Master Plan Outreach Committee

In December 2012, TTAD staff and Board members invited a wide range of stakeholders to participate in the Master Plan Outreach Committee (MPOC) to assist with making the process as broad and inclusive as possible. The 27 MPOC committee members met two times, in February and March, and assisted with guiding the design, materials and publicity strategies for the workshop series. Specifically, the MPOC was effective in helping the team understand what questions to ask of the public that would be meaningful both to participants and the master plan developers.

Ad-HOC Master Plan Committee

In addition to the MPOC, an Ad-Hoc Committee comprised of TTAD Board, staff and consultants was formed to run the day-to-day aspects of the outreach process.

Outreach Process

Between January and May 2013, over 500 people from around the Region participated in the community outreach process for the update of the airport master plan via eight public workshops and/or the online survey. The workshops were held in seven different neighborhoods through the District to ensure maximum participation. The various public outreach methods are described in Chapter 3 of this report. The public responses confirmed the importance of a number of key issues critical to planning for the unique aspects of the Truckee Tahoe Airport. These topics include:

Land use
Non-aviation development
Open space
Flight paths
Emergency services & safety
Community benefits
Annoyance mitigation
Runways
Aviation services & development
Community facilities
Future growth

We would like to thank the community for providing us with feedback; it was clear that many submissions involved considerable thought and time.

-Kevin Smith, General Manager, Truckee Tahoe Airport District

Next Steps

MAY 2013
Community outreach summary report presented to TTAD Board of Directors

JUNE 2013
- Board Workshop:
  Review of key findings in community outreach summary report/additional categorization of input/ pilot survey/discussion (open to public)
- TTAD Board Meeting:
  Review of Priorities Based on Community Outreach Summary Workshop

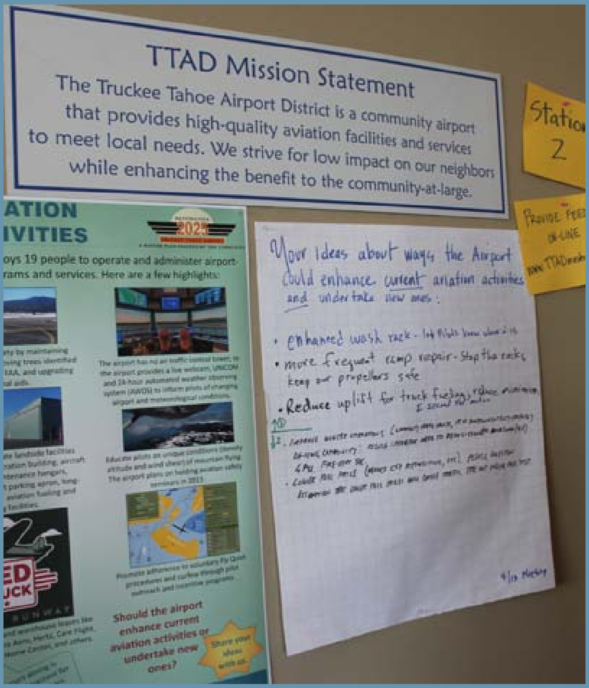
JUNE - AUGUST 2013
Mead & Hunt draft 3-4 alternatives for update of master plan

OCTOBER - NOVEMBER 2013
- Public outreach
- Board decision on preferred alternative

2014
Environmental studies of preferred alternative

SUMMER 2014
Board adoption of final master plan

2. What People Said



8

community workshops

190

community members attended workshops

3,200

survey comments

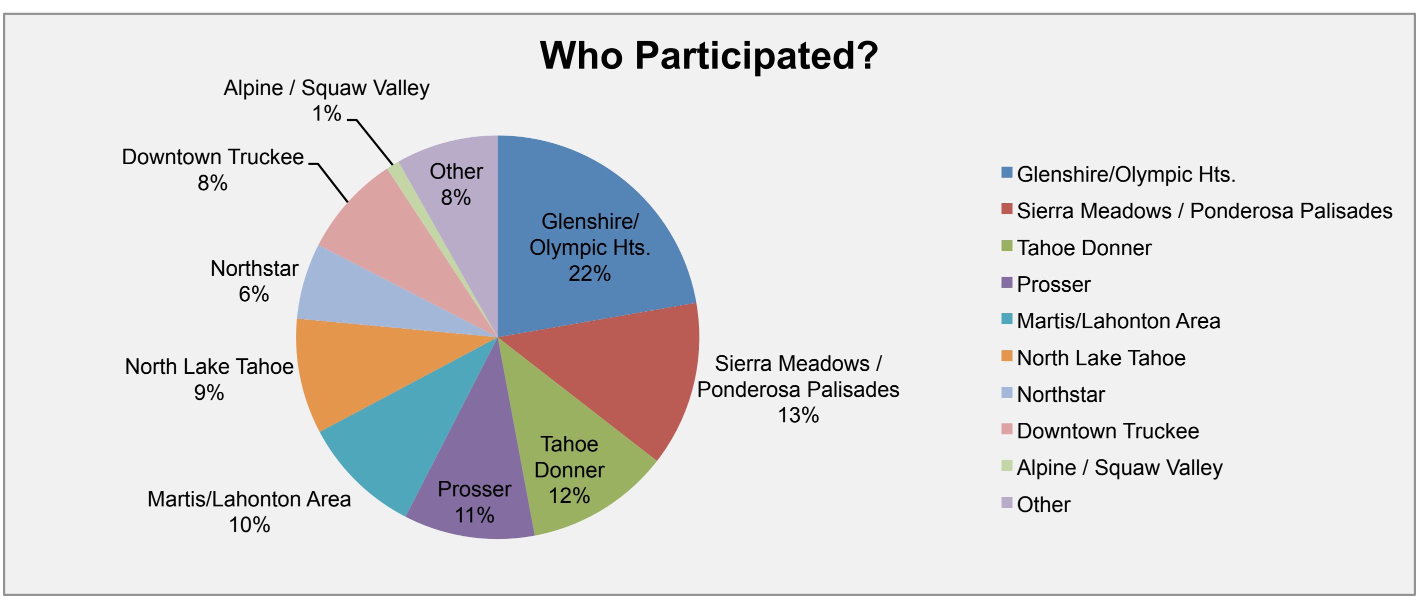
Focus on Themes

Based on community response from the eight workshops and 311 online surveys as well as meetings with various service and neighboring agencies, a number of themes emerged on the topics being examined as part of the master plan update process.

Following is a summary of the key themes that emerged from the Spring 2013 community outreach effort. The goal of the outreach process was to collect as many ideas as possible on the key topics associated with the update of the master plan. Over 3,000 survey comments were reviewed and categorized according to 15 categories. Pages 10 & 11 outline the top themes that emerged in each of the 15 areas from both the surveys and open houses. To review the complete set of comments from both the open houses and survey, please go to the Appendices document.

WHO PARTICIPATED

Community outreach participants represented the far reaches of the TTAD boundaries from Donner Summit to the West Shore of Lake Tahoe and Kings Beach to Prosser Lakeview, Glenshire and Northstar. Of the 311 surveys submitted, 73% stated that they were full-time residents and 26% second homeowners. We estimate that about 80-85% of the participants were community members and about 15-20% of the participants were pilots.



Themes

WHAT PEOPLE LIKE ABOUT TTAD

The top themes that arose from this question from both the open house and online survey responses were as follows:
• Community benefit programs and support for community (events, outreach, facility use)
• Open space programs (around airport, other acquisitions)
• Terminal/Facility (kids playground, new building, Red Truck)
• Operations/Access/Size/Location (close to town, easy to fly in and out, small/rural size, airport operations)
• Leadership/Organization (staff, well run, Board, friendly)
• Economic benefits to the region

CONCERNS ABOUT TTAD

Over 40 people listed that they had no concerns. However, there were three top concerns that surfaced from the open house responses as well as the online survey as follows:
• Noise (air traffic, concentration of flights in corridors, jets)
• Growth (more noise, development at airport, changing what they currently like)
• Anti-pilot sentiments (limits on growth, spending on aviation, expanding services)
(Note: Noise and growth were the top concerns with a far smaller number of participants listing the anti-pilot sentiments as their main concern.)

GROWTH

Participants were asked to state their preference for growth at the Airport based on four options:
1. Stay local
2. Accommodate natural growth
3. Pursue business jet & turboprop activity
4. Investigate limited airline service (commercial)

The overwhelming majority listed the option of accommodating natural growth consistent with aviation and community demand (#2) as their top choice. In other words, they are okay with some growth at the airport.

SPENDING PRIORITIES

Here are the top ideas people had for ways TTAD should prioritize spending, once funds are set aside to run a safe, efficient airport:
• Community benefits/programs
• Open space
• Education programs (scholarships, STEM, aviation club, vocational, Sierra College)
• Improve airport facilities
• Reduce costs
• Annoyance mitigation programs

GENERATING NEW REVENUE

This question was asked only on the survey, not in the open houses. A majority of responses indicated that it was not the role of the airport to focus on generating revenue. A few respondents suggested the following ideas:
• Build more hangars
• Lease land to private entities
• Host events

AVIATION ACTIVITIES

The majority of respondents stated that the airport should continue moving forward with enhancements. Top ideas for enhancements include:
• Expand/Enhance Fly Quiet/Pilot Education/Annoyance mitigation programs
• Enhance support for community and education (shared-use hangar, on-site facilities, land-leasing, aviation education programs/flying club for youth and adults)
• Expand/Enhance Restaurant (longer hours/weekends, more options)
• Enhance/Expand Hangars (build more, improve current, de-icing, shared-use)
• Enhance Runways (expand, improve, shift)

LAND USE

Here are the top ideas people had for how TTAD should use the approximate 611 acres of undeveloped land around the airport:
• Keep as open space
• Use land for recreation (trails, sports fields, indoor rec., camping)
• Enhance facilities for emergency services
• Provide for non-profit/community based entities (transportation hub, museum, library, farming, recycling)
• Build joint-use hangar
• Lease land for private development opportunities

COMMNUNITY BENEFITS

The survey results indicated that 100% of respondents like the current community programs currently in place. The following indicates the top community benefit programs shared from both the survey and open houses:
• Community programs (on & off airport)
• Community facilities (at airport)
• Educational programs (scholarship, STEM)
• Recreation and trails
• Conservation and open space
• Annoyance mitigation programs
• Focus on Airport facilities as priority over community programs

Themes (continued)

ANNOYANCE MITIGATION

Participants were asked to comment on the impacts of the airport to them today as far as air flight annoyance. Options were as follows: 1) Not annoyed, 2) Feel community benefits outweigh annoyance,
3) Feel annoyed by aircraft, 4)Feel annoyance has decreased because of current mitigation and outreach programs.

Based on both survey results and workshop dot input, the majority answered that they are not annoyed by traffic and secondly, community benefits outweigh the annoyance their current experience. Some acknowledged that noise is still an issue for them. There were over 50 narrative comments on various topics related to annoyance mitigation that were also submitted that can be viewed in the Appendices document.

FLIGHT PATHS

Participants were asked to comment on preferences as far as flight path scenarios. Two options were presented as well and opportunity for sharing new ideas. The two options for flight path options were: 1) concentrated flight paths or 2) dispersed flight paths. Both survey and workshop results showed about 50/50 support for each option.

This split was mirrored at the workshops as well. Over 60 comments were submitted along with the preferences above. Comments included ideas about arrivals, departures and specific flight paths over neighborhoods. All comments can be viewed in the Appendices document.

ANNOYANCE MITIGATION OPTIONS

TTAD asked for feedback on several annoyance mitigation options that are currently being explored. These options include: 1) Discouraging night operations, 2) Mandatory night curfew, 3) Pilot incentives, 4) Volunteer home acquisition program (purchasing homes in sensitive areas), 5) Lengthen runways to increase aircraft altitude over neighborhoods, 6) Air traffic tower. The themes that were the most popular were: lengthening runways, discouraging night operations, mandating night curfews, and enhancing incentives for pilots. The volunteer home acquisition program idea as well as the tower were not as favorable as the other options. Along with preferences, 55 other comments were submitted and can be viewed in the Appendices document.

AVIATION SPECIFIC THEMES

There were several aviation specific topics that were presented at the workshops aimed at getting feedback from pilots as well as the community interested in these areas. Below are the themes that came out of these areas. Plans are currently underway to conduct a follow-up survey to pilots on these and other related topics to gather additional feedback. A summary of this pilot-focused mini-survey will be shared with the Board in June and used in the development of master plan alternatives.

RUNWAY SCENARIOS

Between the options of 1) Lengthening / reconfiguring runway 22/29, 2) Widening runway 2/20, and 3) Creating a new runway the majority preferred the first option, lengthening / reconfiguring the runway. This question was not asked in the survey but over 70 people commented by placing dots on option 1.

HANGAR DEVELOPMENT

The options presented at the open houses were: 1) Lease land for private hangar development, 2) Develop shade hangars, 3) Develop multi-use hangars, 4) Develop box/executive hangars. The majority (3 & 4) preferred the multi-use and executive hangars over the other two options.

OTHER PILOT SERVICES

The following outlines feedback on pilot service topics.
- Enhanced Facility Development (washracks/de-icing hangar): Supported
- Enhanced on-ground radio coverage with Oakland Center on all areas of airport: Supported
- Visual vertical guidance on Runway 29: Supported
- Enhanced UNICOM and traffic advisory services: Supported
- Mountain Ridge weather reporting station: Supported
- Investing in a high level repeater for AWOS: Supported
- Air traffic control tower: Not Supported

The Board's goal was to get broad public input on how the airport can best serve the region now, and in the future.

-Mary Hetherington,

TTAD Board President

We wanted the input process to be highly interactive and to collect as many ideas as possible. ***-Jim Morrison, TTAD Board Member***

3. Community Outreach Program

GOAL OF OUTREACH

Due to the open-ended, conversation-style approach to the workshops, and the narrative characteristics of the online survey, the methodology used to evaluate general themes in key areas was qualitative rather than statistically relevant in any way. The goal of the outreach was to listen to the public, collect ideas and review the input for apparent themes that could then be used by decision-makers to drive the update of the master plan.

WORKSHOP METHODOLOGY

During a two-week period, more than 190 people at eight different workshops provided feedback. The workshops worked as both a forum for educating participants about the District and collecting valuable feedback on key topics. There were five stations that offered information and an opportunity for feedback. Truckee Tahoe Airport District staff, board and Airport Community Advisory Team members were on hand, to answer questions, help direct people to various stations and to provide as neutral as possible information about the display boards.

Approach

Clarity

Maximize Involvement

Open

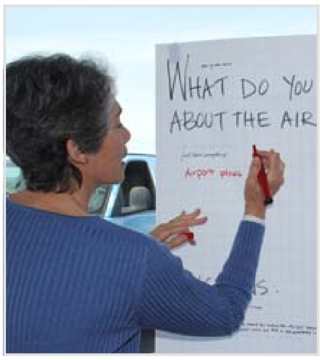
Listen

Design for range of

Understanding

Fun

How Feedback Was Gathered



Narrative Input

Open-ended format

- What do you like about the airport?
- What are your concerns?
- Your ideas on current aviation activities and enhancements
- Your ideas about funding/spending activities
- Ideas about community benefits
- Comments about annoyance mitigation
- Ideas about growth
- Ideas about land use

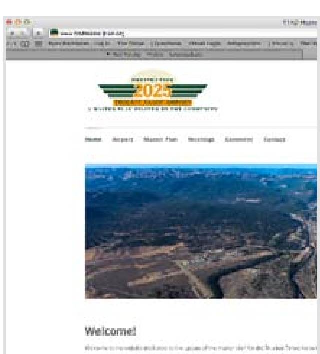
Dot Input

- Where do you live ?
- How are you associated with the airport?
- Yes or No choice
- Which of the following annoyance mitigation initiatives would you like TTAD to investigate?
- Which runway scenarios do you prefer?
- Your ideas about growth
- Which of the following development options for the airport do you like best?
- Which flight path scenarios do you prefer?
- Which hangar options do you prefer?

Survey

Online survey using SurveyMonkey and 3,000 comments

The online survey garnered over 300 responses during a six-week time frame. The same questions asked at the workshops were asked on the survey. SurveyMonkey was used for the survey and was posted as a link on the TTADmasterplan.org website. The MPOC committee helped with outreach to various community networks to get the word out about the online survey. Survey respondents were asked to pick multiple choice answers as well as to submit narrative responses to most of the questions. To review the survey results, go to Appendix B.



Master Plan Website

www.ttadmasterplan.org

A website was established to provide information, meeting schedules, an online survey, and will serve as a tool to collect ongoing feedback over entire master plan time frame.

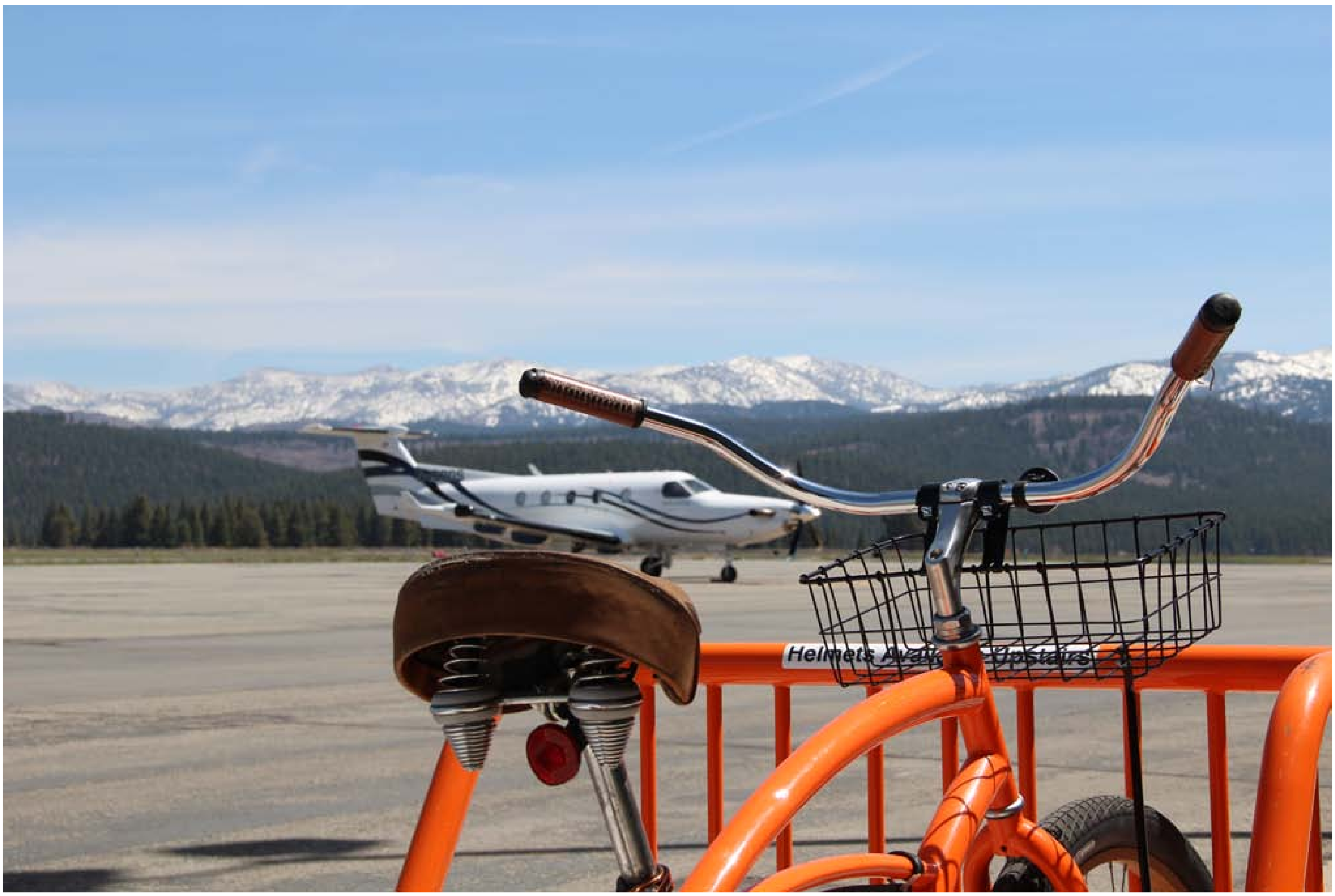
Awareness Building

Publicity & Outreach

Key to the high rate of participation in the public outreach process was the extensive publicity generated prior to April. The team worked to raise awareness of the airport, master plan and ways to get involved. Publicity for the public workshops and survey included:

- Print advertising in local papers and neighborhood newsletters
- Website
- E-blasts
- Postcard mailing to 20,000 homes
- Newsletter article in TTAD newsletter to 20,000 homes
- Presentations to service clubs, business associations

Additionally, the Master Plan Outreach Committee helped with outreach to various community networks to get the word out about open houses and the online survey.



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TRUCKEE TAHOE AIRPORT

MASTER PLAN

Appendix

Appendix B. **Noise Modeling Technical Report**

MASTER PLAN

APPENDIX B

Technical Noise Report

1. OVERVIEW

As part of this Airport Master Plan, noise contours were developed which help visualize sound generated by aircraft operations at Truckee Tahoe Airport (TRK). This appendix presents the input data required for generating these contours.

The noise contours are introduced and presented in Chapter 5 of this plan. These contours will be one factor in determining appropriate land use measures and the breadth of influence TRK has on nearby property. The noise contours will also help identify and quantify the potential environmental impacts associated with existing and future operations on the current and future airfield configuration.

This Appendix presents the input data required to generate the three scenarios of noise contours. Also included is a discussion on the effects airport noise has on a population and explains how metrics are used to help quantify airport noise.

2. AIRPORT NOISE

Of all the adverse effects related to airport activity, noise is arguably the most noticeable. To understand airport noise and its effects on people, it is important to understand the science of sound. Sound is a type of energy which travels in the form of a wave. Sound waves create minute pressure differences in the air which are recognized by the human ear or microphones. Sound waves can be measured using decibels (dB) to measure the amplitude or strength of the wave and Hertz (Hz) which measures the frequency or pitch of the wave.

The strength, or loudness, of a sound wave is measured using decibels on a logarithmic scale. The range of audibility of a human ear is 0 dB (threshold of hearing) to 120 dB (threshold of pain). The use of a logarithmic scale often confuses people because it does not directly correspond to the perception of relative loudness. A common misconception is that if two noise events occur at the same time, the result will be twice as loud. In reality, the event will double the sound energy, but only result in a 3 dB increase in magnitude. For a sound event to actually be twice as loud as another, it must be 10 dB higher.

Scientific studies have shown that people do not interpret sound the same way a microphone does. For example, humans are biased and sensitive to tones within a certain frequency range. The A-weighted decibel scale was developed to correlate sound tones with the sensitivity of the human ear. The A-weighted decibel is a “frequency dependent” rating scale which emphasizes the sound components within the frequency range where most speech occurs. This scale is illustrated in **Figure B-1**, Approximate Decibel Level of Common Sound Sources, which lists typical sound levels of common indoor and outdoor sound sources.

When sound becomes annoying to people, it is generally referred to as noise. A common definition of noise is unwanted sound. One person may find higher levels of noise bearable while others do not. Studies have also shown that a person will react differently to the same noise de-pending on that person’s activity at the time the noise is recognized, e.g., when that person is sleeping.

2.1 Community Noise Equivalent Level (CNEL)

While the A-weighted decibel scale measures human perception of loudness, it does not account for the degree of annoyance based on the duration of a noise event or the differences in sensitivity associated with a person's activity during a noise event.

Noise generated by the operation of aircraft to, from, and around an airport is generally measured in terms of cumulative noise levels of all aircraft operations. Cumulative noise level metrics pro-vide a single measure of the average sound levels in decibels for any point near an airport when exposed over the course of a day. A variety of cumulative noise level metrics have been formulated to provide a single measure of continuous or multiple noise events over an extended period of time. In the state of California, the metric used is the Community Noise Equivalent Level, or CNEL. The CNEL metric recognizes that frequent medium intensity noise events are more bother-some than less frequent high intensity noises events.

The CNEL penalizes any activity which takes place in the evening (7:00 PM - 10:00 PM) by increasing the decibel level by 5 dB, and in the nighttime (10:00 PM – 7:00 AM) by increasing the decibel level by 10 dB. Since the decibel scale uses a base-10 logarithm, each evening operation is equal to 5 daytime operations, and each nighttime operation is equivalent to 10 daytime operations. The rationale for this adjustment is based on the reduced ambient noise at these times, and thus the increase in human sensitivity. This increase in sensitivity creates a perceived notion that aircraft are louder and more disruptive at night. A summary of effects that noise has on people was developed by the Federal Interagency Committee on Noise in 1992. This is presented in **Figure B-2**, Summary of Noise Effects, which gives a better understanding of what type of noise exposure is expected at each decibel level.

3. NOISE CONTOURS

Noise contours were generated for three scenarios using the FAA's Integrated Noise Model (INM), version 7.0d:

- **Base Year (2013): This scenario shows 2013 aircraft activity on the existing airfield configuration. These contours are illustrated in Figure 5-2 in Chapter 5.**
- **Extend Runway 2-20 (2025): Contours for this scenario represent noise from 2025 activity on the future airfield configuration. This scenario assumes the runway utilization changes projected in Table 4-1 in the Alternatives Chapter. Runway Extension scenario contours are presented in Figure 5-3 in Chapter 5.**
- **No Build (2025): This scenario also shows 2025 activity, but on the existing airfield configuration. Without the extension to Runway 2-20, runway use percentages do not change from 2013. The No Build scenario contours are shown in Figure 5-4 in Chapter 5.**

For all three scenarios, aircraft activity was modeled based on summer peak conditions. The contours represent noise exposure over a 24-hour period during the summer peak month – July. The weighted CNEL metric is used to statistically predict the amount of annoyance that cumulative noise exposure would have on a typical population.

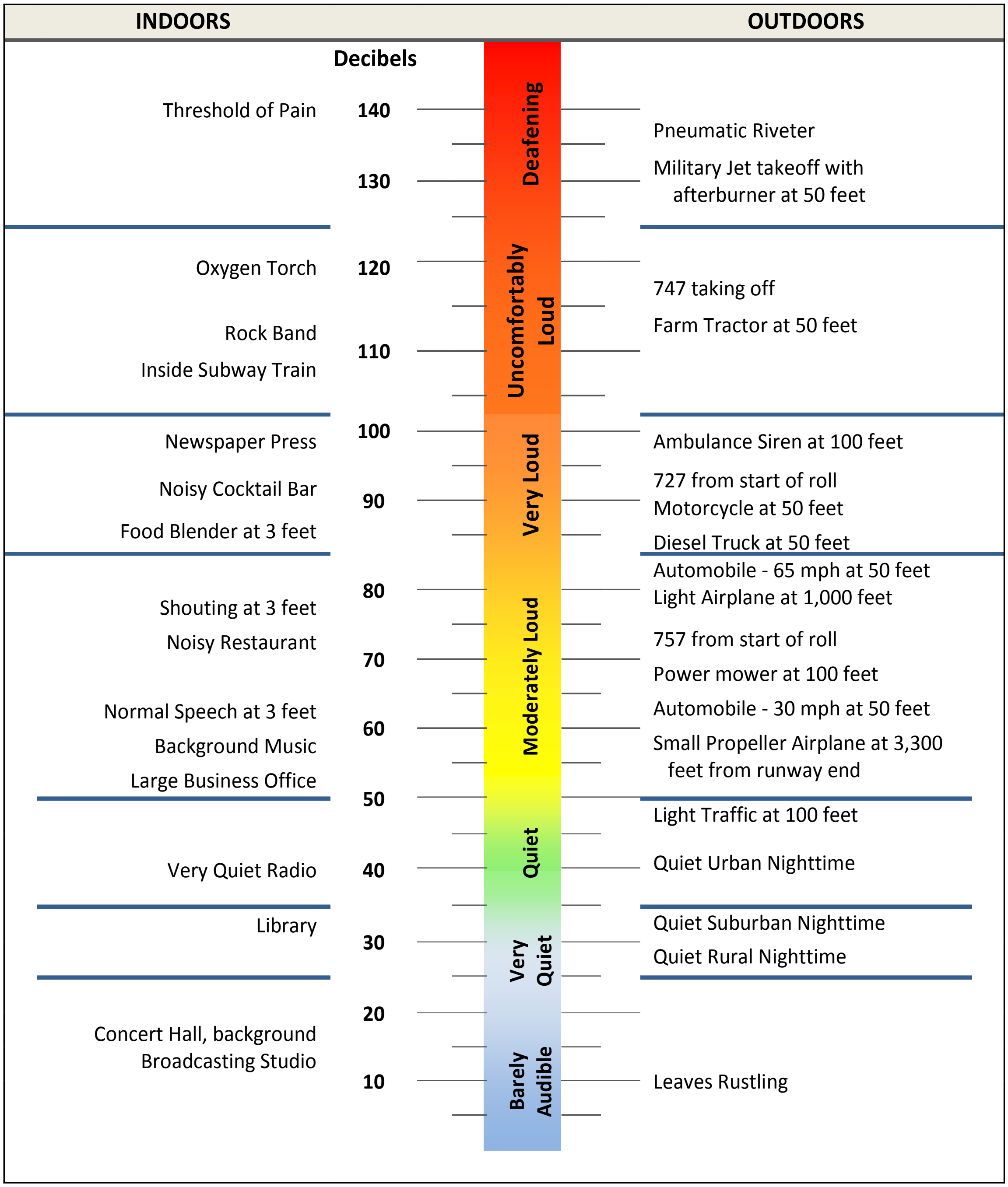


Figure B-1

Approximate Decibel Level of Common Sound Sources

Day-Night Average Sound Level (Decibels)	Effects[1]			
	Hearing Loss Qualitative Description)	Annoyance[2] Percentage of Population Highly Annoyed)[3]	Average Community Reaction[4]	General Community Attitude Toward Area
≥75	May begin to occur	37%	Very severe	Noise is likely to be the most important of all adverse aspects of the community environment.
70	Will not likely occur	22%	Severe	Noise is one of the most important adverse aspects of the community environment.
65	Will not occur	12%	Significant	Noise is one of the important adverse aspects of the community environment.
60	Will not occur	7%	Moderate to Slight	Noise may be considered an adverse aspect of the community environment.
≥55	Will not occur	3%		Noise considered no more important than various other environmental factors.

[1] All data is drawn from National Academy of Science 1977 report Guidelines for Preparing Environmental Impact Statements on Noise, Report of Working Group 69 on Evaluation of Environmental Impact of Noise.

[2] A summary measure of the general adverse reaction of people to living in noisy environments that cause speech interference; sleep disturbance; desire for tranquil environment; and the inability to use the telephone, radio or television satisfactorily.

[3] The percentage of people reporting annoyance to lesser extents are higher in each case. An unknown small percentage of people will report being "highly annoyed" even in the quietest surroundings. One reason is the difficulty all people have in integrating annoyance over a very long time. USAF Update with 400 points (Finegold et al. 1992)

[4] Attitudes or other non-acoustic factors can modify this. Noise at low levels can still be an important problem, particularly when it intrudes into a quiet environment.

NOTE:
Research implicates noise as a factor producing stress-related health effects such as heart disease, high blood pressure and stroke, ulcers and other digestive disorders. The relationships between noise and these effects, however, have not as yet been conclusively demonstrated. (Thompson 1981; Thompson et al. 1989; CHABA 1981; CHABA 1982; Hattis et al. 1980; and U.S. EPA 1981)

Source: Federal Interagency Committee on Noise (1992)

Figure B-2

Summary of Noise Effects

3.1 Noise Model Inputs

The Integrated Noise Model (INM) 7.0d was used to generate the CNEL noise contours for each scenario. The INM is developed by the FAA and is the standard model for computer analysis of aircraft noise. Detailed operational data is required for input into the INM for the program to generate the contours. This data includes specific aircraft fleet mix and number of operations for each, time of day that aircraft operate, runway use percentages, and the dispersal of flight tracks - the paths aircraft use when approaching or departing a particular runway.

BridgeNet International generated the noise contours for all three scenarios. BridgeNet was in excellent position to produce the contours due to their extensive experience in noise analysis, and existing contracts with TRK utilizing their VOLANS system. VOLANS is a web-based application designed to create, evaluate and display flight operations in three dimensions. The data utilized by BridgeNet is presented below.

Aircraft Operations and Fleet Mix

To accurately portray average noise exposure at TRK, operation records are observed and used for input into the INM. TRK has an elaborate system that records aircraft operations making existing operational data easily accessible. One component of this system is an airfield camera which records operations. The camera system is explained in detail in Chapter 2 on page 2-14. This system records the aircraft model, runway of use and time of day and compiles a database of operations. This data was utilized by BridgeNet to generate the Base Year scenario contours. Using this data for existing operations, existing scenario contours were generated by BridgeNet. The aircraft types and operation totals for each are detailed in **Table B-1**.

The data for existing operations was also utilized to generate aircraft operation forecasts, which can be viewed in Chapter 2. After forecasts were completed, operation totals for 2025 were input into the INM by BridgeNet to produce the future scenario contours. Operations for the future scenario contours are presented in **Table B-2**. For all three scenarios, contours represent an average day of activity during the peak month of the year (July).

Aircraft Substitutions

A limitation of the INM is that it contains only a selected sample of aircraft. Since aircraft of similar make produce similar noise levels, the INM provides a substitution list for aircraft not included in the INM. The types of aircraft modeled in each Scenario are detailed under the INM Aircraft Type heading in **Tables B-1 and B-2**.

Table B-1 Base Year (2013) Scenario Operations

INM Aircraft Type		Arrivals			Departures			Group Totals		
		Day	Evening	Night	Day	Evening	Night	Daily	Monthly	Annual
Tow Plane	CNA172	2.109	0.000	0.000	2.109	0.000	0.000			
	GASEPF	10.354	0.000	0.000	10.354	0.000	0.000	24.926	758	9,098
SEP T&G	CNA172	0.604	0.000	0.000	0.604	0.000	0.000			
	GASEPF	2.964	0.000	0.000	2.964	0.000	0.000			
	GASEPV	5.984	0.000	0.000	5.984	0.000	0.000	19.104	581	6,973
MEP T&G	BEC58P	0.145	0.000	0.000	0.145	0.000	0.000			
	PA31T	0.710	0.000	0.000	0.710	0.000	0.000	1.710	52	624
Piston Single	CNA150	1.409	0.053	0.019	1.409	0.053	0.019			
	CNA172	1.052	0.040	0.014	1.052	0.040	0.014			
	CNA182	1.956	0.074	0.027	1.956	0.074	0.027			
	CNA206	1.241	0.047	0.017	1.241	0.047	0.017			
	CNA20T	0.982	0.037	0.013	0.982	0.037	0.013			
	GASEPF	1.178	0.045	0.016	1.178	0.045	0.016			
	GASEPV	8.839	0.334	0.120	8.839	0.334	0.120			
	PA28	1.136	0.043	0.015	1.136	0.043	0.015	37.414	1,138	13,656
Piston Twin	BEC58P	1.290	0.049	0.017	1.290	0.049	0.017			
	PA30	0.283	0.011	0.004	0.283	0.011	0.004			
	PA31	0.553	0.021	0.007	0.553	0.021	0.007	4.471	136	1,632
Turbo Prop	BEC190	2.606	0.190	0.046	2.606	0.190	0.046			
	BEC9F	0.536	0.039	0.009	0.536	0.039	0.009			
	CNA208	0.827	0.060	0.014	0.827	0.060	0.014			
	CNA441	1.333	0.097	0.023	1.333	0.097	0.023			
	HS748A	0.290	0.021	0.005	0.290	0.021	0.005			
	PA42	0.720	0.053	0.013	0.720	0.053	0.013			
	PC12	0.751	0.055	0.013	0.751	0.055	0.013			
	P180	0.352	0.026	0.006	0.352	0.026	0.006	16.175	492	5,904
Heli	B206L	0.050	0.003	0.000	0.050	0.003	0.000			
	EC130	2.620	0.104	0.104	2.620	0.104	0.104			
	R22	0.201	0.012	0.000	0.201	0.012	0.000			
	R44	0.402	0.024	0.000	0.402	0.024	0.000	7.041	214	2,570
Jet <12k lbs.	CNA510	0.332	0.013	0.003	0.332	0.013	0.003			
	ECLIPSE5	0.796	0.031	0.008	0.796	0.031	0.008	2.367	72	864
Jet >12k <20k lbs.	CIT3	0.208	0.008	0.002	0.208	0.008	0.002			
	CNA500	0.230	0.009	0.002	0.230	0.009	0.002			
	CNA525C	0.110	0.004	0.001	0.110	0.004	0.001			
	CNA55B	0.230	0.009	0.002	0.230	0.009	0.002			
	CNA560E	0.138	0.005	0.001	0.138	0.005	0.001			
	CNA560XL	0.048	0.002	0.001	0.048	0.002	0.001			
	FAL20	0.024	0.001	0.000	0.024	0.001	0.000			
	LEAR35	0.234	0.009	0.002	0.234	0.009	0.002	2.564	78	936
Jet >20k lbs.	CL600	0.177	0.007	0.002	0.177	0.007	0.002			
	CNA680	0.332	0.013	0.003	0.332	0.013	0.003			
	CNA750	0.218	0.009	0.002	0.218	0.009	0.002			
	IA1125	0.141	0.006	0.001	0.141	0.006	0.001			
	F10062	0.153	0.006	0.001	0.153	0.006	0.001			
	GIIB	0.010	0.000	0.000	0.010	0.000	0.000			
	GIV	0.197	0.008	0.002	0.197	0.008	0.002			
	GV	0.048	0.002	0.000	0.048	0.002	0.000			
	SABR80	0.010	0.000	0.000	0.010	0.000	0.000	2.696	82	984
Totals		65.595	1.928	0.660	65.595	1.928	0.660	136.364	4,148	43,241

Table B-2 Extend Runway 2-20 and No Build (2025) Scenario Operations

INM Aircraft Type		Arrivals			Departures			Group Totals		
		Day	Evening	Night	Day	Evening	Night	Daily	Monthly	Annual
Tow Plane	CNA172	2.109	0.000	0.000	2.109	0.000	0.000	24.926	758	9,098
	GASEPF	10.354	0.000	0.000	10.354	0.000	0.000			
SEP T&G	CNA172	0.703	0.000	0.000	0.703	0.000	0.000	22.225	676	8,112
	GASEPF	3.449	0.000	0.000	3.449	0.000	0.000			
	GASEPV	6.961	0.000	0.000	6.961	0.000	0.000			
MEP T&G	BEC58P	0.139	0.000	0.000	0.139	0.000	0.000	1.644	50	600
	PA31T	0.683	0.000	0.000	0.683	0.000	0.000			
Piston Single	CNA150	1.639	0.062	0.022	1.639	0.062	0.022	43.526	1,324	15,887
	CNA172	1.223	0.046	0.017	1.223	0.046	0.017			
	CNA182	2.275	0.086	0.031	2.275	0.086	0.031			
	CNA206	1.443	0.055	0.020	1.443	0.055	0.020			
	CNA20T	1.143	0.043	0.016	1.143	0.043	0.016			
	GASEPF	1.370	0.052	0.019	1.370	0.052	0.019			
	GASEPV	10.283	0.389	0.140	10.283	0.389	0.140			
	PA28	1.321	0.050	0.018	1.321	0.050	0.018			
Piston Twin	BEC58P	1.195	0.045	0.016	1.195	0.045	0.016	4.142	126	1,512
	PA30	0.263	0.010	0.004	0.263	0.010	0.004			
	PA31	0.512	0.019	0.007	0.512	0.019	0.007			
Turbo Prop	BEC190	3.371	0.246	0.059	3.371	0.246	0.059	20.923	636	7,637
	BEC9F	0.694	0.051	0.012	0.694	0.051	0.012			
	CNA208	1.070	0.078	0.019	1.070	0.078	0.019			
	CNA441	1.724	0.126	0.030	1.724	0.126	0.030			
	HS748A	0.375	0.027	0.007	0.375	0.027	0.007			
	PA42	0.932	0.068	0.016	0.932	0.068	0.016			
	PC12	0.971	0.071	0.017	0.971	0.071	0.017			
	P180	0.456	0.033	0.008	0.456	0.033	0.008			
Heli	B206L	0.065	0.004	0.000	0.065	0.004	0.000	9.110	277	3,325
	EC130	3.389	0.135	0.135	3.389	0.135	0.135			
	R22	0.260	0.016	0.000	0.260	0.016	0.000			
	R44	0.520	0.031	0.000	0.520	0.031	0.000			
Jet <12k lbs.	CNA510	0.429	0.017	0.004	0.429	0.017	0.004	3.063	93	1,118
	ECLIPSE5	1.030	0.040	0.011	1.030	0.040	0.011			
Jet >12k <20k lbs.	CIT3	0.269	0.011	0.003	0.269	0.011	0.003	3.318	101	1,211
	CNA500	0.297	0.012	0.003	0.297	0.012	0.003			
	CNA525C	0.143	0.006	0.002	0.143	0.006	0.002			
	CNA55B	0.297	0.012	0.003	0.297	0.012	0.003			
	CNA560E	0.178	0.007	0.002	0.178	0.007	0.002			
	CNA560XL	0.062	0.002	0.001	0.062	0.002	0.001			
	FAL20	0.031	0.001	0.000	0.031	0.001	0.000			
	LEAR35	0.302	0.012	0.003	0.302	0.012	0.003			
Jet >20k lbs.	CL600	0.228	0.009	0.002	0.228	0.009	0.002	3.488	106	1,273
	CNA680	0.429	0.017	0.004	0.429	0.017	0.004			
	CNA750	0.283	0.011	0.003	0.283	0.011	0.003			
	IA1125	0.182	0.007	0.002	0.182	0.007	0.002			
	F10062	0.197	0.008	0.002	0.197	0.008	0.002			
	GIIB	0.013	0.000	0.000	0.013	0.000	0.000			
	GIV	0.255	0.010	0.002	0.255	0.010	0.002			
	GV	0.062	0.002	0.001	0.062	0.002	0.001			
	SABR80	0.013	0.000	0.000	0.013	0.000	0.000			
Totals		65.595	1.928	0.660	65.595	1.928	0.660	136.364	4,148	49,773

Runway Utilization

The specific runway which aircraft operate on is another vital input for generating noise contours. As with aircraft model types, runway use data was obtained directly from TRK.

As discussed in the Alternatives Chapter, a primary goal of extending Runway 2-20 is to entice more activity to this runway. For the Extend Runway 2-20 contour scenario, runway use by the aircraft groups change, and more activity is expected on Runway 2-20. Estimating future runway utilization is discussed further on pages 4-27 and 4-28 in Chapter 4. Runway utilization does not change from the existing scenario to the No Build scenario since the runway extension would not be completed and therefore less aircraft would be able to use Runway 2-20. The runway utilization figures for each aircraft group are detailed in **Table B-3** for Base Year (2013) and No Build (2025) scenarios and **Table B-4** for the Extend Runway 2-20 (2025) scenario.

Table B-3 Base Year (2013) and No Build (2025) Scenario Runway Utilization

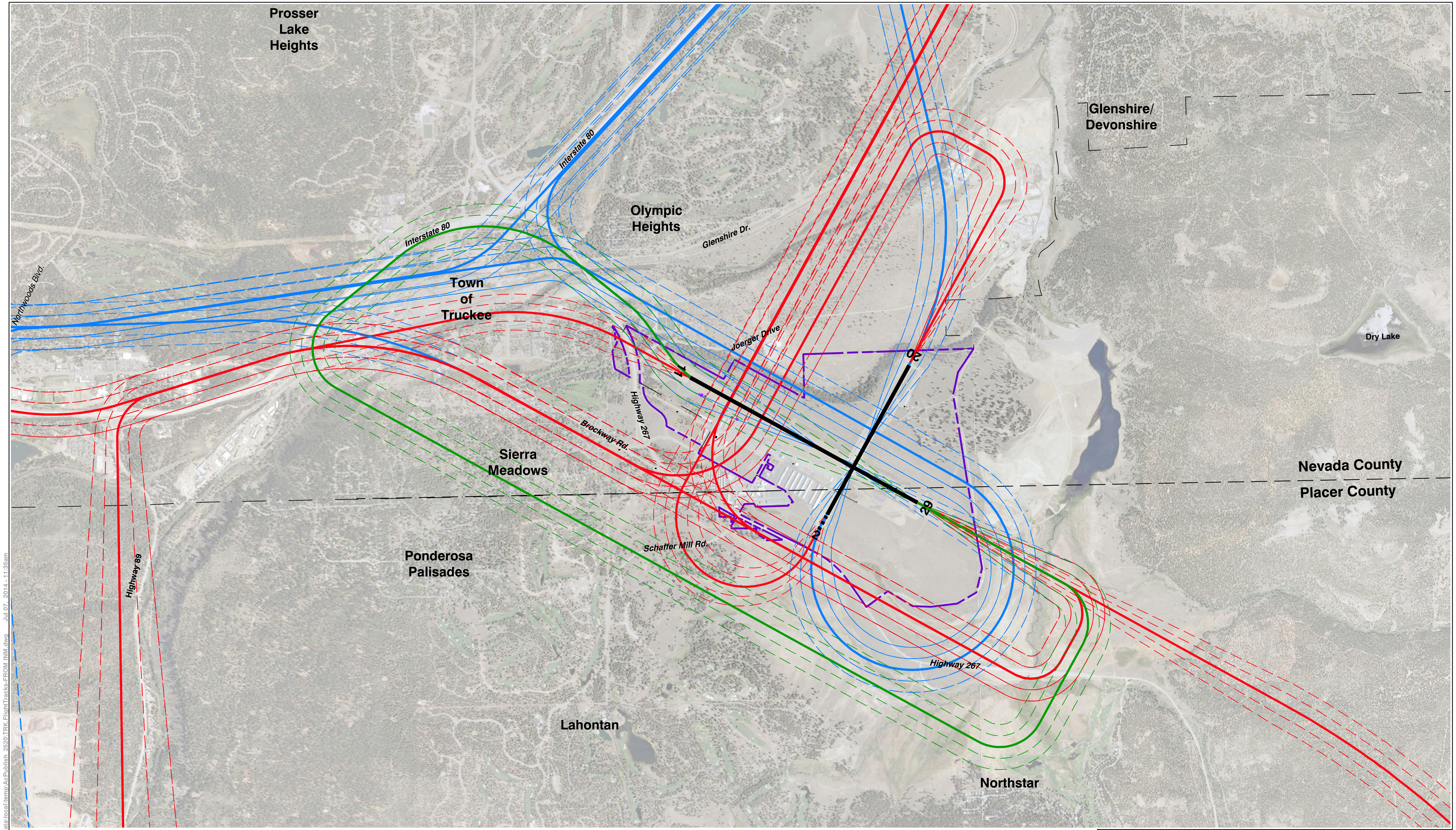
INM Group Type	Departures				Arrivals			
	Runway				Runway			
	11	29	2	20	11	29	2	20
Single Piston T&G	4%	77%	8%	11%	4%	66%	8%	22%
Multi Piston T&G	4%	77%	8%	11%	4%	66%	8%	22%
Piston Single	4%	77%	8%	11%	4%	66%	8%	22%
Piston Twin	4%	77%	8%	11%	4%	66%	8%	22%
Turbo Prop	4%	88%	2%	6%	4%	82%	2%	12%
Helicopters	4%	77%	8%	11%	4%	66%	8%	22%
Jet <12k lbs.	3%	96%	0.5%	0.5%	3%	94%	1%	2%
Jet >12k <20k lbs.	3%	96%	0.5%	0.5%	3%	94%	1%	2%
Jet >20k lbs.	3%	96%	0.5%	0.5%	3%	94%	1%	2%

Table B-4 Extend Runway 2-20 Scenario Runway Utilization

INM Group Type	Departures				Arrivals			
	Runway				Runway			
	11	29	2	20	11	29	2	20
Single Piston T&G	4%	58%	16%	22%	4%	47%	16%	33%
Multi Piston T&G	4%	58%	16%	22%	4%	47%	16%	33%
Piston Single	4%	58%	16%	22%	4%	47%	16%	33%
Piston Twin	4%	58%	16%	22%	4%	47%	16%	33%
Turbo Prop	4%	76%	8%	12%	4%	64%	8%	24%
Helicopters	4%	58%	16%	22%	4%	47%	16%	33%
Jet <12k lbs.	3%	88%	6%	3%	3%	83%	4%	10%
Jet >12k <20k lbs.	3%	88%	6%	3%	3%	83%	4%	10%
Jet >20k lbs.	3%	88%	6%	3%	3%	83%	4%	10%

Flight Tracks

Flight tracks modeled in the INM were obtained by BridgeNet via their VOLANS system that records operations at TRK. VOLANS is a web-based application designed to create, evaluate and display flight operations in three dimensions. Flight tracks modeled represent paths where aircraft typically fly during fair weather conditions. The tracks modeled for the noise contours in the plan are illustrated in **Figure B-3**. The tracks are meant to portray a typical flight path of aircraft arriving and departing TRK on the four runways.



DESTINATION 2025 TRUCKEE TAHOE AIRPORT — A MASTER PLAN PILOTED BY THE COMMUNITY

0 — 1,250 — 2,500 Feet

N

LEGEND

- Airfield Property
- Truckee Town Limits
- County Line
- Runway Extension
- Arrival Primary / Sub-Track
- Departure Primary / Sub-Track
- Touch-and-Go / Sub-Track

Prepared By: Mead&Hunt www.meadhunt.com

Figure B-3

INM Modeled Flight Tracks

Truckee Tahoe Airport

Fig B-3 (11x17)
Reverse Side

INTENTIONALLY LEFT BLANK

MASTER PLAN

Appendix

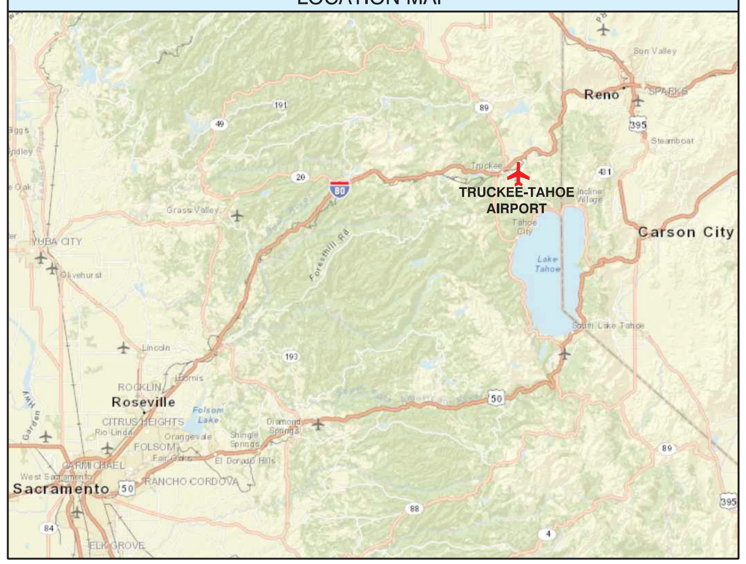
Appendix C. **Airport Layout Plan**

MASTER PLAN

Truckee-Tahoe Airport
Airport Layout Plan

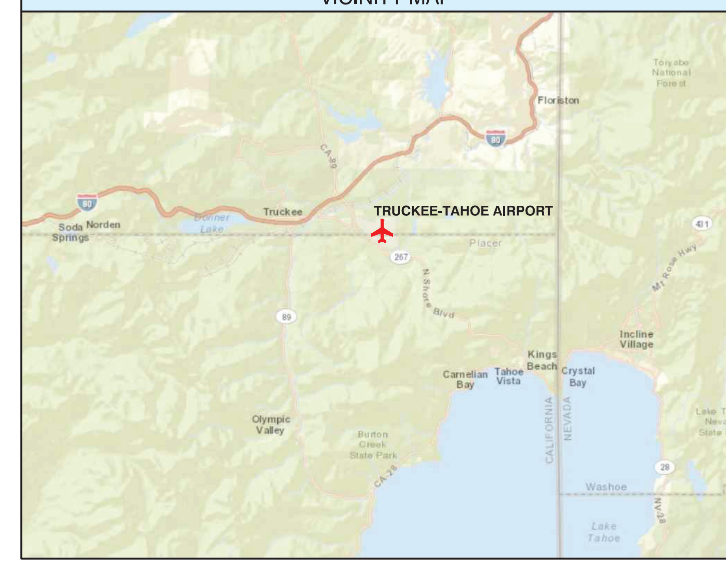
Truckee, California
Truckee-Tahoe Airport District
July 2015

LOCATION MAP



SHEET INDEX

VICINITY MAP



CALIFORNIA STATE MAP

SUBMITTED BY:

Turckee-Tahoe Airport District

By ______________________

Title ______________________ Date ______________________

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

INDEX

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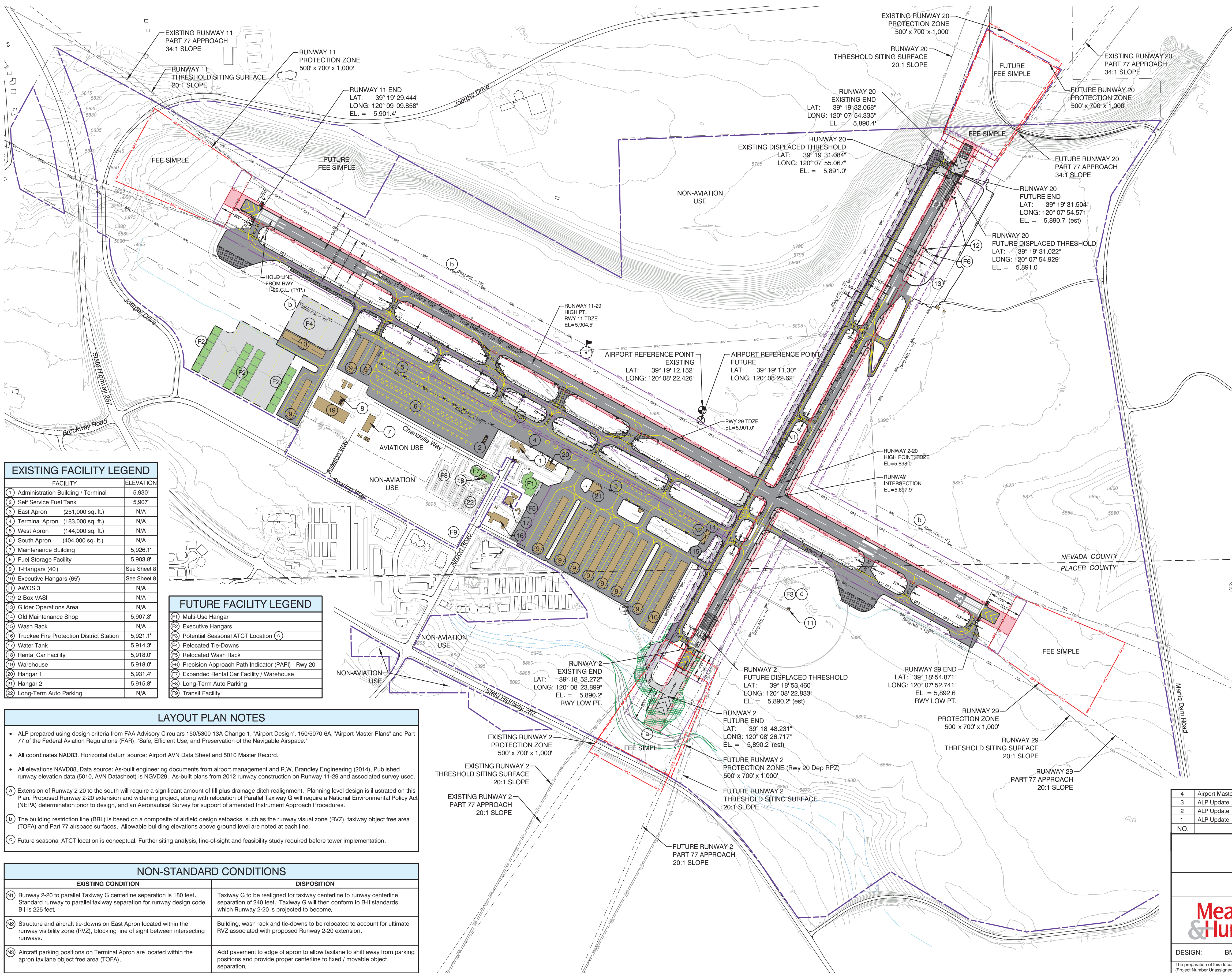
(707) 526-5010
Fax (707) 526-9721
www.meadhunt.com

TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 1 OF 11

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number Unassigned) as provided under Title 49 U.S.C., Section 47104. The contents do 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.



DRAWING LEGEND

	EXISTING	FUTURE
ACTIVE AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED	N/A	
AIRPORT PROPERTY		
AIRPORT REFERENCE POINT		
COUNTY BOUNDARY		N/A
TOWN OF TRUCKEE BOUNDARY		N/A
RUNWAY SAFETY AREA (RSA)	RSA	RSA
RUNWAY PROTECTION ZONE (RPZ)	RPZ	RPZ
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	ROFA
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	TOFA
OBSTACLE FREE ZONE (OFZ)	OFZ	OFZ
AWOS CRITICAL AREA (ACA)	ACA	N/A
BUILDING RESTRICTION LINE (BRL) (b)	BRL	N/A
RUNWAY VISIBILITY ZONE (RVZ)	RVZ	RVZ
FAR PART 77 APPROACH SURFACE		
THRESHOLD SITING SURFACE (TSS)	TSS	TSS
BUILDING - ON AIRPORT		
BUILDING - ON AIRPORT - TO BE RELOCATED		N/A
BUILDING - OFF AIRPORT		N/A
TAXIWAY MARKING (C.L. / TIE-DOWNS)		
BEACON	★	N/A
VISUAL APPROACH SLOPE INDICATOR (VASI)		N/A
PRECISION APPROACH PATH INDICATOR (PAPI)	N/A	□□□□
WIND CONE		N/A
RUNWAY LIGHTS (EDGE/THRESHOLD/REIL/TWY)		N/A
RUNWAY / TAXIWAY SIGN		
UTILITY / LIGHT POLE		N/A
PUBLIC ROAD / PARKING LOT		
FENCE		N/A
FILL FOR RUNWAY AND RSA EXTENSION	N/A	
CHANNEL / STREAM / DITCH		N/A
TERRAIN CONTOUR	5900	
CENTER SECTION MARKER	13 18 24 19	N/A

EXISTING FACILITY LEGEND

FACILITY	ELEVATION
(1) Administration Building / Terminal	5,930'
(2) Self Service Fuel Tank	5,907'
(3) East Apron (251,000 sq. ft.)	N/A
(4) Terminal Apron (183,000 sq. ft.)	N/A
(5) West Apron (144,000 sq. ft.)	N/A
(6) South Apron (404,000 sq. ft.)	N/A
(7) Maintenance Building	5,926.1'
(8) Fuel Storage Facility	5,903.8'
(9) T-Hangars (40')	See Sheet 8
(10) Executive Hangars (65')	See Sheet 8
(11) AWOS 3	N/A
(12) 2-Box VASI	N/A
(13) Glider Operations Area	N/A
(14) Old Maintenance Shop	5,907.3'
(15) Wash Rack	N/A
(16) Truckee Fire Protection District Station	5,921.1'
(17) Water Tank	5,914.3'
(18) Rental Car Facility	5,918.0'
(19) Warehouse	5,918.0'
(20) Hangar 1	5,931.4'
(21) Hangar 2	5,915.8'
(22) Long-Term Auto Parking	N/A

FUTURE FACILITY LEGEND

(F1)	Multi-Use Hangar
(F2)	Executive Hangars
(F3)	Potential Seasonal ATCT Location (c)
(F4)	Relocated Tie-Downs
(F5)	Relocated Wash Rack
(F6)	Precision Approach Path Indicator (PAPI) - Rwy 20
(F7)	Expanded Rental Car Facility / Warehouse
(F8)	Long-Term Auto Parking
(F9)	Transit Facility

LAYOUT PLAN NOTES

- ALP prepared using design criteria from FAA Advisory Circulars 150/5300-13A Change 1, "Airport Design", 150/5070-6A, "Airport Master Plans" and Part 77 of the Federal Aviation Regulations (FAR), "Safe, Efficient Use, and Preservation of the Navigable Airspace."
- All coordinates NAD83. Horizontal datum source: Airport AVN Data Sheet and 5010 Master Record.
- All elevations NAVD88. Data source: As-built engineering documents from airport management and R.W. Brandley Engineering (2014). Published runway elevation data (5010, AVN Datasheet) is NGVD29. As-built plans from 2012 runway construction on Runway 11-29 and associated survey used.

(a) Extension of Runway 2-20 to the south will require a significant amount of fill plus drainage ditch realignment. Planning level design is illustrated on this Plan. Proposed Runway 2-20 extension and widening project, along with relocation of Parallel Taxiway G will require a National Environmental Policy Act (NEPA) determination prior to design, and an Aeronautical Survey for support of amended Instrument Approach Procedures.

(b) The building restriction line (BRL) is based on a composite of airfield design setbacks, such as the runway visual zone (RVZ), taxiway object free area (TOFA) and Part 77 airspace surfaces. Allowable building elevations above ground level are noted at each line.

(c) Future seasonal ATCT location is conceptual. Further siting analysis, line-of-sight and feasibility study required before tower implementation.

NON-STANDARD CONDITIONS

EXISTING CONDITION	DISPOSITION
(N1) Runway 2-20 to parallel Taxiway G centerline separation is 180 feet. Standard runway to parallel taxiway separation for runway design code B-I is 225 feet.	Taxiway G to be realigned for taxiway centerline to runway centerline separation of 240 feet. Taxiway G will then conform to B-II standards, which Runway 2-20 is projected to become.
(N2) Structure and aircraft tie-downs on East Apron located within the runway visibility zone (RVZ), blocking line of sight between intersecting runways.	Building, wash rack and tie-downs to be relocated to account for ultimate RVZ associated with proposed Runway 2-20 extension.
(N3) Aircraft parking positions on Terminal Apron are located within the apron taxilane object free area (TOFA).	Add pavement to edge of apron to allow taxilane to shift away from parking positions and provide proper centerline to fixed / movable object separation.

C:\Users\1134bjm\appdata\local\temp\AcPublish_2696\TRK.ALP.LayoutPlan.dwg Jul 02, 2015 - 3:17pm

SUBMITTED BY:
Truckee Tahoe Airport Board

By ______ Date ______

FAA Approval Space

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

AIRPORT LAYOUT PLAN

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www.meadhunt.com

TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 2 OF 11

The preparation of this document may have been supported, in part, through the Airport Improvement Program financial assistance from the Federal Aviation Administration (Project Number Unassigned) as provided under Title 49 U.S.C., Section 47104. The contents do 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.

AIRPORT DATA

		EXISTING	FUTURE
AIRPORT IDENTIFIER		KTRK	No Change
AIRPORT REFERENCE CODE		B-II-5000	No Change
MEAN MAX. TEMP. (Hottest Month) (d)		82.3° F (July)	No Change
AIRPORT ELEVATION (Above Mean Sea Level) (c)		5,904.5'	No Change
AIRPORT NAVIGATIONAL AIDS		Beacon, Seg.Circle, GPS, VASI, REILs	Same +PAPI, -VASI
AIRPORT REFERENCE POINT (b)	LATITUDE	39° 19' 12.152" N	39° 19' 11.30" N
	LONGITUDE	120° 08' 22.426" W	120° 08' 22.62" W
MISCELLANEOUS FACILITIES		Fuel: 100LL JET-A, powerplant and airframe service	No Change
CRITICAL AIRCRAFT		Citation Citation V 560	No Change
MAGNETIC VARIATION		13° 50' 4" E Feb. 2013	Moving 0° 7.1' W / Year
NPIAS SERVICE LEVEL		Regional/General Aviation	No Change
STATE SERVICE LEVEL		Regional	No Change
AIRPORT ACREAGE (f)	Fee Simple	936 acres	966 acres
	Avigation Easement	None	No Change

ALP DATA NOTES

(a) ALP prepared using design criteria from FAA Advisory Circulars 150/5300-13A Change 1, "Airport Design", 150/5070-6A, "Airport Master Plans" and Part 77 of the Federal Aviation Regulations (FAR), "Safe, Efficient Use, and Preservation of the Navigable Airspace."

(b) All coordinates NAD83. Horizontal datum source: Airport AVN Datasheet and 5010 Master Record.

(c) All elevations NAVD88. Data source: As-built engineering documents from airport management and R.W. Brandley Engineering (2014). Published runway elevation data (5010, AVN Datasheet) is NGVD29. As-built plans from 2012 runway construction on Runway 11-29 and associated survey used instead.

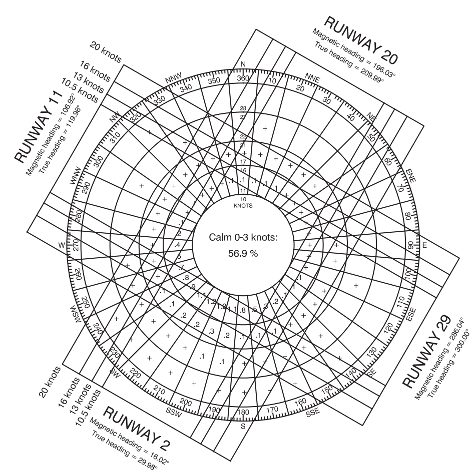
(d) Temperature data source: Western Regional Climate Center, Station ID: Truckee Ranger Station, CA #049043.

(e) Pavement design strength source: Truckee-Tahoe Airport District management per 2014 pavement maintenance plan.

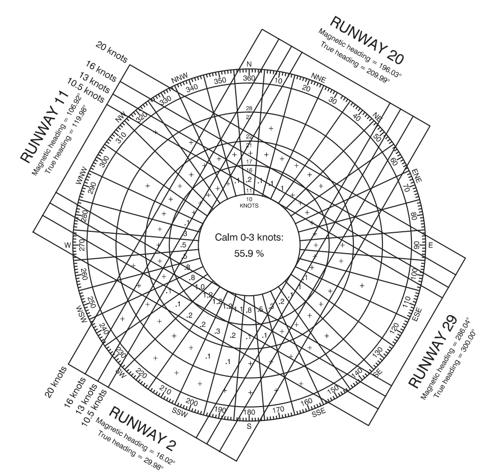
(f) Airport acreage calculated for immediate property dedicated to aviation functions. All Truckee-Tahoe Airport District property holdings are detailed on the Airport Property Maps, Sheets 10 and 11.

(g) Declared distances proposed for future Runway 2-20 to obtain necessary length while obtaining standard RSA, and to mitigate unacceptable incompatible land uses in the RPZ (Highway 267). See Sheet 8 (Runway 2-20 Declared Distances) for more information.

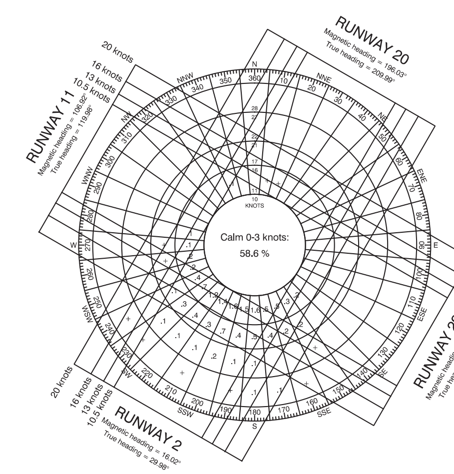
ALL WEATHER WIND ROSE



VFR WIND ROSE



IFR WIND ROSE



RUNWAY DATA

		RUNWAY 11-29				RUNWAY 2-20			
		EXISTING		FUTURE		EXISTING		FUTURE	
UTILITY / GREATER THAN UTILITY		Greater than Utility		No Change		Greater than Utility		No Change	
RUNWAY DESIGN CODE		B-II-Vis		B-II-5000		B-I-5000		B-II-5000	
APPROACH REFERENCE CODE		B-II-Vis		B-II-5000		B-I-5000		B-II-5000	
CRITICAL AIRCRAFT	AIRCRAFT	Citation Citation V 560		No Change		Beech Baron		Super King Air	
	WINGSPAN	55.8'		No Change		37.7'		54.5'	
	APPROACH SPEED (kts)	107		No Change		101		103	
	MAX. TAKEOFF WT. (lbs.)	16,830		No Change		6,200		12,500	
	COCKPIT TO MAIN GEAR	19'		No Change		7'		10'	
	MAIN GEAR WIDTH	15'		No Change		8'		18'	
	TAXIWAY DESIGN GROUP	2		No Change		1A		2	
PAVEMENT STRENGTH AND MATERIAL TYPE (e)	SURFACE MATERIAL	Asphalt		No Change		Asphalt		No Change	
	DESIGN STRENGTH (1,000#) - S/D/DT	50/80/NA		No Change		35/50/-		No Change	
	STRENGTH BY PCN	N/A		No Change		N/A		No Change	
	SURFACE TREATMENT	Grooved		No Change		N/A		No Change	
EFFECTIVE GRADIENT (%) (c)		0.126%		No Change		0.004%		0.010%	
MAXIMUM GRADIENT (%) (c)		0.377%		No Change		0.004%		No Change	
VERTICAL LINE OF SIGHT PROVIDED		No - Parallel Txwy		Yes		No - Parallel Txwy		Yes	
RUNWAY LENGTH		7,000'		No Change		4,650'		5,055'	
RUNWAY WIDTH		100'		No Change		75'		100'	
RUNWAY END ELEVATIONS (c)		11	5,901.4'	11	No Change	2	5,890.2'	2	5,890.2' (est)
		29	5,892.6'	29	No Change	20	5,890.4'	20	5,890.7' (est)
DISPLACED THRESHOLD		11	N/A	11	No Change	2	N/A	2	611'
		29	N/A	29	No Change	20	115'	20	55'
DISPLACED THRESHOLD ELEVATIONS (c)		11	N/A	11	No Change	2	N/A	2	5,890.2' (est)
		29	N/A	29	No Change	20	5,891.0'	20	No Change
RUNWAY TOUCHDOWN ZONE ELEVATIONS (c)		11	5,904.5'	11	No Change	2	5,898.0'	2	No Change
		29	5,901.0'	29	No Change	20	5,898.0'	20	No Change
RUNWAY HIGH POINT (c)		5,904.5'		No Change		5,898.0'		No Change	
RUNWAY LOW POINT (c)		5,892.6'		No Change		5,890.2'		No Change	
RUNWAY EDGE LIGHTING		Medium Intensity		No Change		Medium Intensity		No Change	
RUNWAY MARKING		11	Non-Precision	11	No Change	2	Non-Precision	2	No Change
		29	Non-Precision	29	No Change	20	Non-Precision	20	No Change
RUNWAY SAFETY AREA (RSA) LENGTH BEYOND RUNWAY END	REQUIRED	11	300'	11	No Change	2	240'	2	300'
		29	300'	29	No Change	20	240'	20	300'
	ACTUAL	11	300'	11	No Change	2	240'	2	300'
		29	300'	29	No Change	20	240'	20	300'
RUNWAY SAFETY AREA WIDTH	REQUIRED	150'		No Change		120'		150'	
	ACTUAL	150'		No Change		120'		150'	
RUNWAY PROTECTION ZONE (RPZ) (Inner Width x Outer Width x Length)		11	500' x 700' x 1,000'	11	No Change	2	500' x 700' x 1,000'	2	No Change
		29	500' x 700' x 1,000'	29	No Change	20	500' x 700' x 1,000'	20	No Change
PART 77 APPROACH CATEGORY		11	Non Prec. [C]	11	No Change	2	Visual [B(V)]	2	No Change
		29	Visual [B(V)]	29	No Change	20	Non Prec. [C]	20	No Change
PART 77 APPROACH SLOPE		11	34:1	11	No Change	2	20:1	2	No Change
		29	20:1	29	No Change	20	34:1	20	No Change
APPROACH VISIBILITY MINIMUMS		11	1¼ Mile	11	No Change	2	Visual	2	No Change
		29	Visual	29	No Change	20	1¼ Mile	20	No Change
AERONAUTICAL SURVEY REQUIRED (VERTICALLY GUIDED OR NOT)		11	Vert. Guided	11	No Change	2	Not Required	2	No Change
		29	Not Required	29	No Change	20	Vert. Guided	20	No Change
RUNWAY DEPARTURE SURFACE		11	40:1	11	No Change	2	40:1	2	No Change
		29	40:1	29	No Change	20	40:1	20	No Change
RUNWAY OBJECT FREE AREA (ROFA) (Length Beyond Runway End)		11	300'	11	No Change	2	240'	2	300'
		29	300'	29	No Change	20	240'	20	300'
RUNWAY OBJECT FREE AREA WIDTH		500'		No Change		400'		500'	
OBSTACLE FREE ZONE (OFZ) (Length Beyond Runway End)		11	200'	11	No Change	2	200'	2	No Change
		29	200'	29	No Change	20	200'	20	No Change
OBSTACLE FREE ZONE WIDTH		400'		No Change		400'		No Change	
INNER-APPROACH OFZ LENGTH (For Rwys w/ Approach Lighting System. Begins 200' from Rwy end @ 50:1		11	N/A	11	No Change	2	N/A	2	No Change
		29	N/A	29	No Change	20	N/A	20	No Change
INNER-APPROACH OFZ WIDTH		N/A		No Change		N/A		No Change	
INNER-TRANSITIONAL OFZ WIDTH (For Runways w/ <3/4-mile Approach Visibility Minimums)		11	N/A	11	No Change	2	N/A	2	No Change
		29	N/A	29	No Change	20	N/A	20	No Change
PRECISION OBSTACLE FREE ZONE (Length x Width) (For Rwys w/vert. guided approach and <250' ceiling/<3/4 mile visibility)		11	N/A	11	No Change	2	N/A	2	No Change
		29	N/A	29	No Change	20	N/A	20	No Change
THRESHOLD SITING SURFACE (Per AC 150/5300-13A, Table 3-2. See Airspace Plan for more information.)		11	20:1 - Expected to serve large airplanes (visual day/night) or inst. min ≥ 1 SM (day only)	11	No Change	2	20:1 - Expected to serve large airplanes (visual day/night) or inst. min ≥ 1 SM (day only)	2	No Change
		29	20:1 - Expected to serve large airplanes (visual day/night) or inst. min ≥ 1 SM (day only)	29	No Change	20	20:1 - Expected to support instrument night ops, greater than approach Cat. B aircraft	20	No Change
NAVIGATION AIDS		11	N/A	11	GPS	2	N/A	2	No Change
		29	N/A	29	No Change	20	GPS	20	No Change
VISUAL AIDS		11	REILs	11	No Change	2	N/A	2	No Change
		29	N/A	29	No Change	20	VASI (2B)	20	PAPI

RUNWAY END COORDINATES (b)

		EXISTING	FUTURE
11	LATITUDE	39° 19' 29.444" N	No Change
	LONGITUDE	120° 09' 09.858" W	No Change
29	LATITUDE	39° 18' 54.871" N	No Change
	LONGITUDE	120° 07' 52.740" W	No Change
2	LATITUDE	39° 18' 52.272" N	39° 18' 48.231" N
	LONGITUDE	120° 08' 23.899" W	120° 08' 26.717" W
20	LATITUDE	39° 19' 32.068" N	39° 19' 31.504" N
	LONGITUDE	120° 07' 54.335" W	120° 07' 54.571" W

ALL WEATHER WIND COVERAGE

RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
2-20	97.68 %	99.07 %	99.83 %	99.97 %
11-29	90.22 %	94.21 %	98.16 %	99.45 %
Combined	99.38 %	99.85 %	99.96 %	99.99 %
Number of Observations:	74,107			

VFR WIND COVERAGE

RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
2-20	97.64 %	99.07 %	99.84 %	99.97 %
11-29	90.20 %	94.27 %	98.27 %	99.50 %
Combined	99.41 %	99.86 %	99.97 %	100.0 %
Number of Observations:	68,631			

IFR WIND COVERAGE

RUNWAY	10.5 KNOTS (12 M.P.H.)	13 KNOTS (15 M.P.H.)	16 KNOTS (18.5 M.P.H.)	20 KNOTS (23 M.P.H.)
2-20	97.60 %	98.89 %	99.63 %	99.91 %
11-29	87.21 %	91.42 %	96.14 %	98.55 %
Combined	98.65 %	99.56 %	99.86 %	99.96 %
Number of Observations:	2,913			

Wind Data Source: NOAA Weather Station 72584, Truckee, California
Period of Time: Jan. 1, 2000 - Dec. 31, 2009
Note: Windrose compass headings are true north.

TAXIWAY DATA

	PARALLEL TAXIWAYS				CONNECTOR TAXIWAYS					
	A		G		B,C,H,J,L,M,N,P,Q,S,U,V		D, F		E,H	
	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE	EXISTING	FUTURE
TAXIWAY DESIGN GROUP	2	No Change	2	No Change	2	No Change	2	No Change	2	No Change
AIRCRAFT DESIGN GROUP	II	No Change	II	No Change	II	No Change	II	No Change	II	No Change
WIDTH	50'	No Change	50'	No Change	50'	No Change	50'	70'	70'	No Change
TAXIWAY SAFETY AREA WIDTH	79'	No Change	79'	No Change	79'	No Change	79'	No Change	79'	No Change
TAXIWAY OBJECT FREE AREA WIDTH	131'	No Change	131'	No Change	131'	No Change	131'	No Change	131'	No Change
DISTANCE from TWY. ℄ to FIXED/MOVABLE OBJECT	65.5'	No Change	65.5'	No Change	65.5'	No Change	65.5'	No Change	65.5'	No Change
TAXIWAY WINGTIP CLEARANCE	26'	No Change	26'	No Change	26'	No Change	26'	No Change	26'	No Change
DISTANCE from RUNWAY ℄ to TAXIWAY ℄	250'	No Change	180'	240'	N/A	No Change	N/A	No Change	N/A	No Change
DISTANCE FROM RUNWAY ℄ to HOLD BARS	200'	No Change	125'	200'	N/A	No Change	N/A	No Change	N/A	No Change
TAXIWAY SURFACE TYPE	Asphalt	No Change	Asphalt	No Change	Asphalt	No Change	Asphalt	No Change	Asphalt	No Change
TAXIWAY LIGHTING	Medium	No Change	Medium	No Change	Medium	No Change	Medium	No Change	Medium	No Change

NOTES

- Four taxiways to be reconfigured to meet new Advisory Circular 150/5300-13A (Change 1) guidance for enhancing taxiway safety. Direct apron to runway access (Taxiways C, D, E and F) to be eliminated and 45 degree exit taxiways (Taxiways D and F) changed to 90 degrees.
- See Taxiway Fillet Data table for more detailed dimension data.

TAXIWAY FILLET DATA

Table 4-5. Standard intersection details for TDG 2

TDG 2							
Dimension (See Figure 4-13, Figure 4-14, and Figure 4-15)							
Δ (degrees)	30	45	60	90	120	135	150
W-0 (ft)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
W-1 (ft)	29	35	26	26	27	26	28
W-2 (ft)	29	35	40	48	48	50	54
L-1 (ft)	192	228	183	185	192	183	194
L-2 (ft)	0	0	60	75	65	75	71
L-3 (ft)	8	14	23	48	117	170	279
R-Fillet (ft)	0	0	0	0	25	25	25
R-CL (ft)	75	75	75	60	75	75	80
R-Outer (ft)	92	92	92	77	92	92	97

Note: Values in the table are rounded to the nearest foot. 1 foot = 0.305 meters.

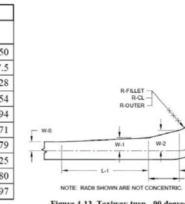


Figure 4-13. Taxiway turn - 90 degree delta

Table 4-5 and Figure 4-13 from FAA Advisory Circular 150/5300-13A (Change 1) "Airport Design".

DECLARED DISTANCES (g)

	EXISTING		FUTURE	
	RUNWAY 11	RUNWAY 29	RUNWAY 11	RUNWAY 29
DISPLACED THRESHOLD	N/A	N/A	No Change	No Change
TAKEOFF RUN AVAILABLE (TORA)	N/A	N/A	No Change	No Change
TAKEOFF DISTANCE AVAILABLE (TODA)	N/A	N/A	No Change	No Change
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	N/A	N/A	No Change	No Change
LANDING DISTANCE AVAILABLE (LDA)	N/A	N/A	No Change	No Change
	RUNWAY 2	RUNWAY 20	RUNWAY 2	RUNWAY 20
DISPLACED THRESHOLD	N/A	115'	611'	55'
TAKEOFF RUN AVAILABLE (TORA)	N/A	N/A	5,055'	4,444'
TAKEOFF DISTANCE AVAILABLE (TODA)	N/A	N/A	5,055'	5,055'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	N/A	N/A	5,055'	5,055'
LANDING DISTANCE AVAILABLE (LDA)	N/A	N/A	4,444'	5,000'

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT

TRUCKEE, CALIFORNIA

DATA SHEET

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DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 3 OF 11

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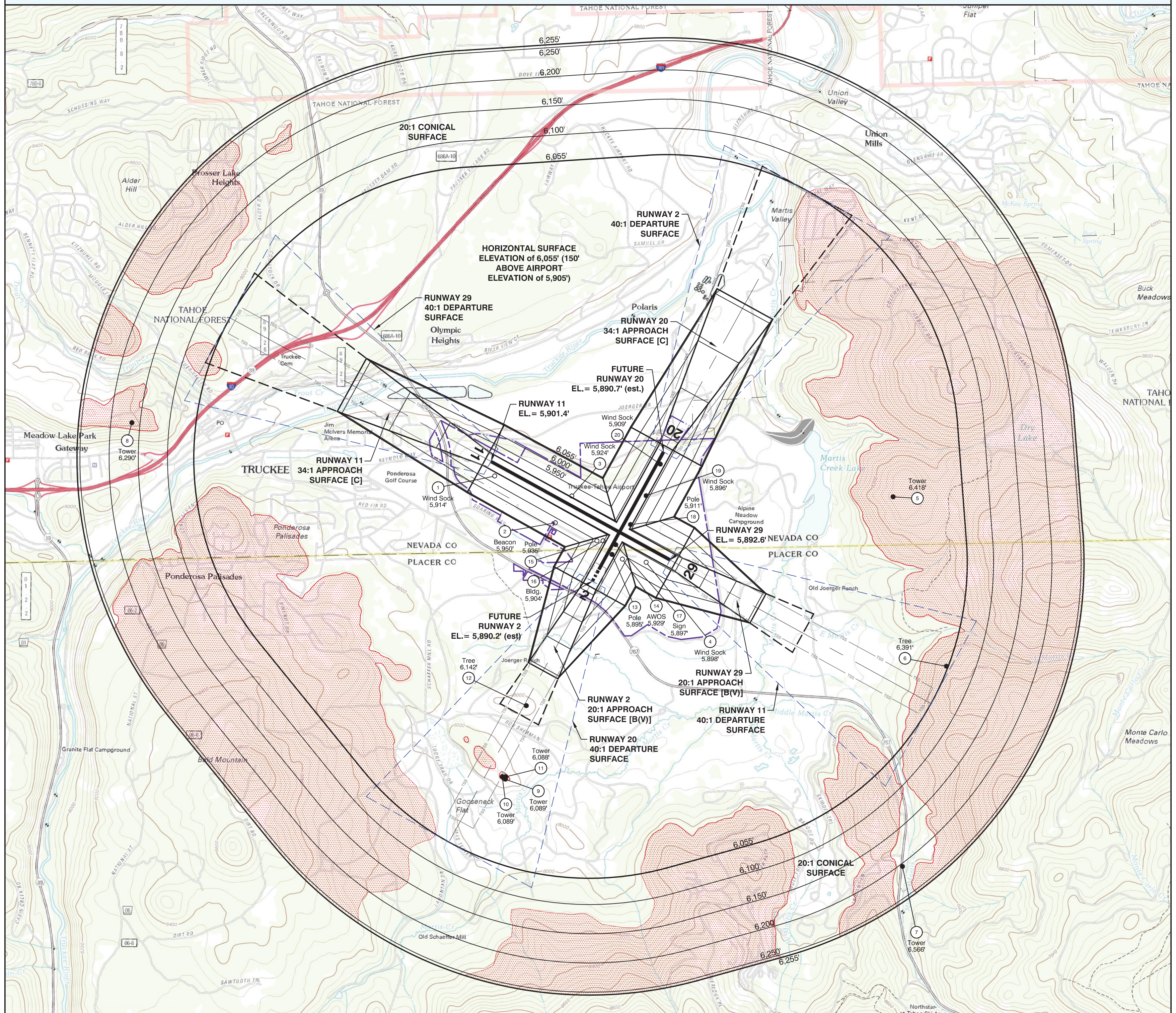
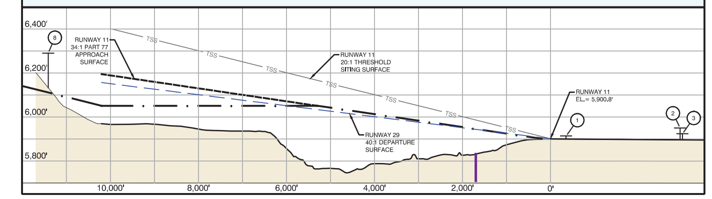
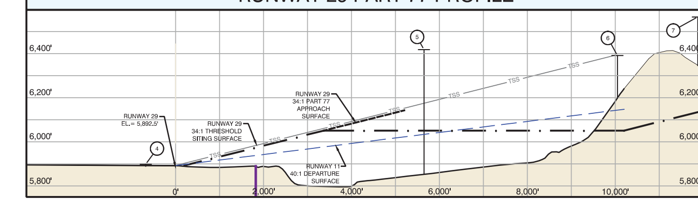
PART 77 AIRSPACE PLAN



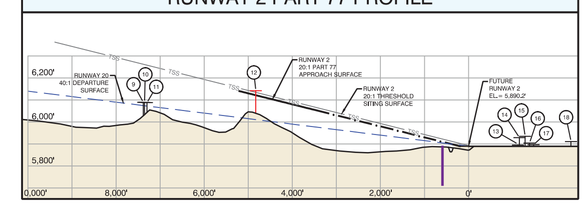
RUNWAY 11 PART 77 PROFILE



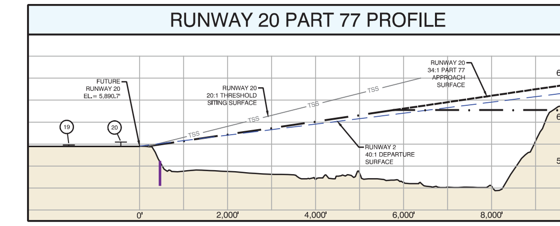
RUNWAY 29 PART 77 PROFILE



RUNWAY 2 PART 77 PROFILE



RUNWAY 20 PART 77 PROFILE



PART 77 OBJECTS

POINT #	OBJECT DESCRIPTION	OBJECT ELEVATION	AFFECTED PART 77 SURFACE	PART 77 SURFACE ELEVATION	PART 77 PENETRATION	THRESHOLD SITING SURFACE ELEVATION	THRESHOLD SITING SURFACE PENETRATION	DEPARTURE SURFACE ELEVATION	DEPARTURE SURFACE PENETRATION	DISPOSITION
1	Wind Sock	5,914'	Transitional	5,968'	-54'	Object not under surface	N/A	Object not under surface	N/A	No Action
2	Beacon	5,950'	Transitional	6,023'	-73'	Object not under surface	N/A	Object not under surface	N/A	No Action
3	Wind Sock	5,924'	Transitional	5,954'	-30'	Object not under surface	N/A	Object not under surface	N/A	No Action
4	Wind Sock	5,898'	Transitional	5,975'	-77'	Object not under surface	N/A	Object not under surface	N/A	No Action
5	Tower	6,418'	Horizontal	6,055'	364'	Object not under surface	N/A	Object not under surface	N/A	Obstruction Light
6	Tree	6,391'	Horizontal	6,055'	337'	Object not under surface	N/A	6,144'	-194'	No Action
7	Tower	6,566'	Conical	6,182'	384'	Object not under surface	N/A	Object not under surface	N/A	Obstruction Light
8	Tower	6,290'	Conical	6,164'	126'	Object not under surface	N/A	Object not under surface	N/A	Obstruction Light
9	Tower	6,089'	Horizontal	6,055'	35'	Object not under surface	N/A	6,076'	342'	Obstruction Light
10	Tower	6,089'	Horizontal	6,055'	35'	6,289'	-200'	6,075'	14'	Obstruction Light
11	Tower	6,088'	Horizontal	6,055'	34'	Object not under surface	N/A	6,074'	15'	Obstruction Light
12	Tree	6,142'	Horz. / Rwy 2 Ap.	6,055'	88'	6,162'	-20'	6,012'	76'	Cut / Trim
13	Pole	5,895'	Primary	5,890'	5'	Object not under surface	N/A	Object not under surface	N/A	No Action ^
14	AWOS	5,929'	Transitional	5,981'	-52'	Object not under surface	N/A	Object not under surface	N/A	No Action
15	Pole	5,935'	Transitional	5,981'	-46'	Object not under surface	N/A	Object not under surface	N/A	No Action
16	Building	5,904'	Transitional	5,955'	-51'	Object not under surface	N/A	Object not under surface	N/A	No Action
17	Sign	5,897'	Primary	5,890'	7'	Object not under surface	N/A	Object not under surface	N/A	No Action ^
18	Pole	5,911'	Primary	5,890'	21'	Object not under surface	N/A	Object not under surface	N/A	No Action ^
19	Wind Sock	5,896'	Primary	5,890'	6'	Object not under surface	N/A	Object not under surface	N/A	No Action ^

Note: A negative penetration value indicates the object is clear of the airspace surface.
^ Objects fixed by aeronautical function.

LEGEND: PLAN VIEW

- Existing Runway
- Future Runway
- Airport Property Boundary
- Future Airport Property
- Part 77 Surfaces
- Part 77 Approach Surface
- Part 77 Surface Contour
- Departure Surface
- Threshold Siting Surface
- Terrain Penetrates Part 77 Surface
- Object Clear of Part 77 Surface
- Object Penetrates Part 77 Surface
- Terrain Contours
- Town of Truckee Boundary

LEGEND: PROFILE VIEW

- Part 77 Approach Surface
- Threshold Siting Surface
- Departure Surface
- Object Under Approach Surface
- Object Under Transitional/Horizontal/Conical Surface

NOTES:

- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
- Only airspace surfaces associated with ultimate runway configurations are illustrated. All objects are analyzed against the ultimate airspace surfaces.
- Runway elevation data source: As built engineering documents from airport management and R.W. Brandley Engineering (2014).
- Objects elevation source: Digital Obstacle File (Nov. 12, 2013 release) and 1993 20:1 Obstacle Survey (2 objects - others recently removed). AGIS survey recommended to help document any potential obstruction to approaches.
- Basemap source: USGS Topographic maps.
- See Inner-Approach Sheets 6 and 7 for close-in obstructions in RPZ areas.
- Proposed Runway 2-20 extension and widening project will requie an Aeronautical Survey for support of amended Instrument Approach Procedures.

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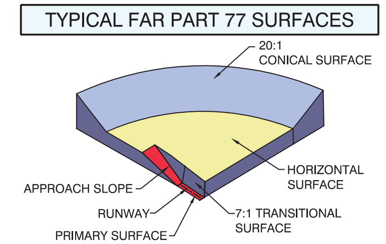
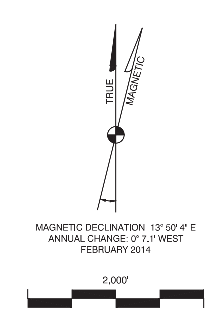
TYPICAL FAR PART 77 SURFACES





MAGNETIC DECLINATION 13° 50' 4" E
ANNUAL CHANGE: 0° 7.1' WEST
FEBRUARY 2014

VERTICAL EXAGGERATION OF 5
VERTICAL SCALE: 1"=400'

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

PART 77 AIRSPACE

Mead & Hunt
133 Aviation Boulevard, Suite 100
Santa Rosa, California 95403
(707) 526-5010
Fax (707) 526-9721
www.meadhunt.com

TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 4 OF 11

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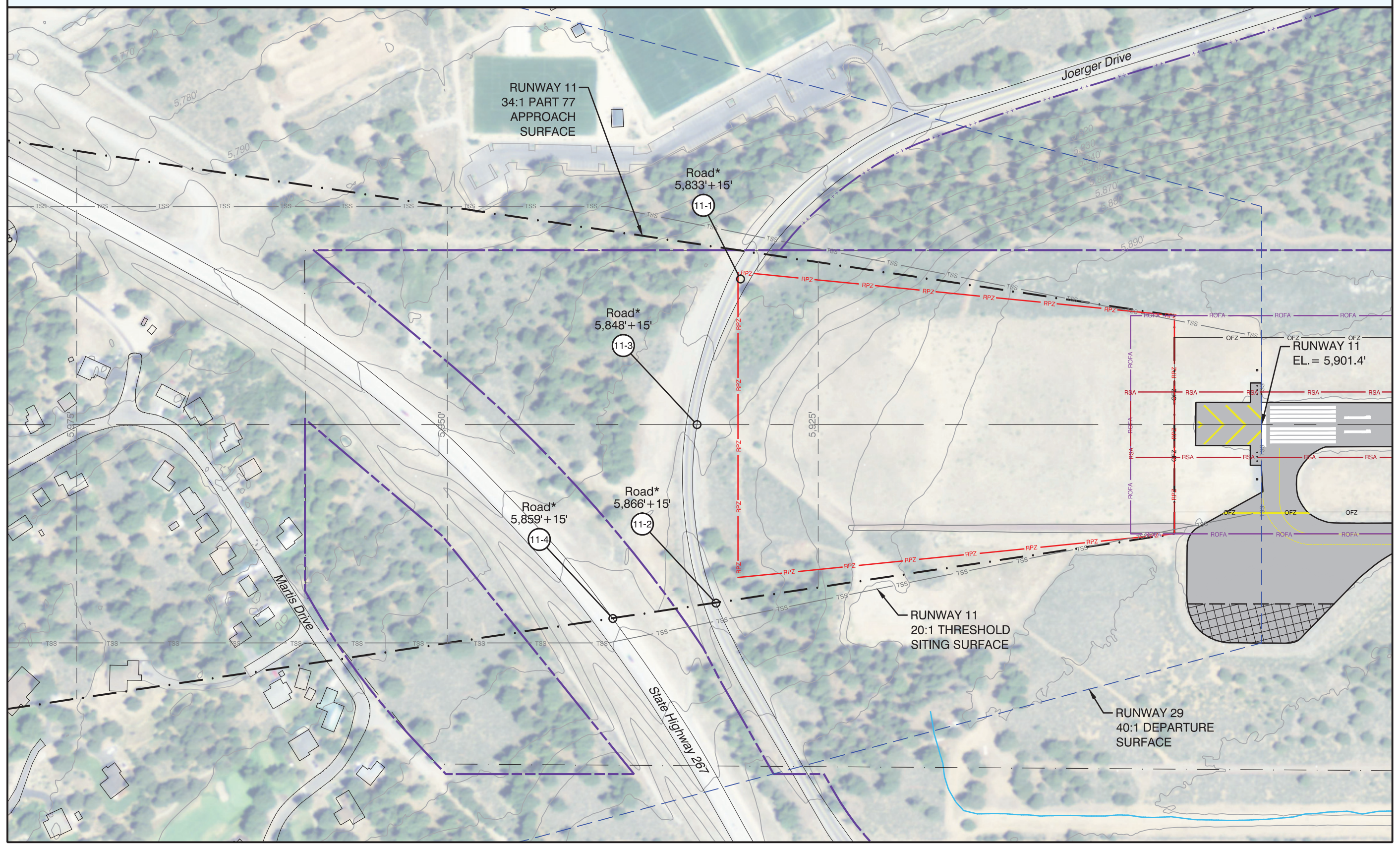
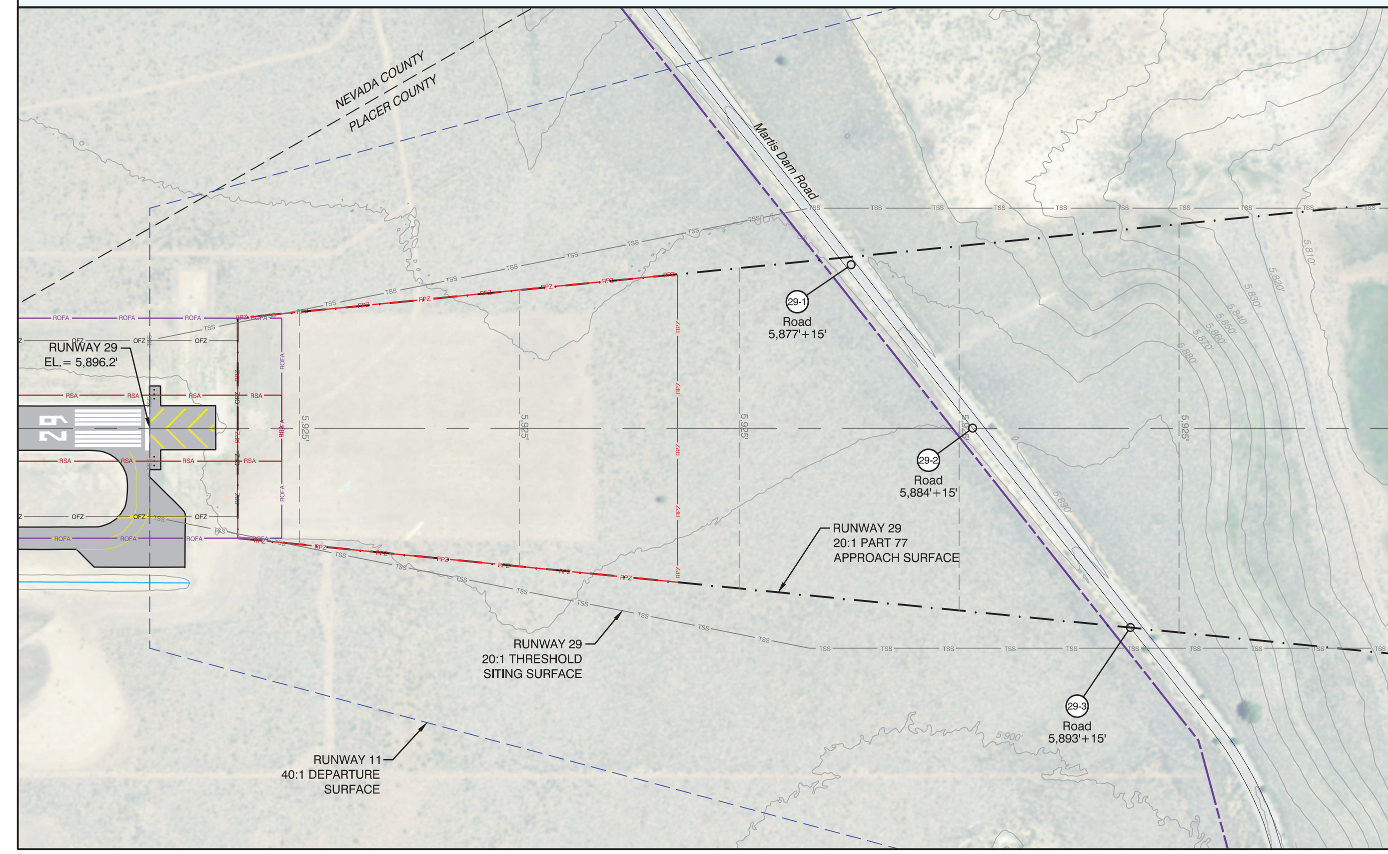
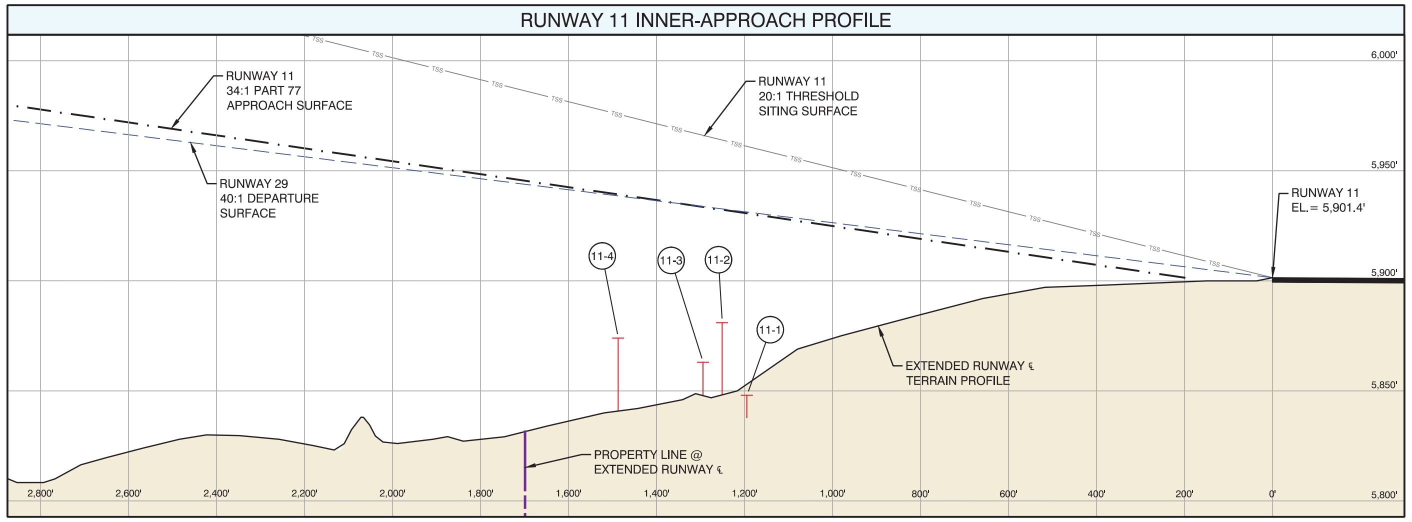
RUNWAY 11 INNER-APPROACH PLAN



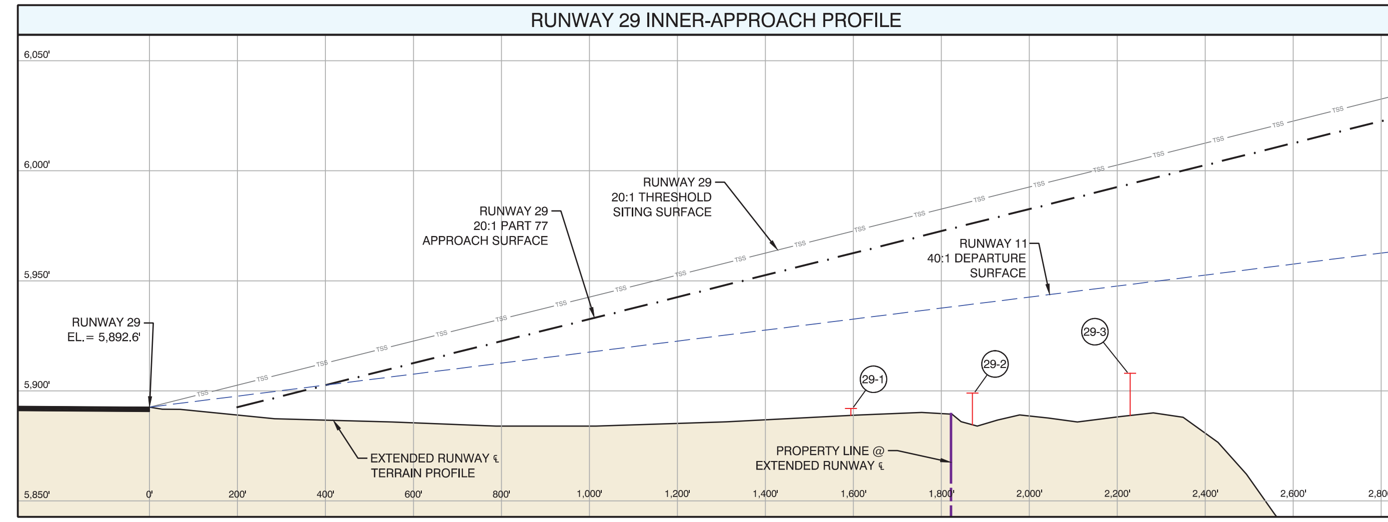
RUNWAY 29 INNER-APPROACH PLAN



RUNWAY 11 INNER-APPROACH PROFILE



RUNWAY 29 INNER-APPROACH PROFILE



LEGEND: PLAN VIEW

- Airport Property Boundary
- Future Airport Property
- Part 77 Surfaces
- Part 77 Approach Surface
- Part 77 Surface Contour
- Threshold Siting Surface
- 40:1 Departure Surface
- Runway Protection Zone (RPZ)
- Object Clear of Part 77 Surface
- Object Penetrates Part 77 Surface
- Terrain Contours

LEGEND: PROFILE VIEW

- Part 77 Approach Surface
- Threshold Siting Surface
- Object Under Approach Surface

NOTES:

- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
- Only airspace surfaces associated with ultimate runway configurations are illustrated. All objects are analyzed against the ultimate airspace surfaces.
- Runway elevation data source: As built engineering documents from airport management and R.W. Brandley Engineering (2014).
- Objects elevation source: Digital Obstacle File (Nov. 12, 2013 release). AGIS survey recommended.
- Road elevations estimated based on LIDAR ground contours.

* 15 feet vertical clearance added to road elevations, per Part 77.

200'
0 FEET 400'
VERTICAL EXAGGERATION OF 5
VERTICAL SCALE: 1"=40'

MAGNETIC
TRUE
MAGNETIC DECLINATION 13° 50' 4" E
ANNUAL CHANGE: 0° 7.1' WEST
FEBRUARY 2014

RUNWAY 11 OBJECTS

POINT #	OBJECT DESCRIPTION	OBJECT ELEVATION	PART 77 SURFACE	PART 77 SURFACE ELEVATION	PART 77 PENETRATION	TSS SURFACE ELEVATION	TSS PENETRATION	RUNWAY 29 DEPARTURE SURFACE ELEVATION	RUNWAY 29 DEPARTURE SURFACE PENETRATION	DISPOSITION
11-1	Road*	5,848'	Approach	5,931'	-82.7'	5,961.1'	-113.1'	5,931.3'	-83.3'	No Action
11-2	Road*	5,881'	Approach	5,932'	-51.3'	5,963.9'	-82.9'	5,932.7'	-51.7'	No Action
11-3	Road*	5,863'	Approach	5,934'	-70.6'	5,966.1'	-103.1'	5,933.8'	-70.8'	No Action
11-4	Road*	5,874'	Approach	5,939'	-65.3'	5,975.8'	-101.8'	5,938.6'	-64.6'	No Action

Note: A negative penetration value indicates the object is clear of the airspace surface.

RUNWAY 29 OBJECTS

POINT #	OBJECT DESCRIPTION	OBJECT ELEVATION	PART 77 SURFACE	PART 77 SURFACE ELEVATION	PART 77 PENETRATION	TSS SURFACE ELEVATION	TSS PENETRATION	RUNWAY 11 DEPARTURE SURFACE ELEVATION	RUNWAY 11 DEPARTURE SURFACE PENETRATION	DISPOSITION
29-1	Road*	5,892'	Approach	5,962'	-70.3'	5,972.3'	-80.3'	5,932.5'	-40.5'	No Action
29-2	Road*	5,899'	Approach	5,976'	-77.1'	5,986.1'	-87.1'	5,939.4'	-40.4'	No Action
29-3	Road*	5,908'	Approach	5,994'	-86.1'	6,004.1'	-96.1'	5,948.3'	-40.3'	No Action

Note: A negative penetration value indicates the object is clear of the airspace surface.

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT

TRUCKEE, CALIFORNIA

INNER-APPROACH: RUNWAY 11-29

Mead & Hunt
133 Aviation Boulevard, Suite 100
Santa Rosa, California 95403
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www.meadhunt.com

TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 5 OF 11

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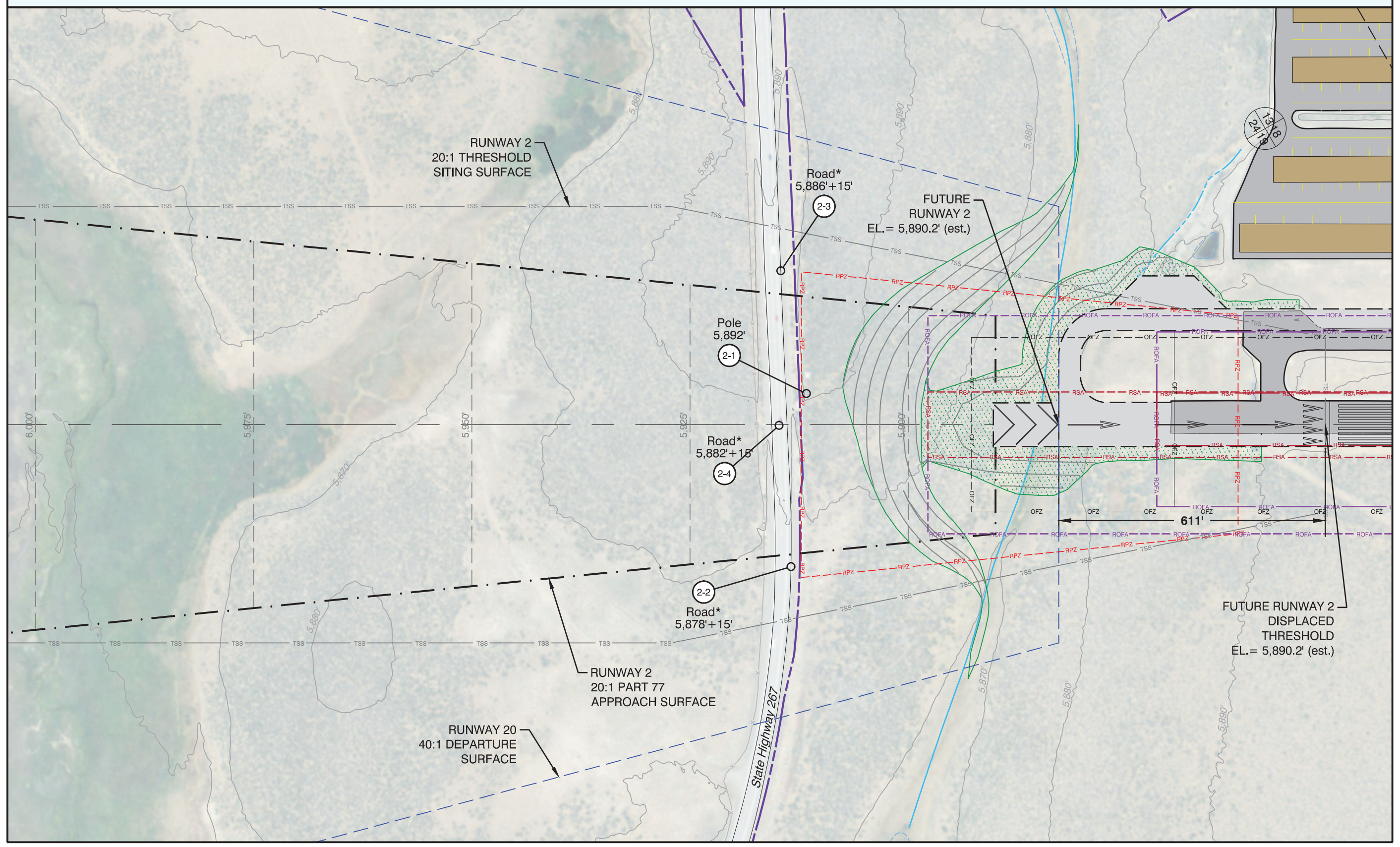
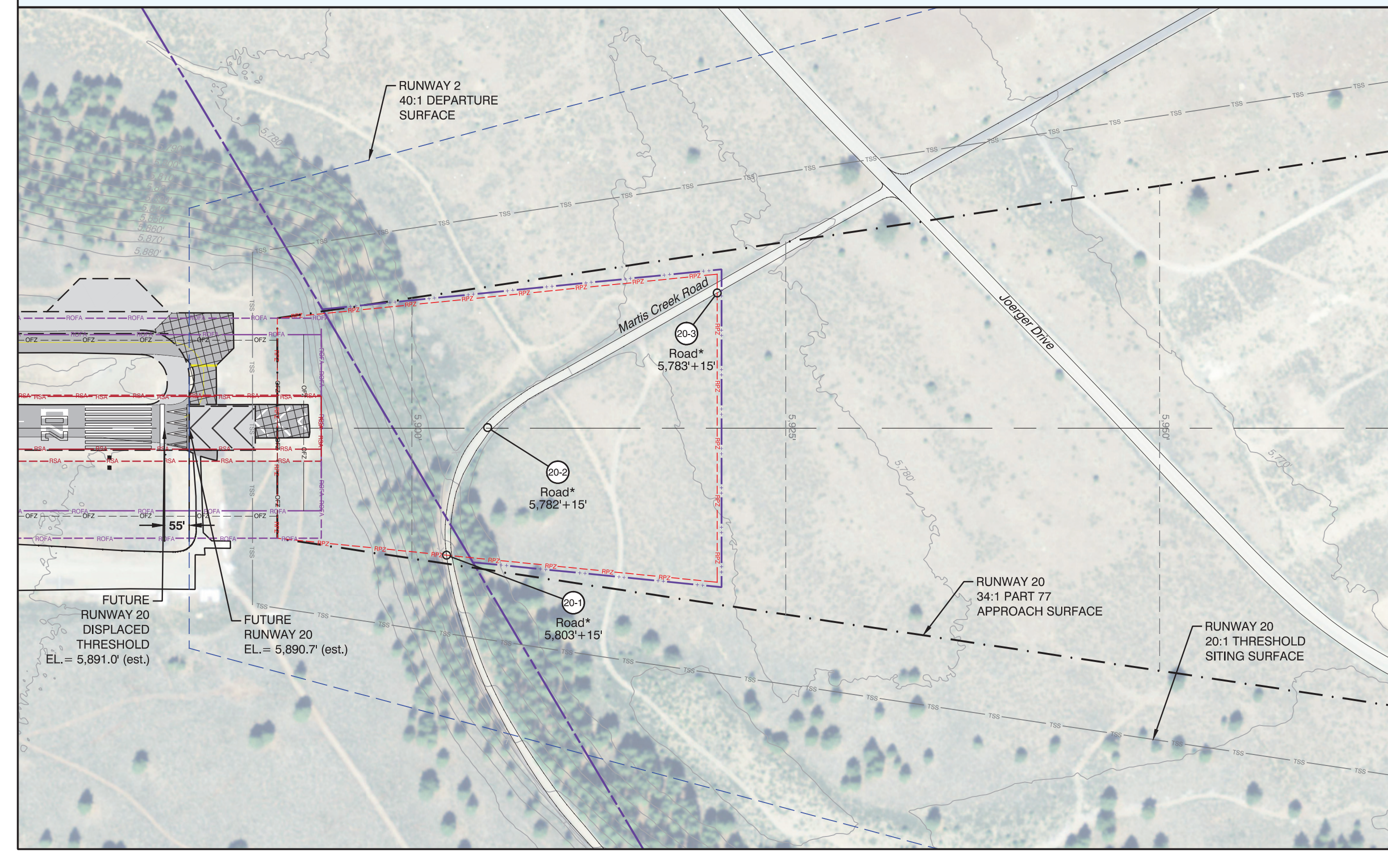
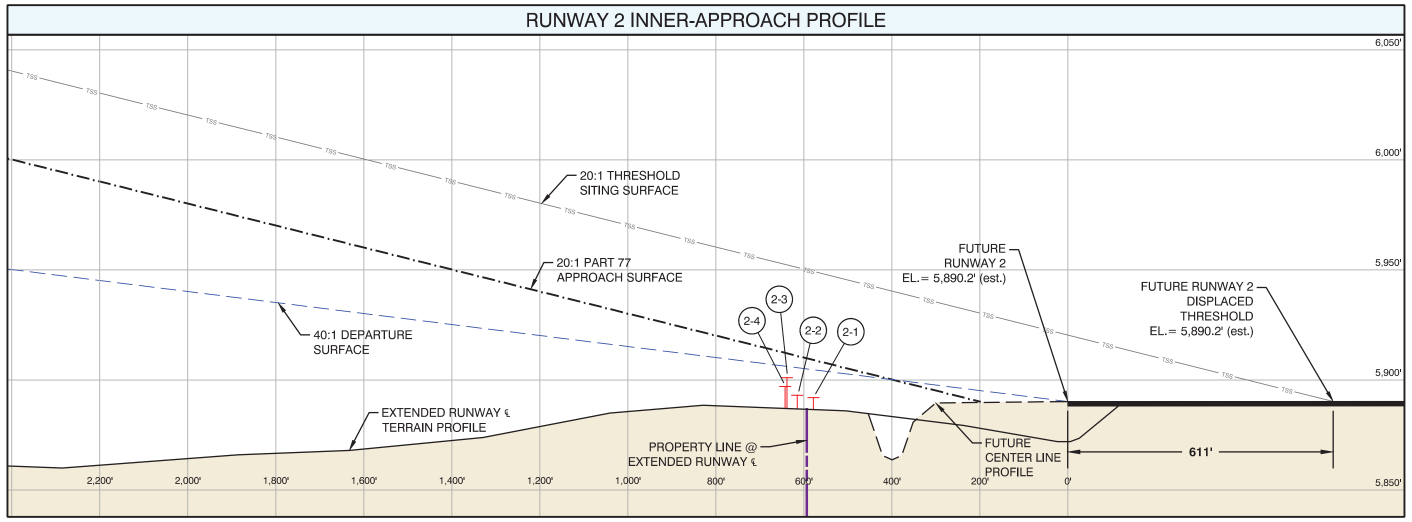
RUNWAY 2 INNER-APPROACH PLAN



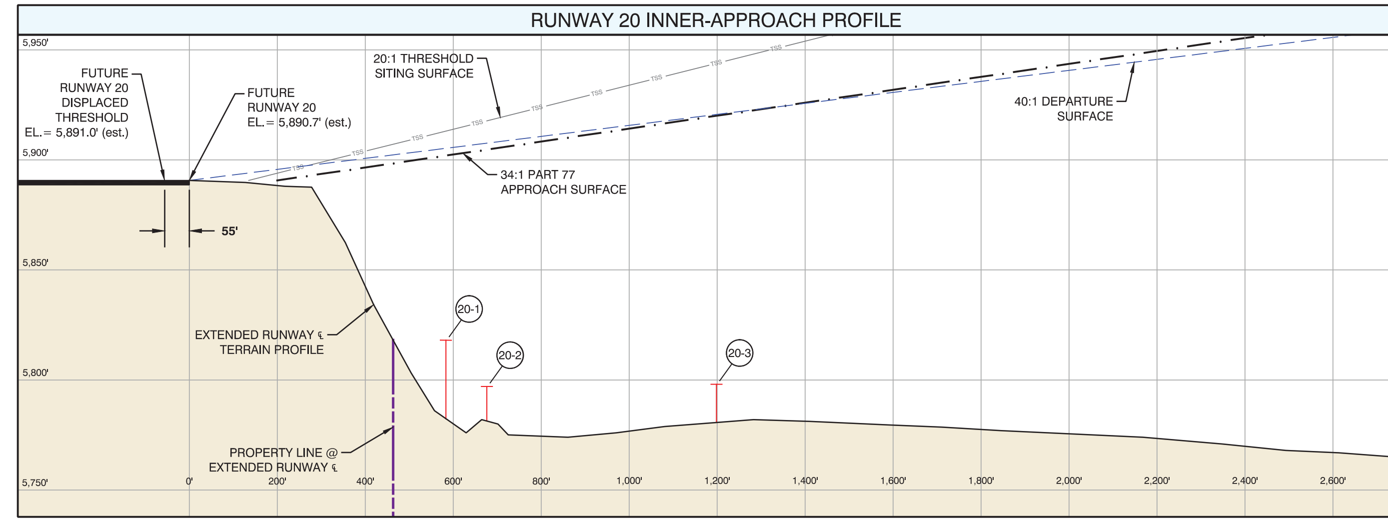
RUNWAY 20 INNER-APPROACH PLAN



RUNWAY 2 INNER-APPROACH PROFILE



RUNWAY 20 INNER-APPROACH PROFILE



LEGEND: PLAN VIEW

- Airport Property Boundary
- Future Airport Property
- Part 77 Surfaces
- Part 77 Approach Surface
- Part 77 Surface Contour
- Threshold Siting Surface
- 40:1 Departure Surface
- Future Runway Protection Zone (RPZ)
- Object Clear of Part 77 Surface
- Object Penetrates Part 77 Surface
- Terrain Contours

LEGEND: PROFILE VIEW

- Part 77 Approach Surface
- Threshold Siting Surface
- Object Under Approach Surface

NOTES:

- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
- Only airspace surfaces associated with ultimate runway configurations are illustrated. All objects are analyzed against the ultimate airspace surfaces.
- Runway elevation data source: As built engineering documents from airport management and R.W. Brandley Engineering (2014).
- Objects elevation source: Digital Obstacle File (Nov. 12, 2013 release). AGIS survey recommended.
- Road elevations estimated based on LIDAR ground contours.
- Proposed Runway 2-20 extension and widening project will require an Aeronautical Survey for support of amended Instrument Approach Procedures.

* 15 feet vertical clearance added to road elevations, per Part 77.

RUNWAY 2 OBJECTS

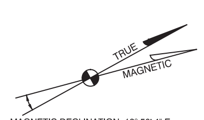
POINT #	OBJECT DESCRIPTION	OBJECT ELEVATION	PART 77 SURFACE	PART 77 SURFACE ELEVATION	PART 77 PENETRATION	TSS SURFACE ELEVATION	TSS PENETRATION	RUNWAY 20 DEPARTURE SURFACE ELEVATION	RUNWAY 20 DEPARTURE SURFACE PENETRATION	DISPOSITION
2-1	Pole	5,892'	Approach	5,909'	-17.1'	5,949.7'	-57.6'	5,904.7'	-12.6'	No Action
2-2	Road*	5,893'	Approach	5,911'	-17.9'	5,951.5'	-58.4'	5,905.6'	-12.6'	No Action
2-3	Road*	5,901'	Approach	5,912'	-11.1'	5,952.6'	-51.6'	5,906.1'	-5.1'	No Action
2-4	Road*	5,897'	Approach	5,912'	-15.3'	5,952.8'	-55.8'	5,906.2'	-9.2'	No Action

Note: A negative penetration value indicates the object is clear of the airspace surface.

RUNWAY 20 OBJECTS

POINT #	OBJECT DESCRIPTION	OBJECT ELEVATION	PART 77 SURFACE	PART 77 SURFACE ELEVATION	PART 77 PENETRATION	TSS SURFACE ELEVATION	TSS PENETRATION	RUNWAY 2 DEPARTURE SURFACE ELEVATION	RUNWAY 2 DEPARTURE SURFACE PENETRATION	DISPOSITION
20-1	Road*	5,818'	Approach	5,902'	-84.0'	5,912.8'	-94.8'	5,905.3'	-87.3'	No Action
20-2	Road*	5,797'	Approach	5,905'	-107.8'	5,917.4'	-120.4'	5,907.7'	-110.7'	No Action
20-3	Road*	5,798'	Approach	5,920'	-122.1'	5,943.5'	-145.5'	5,920.7'	-122.7'	No Action

Note: A negative penetration value indicates the object is clear of the airspace surface.



MAGNETIC DECLINATION 13° 50' 4" E
ANNUAL CHANGE: 0° 7.1' WEST
FEBRUARY 2014

0 200' 400'
FEET
VERTICAL EXAGGERATION OF 5
VERTICAL SCALE: 1"=40'

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

INNER-APPROACH: RUNWAY 2-20

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133 Aviation Boulevard, Suite 100
Santa Rosa, California 95403
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Fax (707) 526-9721
www.meadhunt.com

TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 6 OF 11

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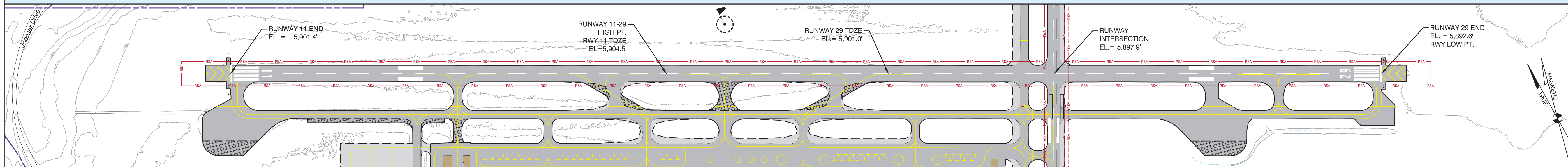
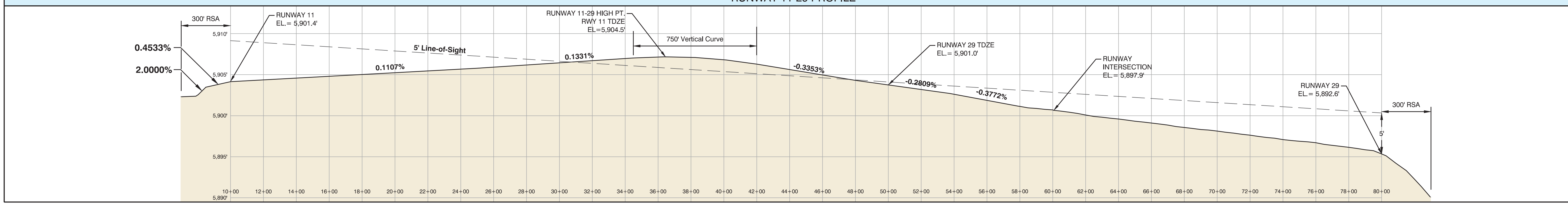
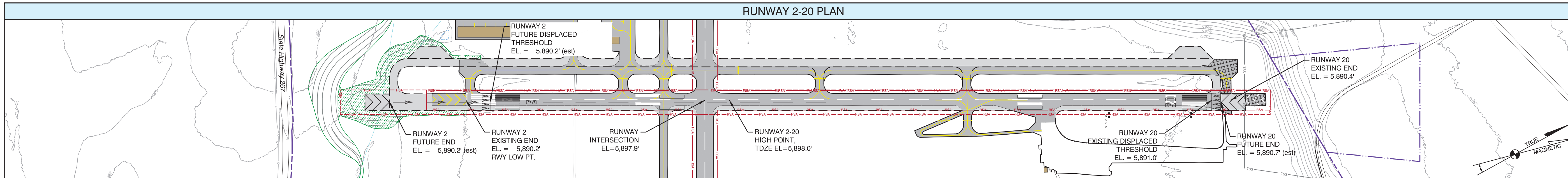
RUNWAY 11-29 PLAN AND PROFILE



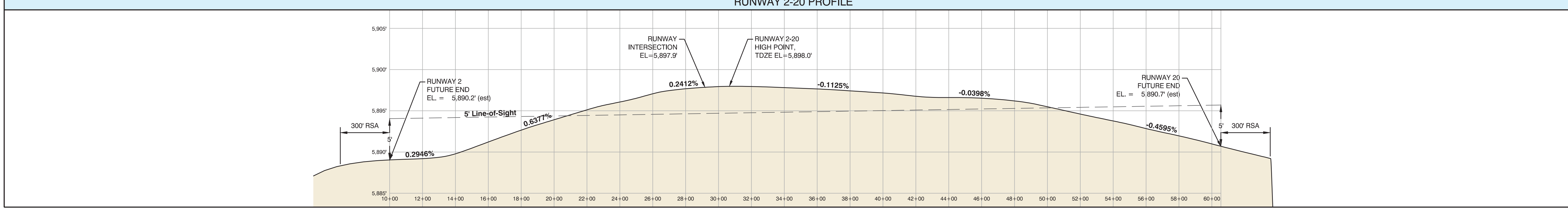
RUNWAY 11-29 PROFILE



RUNWAY 2-20 PLAN



RUNWAY 2-20 PROFILE



LEGEND

- Airport Property Boundary
- Future Airport Property
- Existing Pavement
- Future Pavement
- Runway Safety Area
- Terrain Contours
- 5' Line-of-Sight

NOTES:

- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
- Runway elevation data source: As built engineering documents from airport management and R.W. Brandley Engineering (2014).
- Proposed Runway 2-20 extension and widening project will require an Aeronautical Survey for support of amended Instrument Approach Procedures and National Environmental Policy Act (NEPA) determination prior to design.
- Magnetic declination 13° 50' 4" E, Annual change: 0° 7.1' west, February 2014.

300'
0 FEET 600'
VERTICAL EXAGGERATION OF 50
VERTICAL SCALE: 1"=6'

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NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

RUNWAY CENTERLINE PROFILES

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133 Aviation Boulevard, Suite 100
Santa Rosa, California 95403
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Fax (707) 526-9721
www.meadhunt.com

TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 7 OF 11

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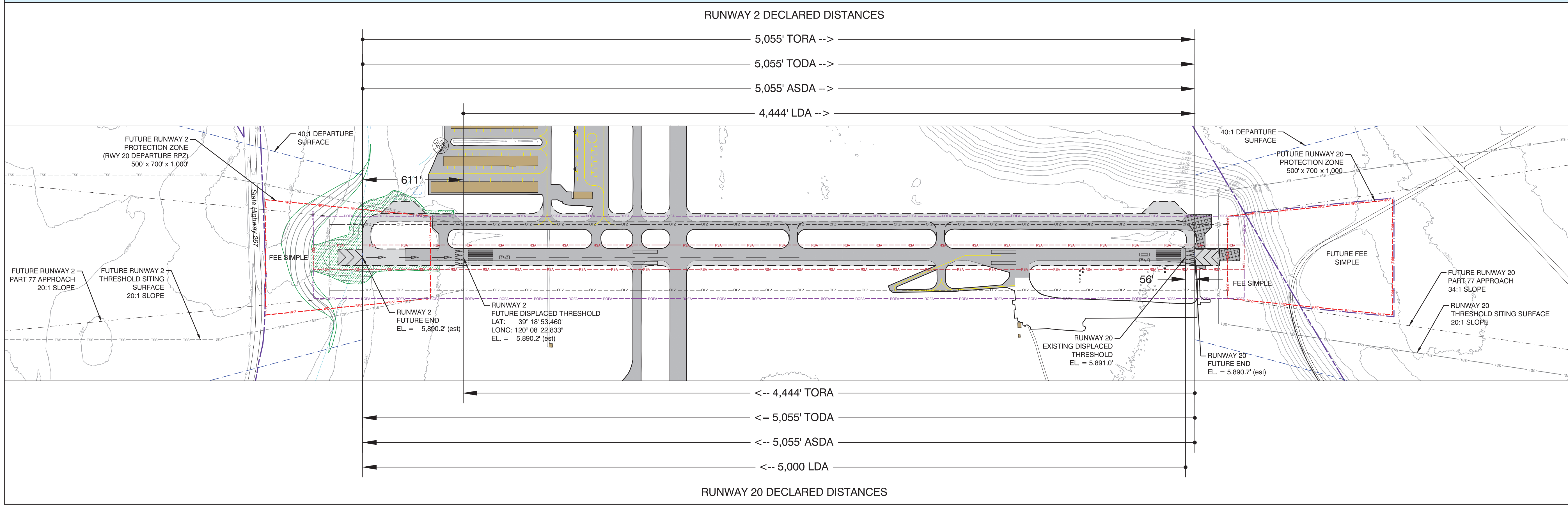
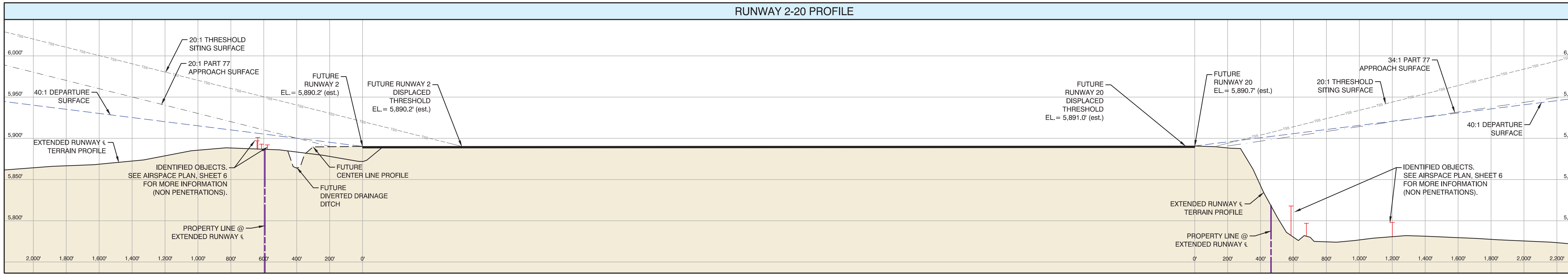
RUNWAY 2-20 FUTURE DECLARED DISTANCES



RUNWAY 2-20 PROFILE

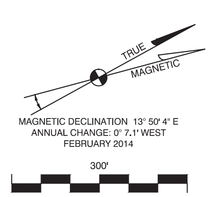


LEGEND

- Airport Property Boundary
- Future Airport Property
- Existing Pavement
- Future Pavement
- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Obstacle Free Zone
- Runway Protection Zone (RPZ)
- Part 77 Approach Surface
- Threshold Siting Surface (TSS)
- 40:1 Departure Surface
- Terrain Contours
- Identified Object (Non-Penetration - See Sheet 6 for more information)

NOTES:

- Runway ends, Part 77 surface contours and obstruction elevations are shown in NAD83 and NAVD88. All elevations in feet above mean sea level (MSL).
- Only airspace surfaces associated with ultimate runway configurations are illustrated. All objects are analyzed against the ultimate airspace surfaces.
- Runway elevation data source: As built engineering documents from airport management and R.W. Brandley Engineering (2014).
- Objects elevation source: Digital Obstacle File (Nov. 12, 2013 release). All identified objects shown. See Airspace Plan, Sheet 6 for more information (objects are non-penetrations). Full AGIS survey recommended.
- Proposed Runway 2-20 extension and widening project will require an Aeronautical Survey for support of amended Instrument Approach Procedures and National Environmental Policy Act (NEPA) determination prior to design.



MAGNETIC DECLINATION 13° 50' 4" E
ANNUAL CHANGE: 0° 7.1' WEST
FEBRUARY 2014

VERTICAL EXAGGERATION OF 5
VERTICAL SCALE: 1"=60'

DECLARED DISTANCES

	EXISTING		FUTURE	
	RUNWAY 2	RUNWAY 20	RUNWAY 2	RUNWAY 20
DISPLACED THRESHOLD	N/A	115'	611'	55'
TAKEOFF RUN AVAILABLE (TORA)	N/A	N/A	5,055'	4,444'
TAKEOFF DISTANCE AVAILABLE (TODA)	N/A	N/A	5,055'	5,055'
ACCELERATE-STOP DISTANCE AVAILABLE (ASDA)	N/A	N/A	5,055'	5,055'
LANDING DISTANCE AVAILABLE (LDA)	N/A	N/A	4,444'	5,000'

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

RUNWAY 2-20 DECLARED DISTANCES

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133 Aviation Boulevard, Suite 100
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www.meadhunt.com

TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 8 OF 11

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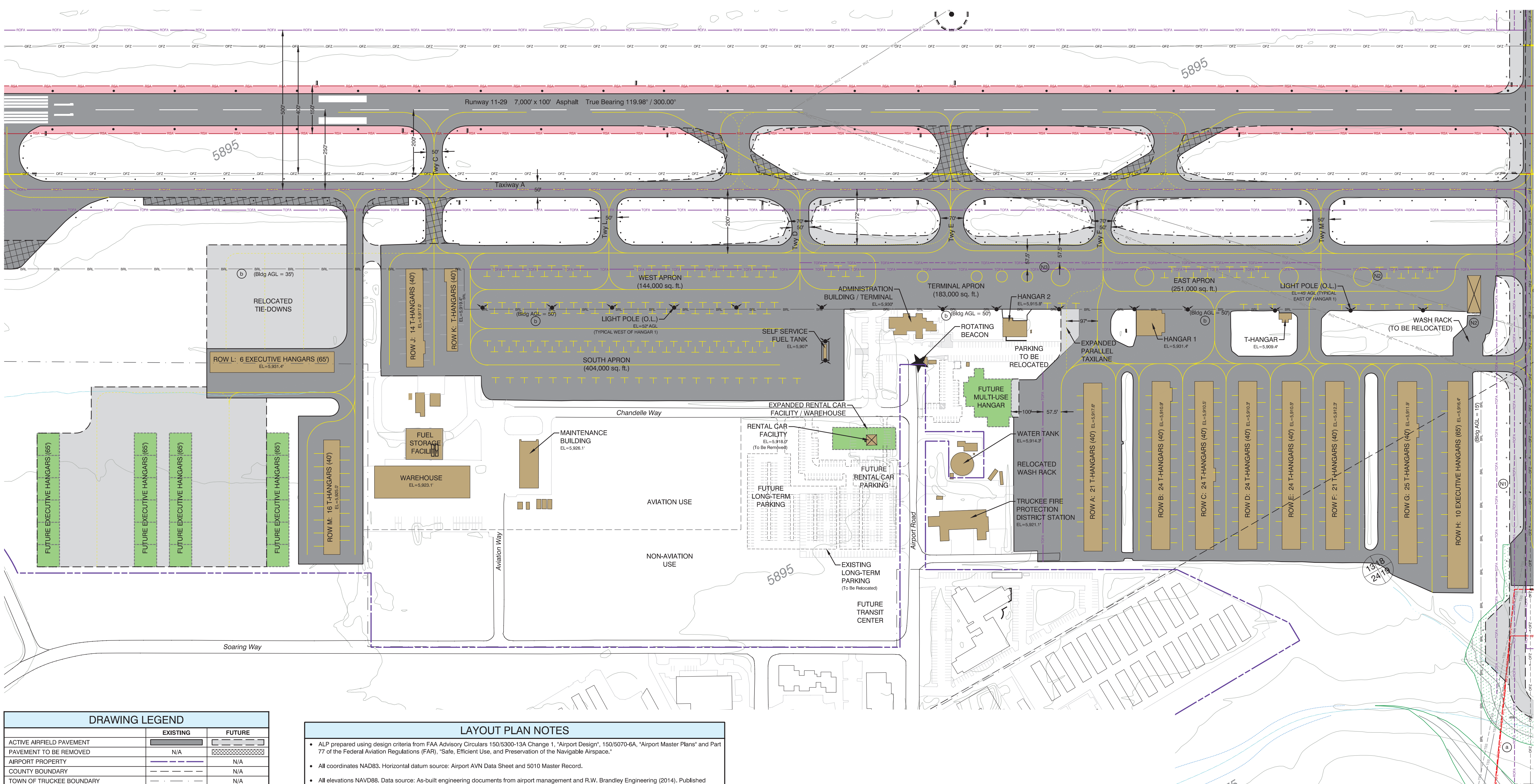

DRAWING LEGEND

	EXISTING	FUTURE
ACTIVE AIRFIELD PAVEMENT		
PAVEMENT TO BE REMOVED	N/A	
AIRPORT PROPERTY		N/A
COUNTY BOUNDARY		N/A
TOWN OF TRUCKEE BOUNDARY		N/A
RUNWAY SAFETY AREA (RSA)	RSA	RSA
RUNWAY PROTECTION ZONE (RPZ)	RPZ	RPZ
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	ROFA
TAXIWAY OBJECT FREE AREA (TOFA)	TOFA	TOFA
OBSTACLE FREE ZONE (OFZ)	OFZ	OFZ
BUILDING RESTRICTION LINE (BRL) (b)	BRL	N/A
RUNWAY VISIBILITY ZONE (RVZ)	RVZ	RVZ
BUILDING - ON AIRPORT		
BUILDING - ON AIRPORT - TO BE RELOCATED		N/A
BUILDING - OFF AIRPORT		N/A
TAXIWAY MARKING (C.L. / TIE-DOWNS)		
BEACON	★	N/A
RUNWAY LIGHTS (EDGE/THRESHOLD/REIL/TWY)		N/A
RUNWAY / TAXIWAY SIGN		
UTILITY / LIGHT POLE		N/A
PUBLIC ROAD		
FENCE		N/A
FILL FOR RUNWAY AND RSA EXTENSION	N/A	
CHANNEL / STREAM / DITCH		N/A
TERRAIN CONTOUR	5900	
CENTER SECTION MARKER	13 18 24 19	N/A

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LAYOUT PLAN NOTES

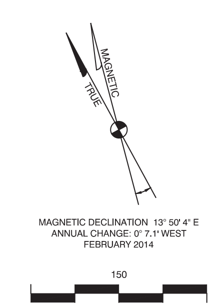
- ALP prepared using design criteria from FAA Advisory Circulars 150/5300-13A Change 1, "Airport Design", 150/5070-6A, "Airport Master Plans" and Part 77 of the Federal Aviation Regulations (FAR), "Safe, Efficient Use, and Preservation of the Navigable Airspace."
- All coordinates NAD83. Horizontal datum source: Airport AVN Data Sheet and 5010 Master Record.
- All elevations NAVD88. Data source: As-built engineering documents from airport management and R.W. Brandley Engineering (2014). Published runway elevation data (5010, AVN Datasheet) is NGVD29. As-built plans from 2012 runway construction on Runway 11-29 and associated survey used.

(a) Extension of Runway 2-20 to the south will require a significant amount of fill plus drainage ditch realignment. Planning level design is illustrated on this Plan. Proposed Runway 2-20 extension and widening project, along with relocation of Parallel Taxiway G will require a National Environmental Policy Act (NEPA) determination prior to design, and an Aeronautical Survey for support of amended Instrument Approach Procedures.

(b) The building restriction line (BRL) is based on a composite of airfield design setbacks, such as the runway visual zone (RVZ), taxiway object free area (TOFA) and Part 77 airspace surfaces. Allowable building elevations above ground level are noted at each line.

NON-STANDARD CONDITIONS

EXISTING CONDITION	DISPOSITION
(N1) Runway 2-20 to parallel Taxiway G centerline separation is 180 feet. Standard runway to parallel taxiway separation for runway design code B-I is 225 feet.	Taxiway G to be realigned for taxiway centerline to runway centerline separation of 240 feet. Taxiway G will then conform to B-II standards, which Runway 2-20 is projected to become.
(N2) Structure and aircraft tie-downs on East Apron located within the runway visibility zone (RVZ), blocking line of sight between intersecting runways.	Building, wash rack and tie-downs to be relocated to account for ultimate RVZ associated with proposed Runway 2-20 extension.
(N3) Aircraft parking positions on Terminal Apron are located within the apron taxilane object free area (TOFA).	Add pavement to edge of apron to allow taxilane to shift away from parking positions and provide proper centerline to fixed / movable object separation.



NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

BUILDING AREA PLAN

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www.meadhunt.com

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 9 OF 11

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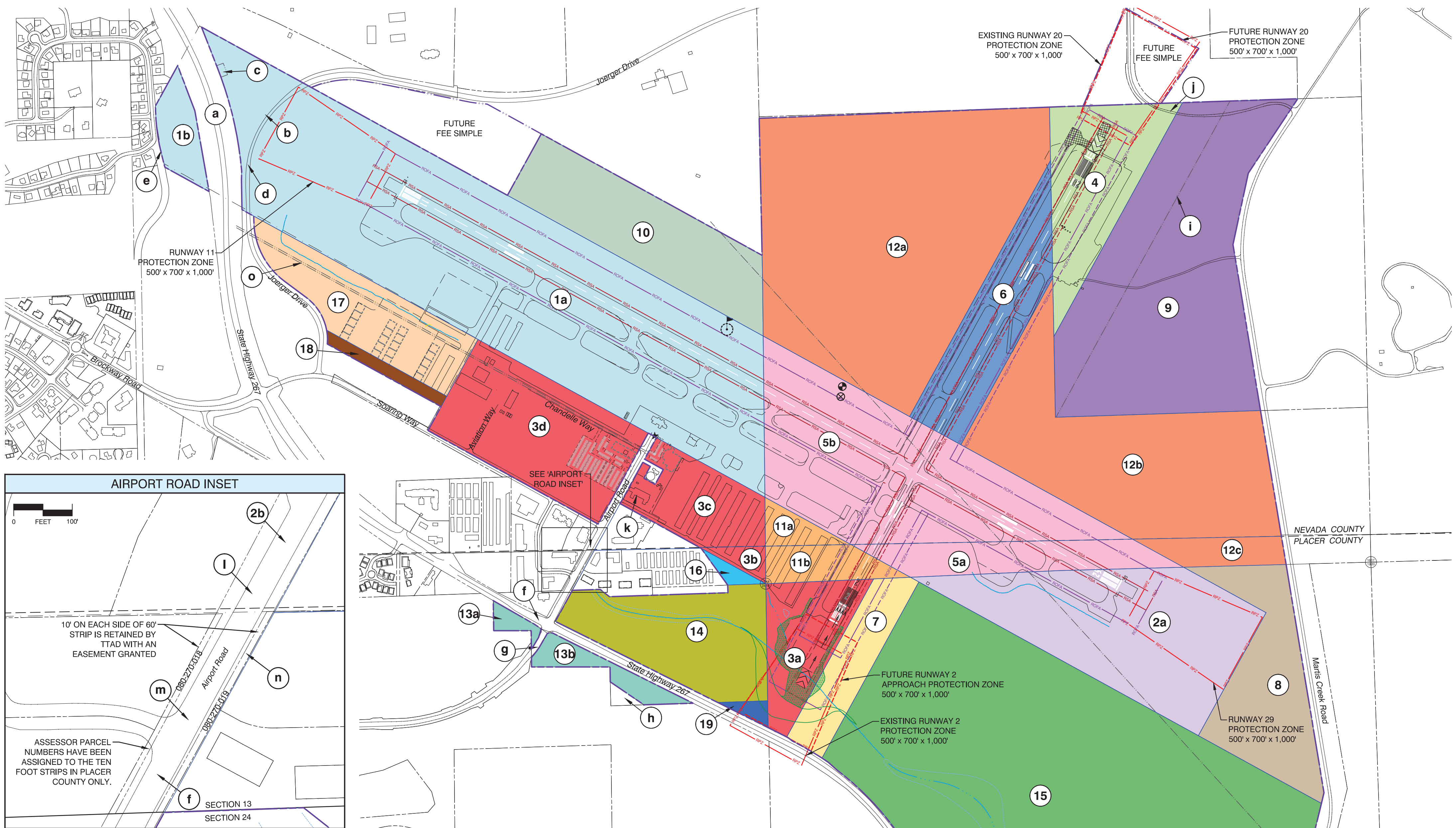

DRAWING LEGEND

	EXISTING	FUTURE
ACTIVE AIRFIELD PAVEMENT		
AIRPORT PROPERTY		
AIRPORT REFERENCE POINT		
AIRPORT PARCEL BOUNDARY		N/A
EXTERNAL PARCEL BOUNDARY		N/A
INTERNAL LEASE BOUNDARY		N/A
COUNTY BOUNDARY		N/A
TOWN OF TRUCKEE BOUNDARY		N/A
EASEMENT		N/A
RUNWAY SAFETY AREA (RSA)	RSA	RSA RSA
RUNWAY PROTECTION ZONE (RPZ)	RPZ	RPZ RPZ
RUNWAY OBJECT FREE AREA (ROFA)	ROFA	ROFA ROFA
BUILDING		
BEACON		N/A
VISUAL APPROACH SLOPE INDICATOR (VASI)		N/A
WIND CONE		N/A
PUBLIC ROAD		
CHANNEL / STREAM / DITCH		N/A
CENTER SECTION MARKER	13 18 24 19	N/A

PROPERTY MAP NOTES

- Airport property boundary source: Truckee-Tahoe Airport. Parcel lines retained from 2005 and 2009 ALP. Airport boundary and individual parcels are not surveyed and therefore should not be considered a precise legal description. Best available data used.
- Only immediate airport property illustrated on this sheet. Remaining Truckee Tahoe Airport District property interests are shown on Sheet 11.
- Total existing Airport property = ±936 acres, based on area calculations in the digital file of this Plan. Total from individual parcels may not equal this due to rounding.

AIRPORT PROPERTY DATA

PARCEL ID	ACRES	ASSESSORS PARCEL #	TYPE OF INTEREST	GRANTOR	DATE ACQUIRED	CONVEYANCE	BOOK AND PAGE RECORDING	TYPE OF ACQUISTION	FAA GRANT NUMBER	NOTES
1a	143.4	19-440-68	Fee Simple	Joerger et ux	June 22, 1960	Grant Deed	283 O.R. 177 (Nevada Co.)	Local Purchase	N/A	Original 159.3 acre parcel in Section 13. Reserves a 20-foot easement along west boundary. Purchase price: $51,320
1b	6.3	19-440-69								
2a	50.0	110-010-004	Fee Simple	Joerger et ux	June 22, 1960	Gift Deed	283 O.R. 179 (Nevada Co.) 844 O.R. 297 (Placer Co.)	Local Purchase	N/A	Original 46 acres in Section 19, together with 80-foot strips of land in Section 13 (Placer & Nevada Counties).
2b	N/A	N/A								
3a	16.2	110-010-002	Fee Simple	Joerger et al	January 12, 1967	Grant Deed	415 O.R. 290 (Nevada Co.) 1143 O.R. 161 (Placer Co.)	Local Purchase	N/A	Four parcels (two in Section 13 and two in Section 19) - all southerly of original airport lands. Purchase price: $75,000.
3b	2.1	080-270-024								
3c	15.8	19-440-68								
3d	33.8	19-440-68								
4	25.6	49-004-07	Fee Simple	Waddles et ux	June 2, 1967	Grant Deed	421 O.R. 562 (Nevada Co.)	Local Purchase	N/A	Two adjacent parcels forming a triangle in Section 18 and obtainied for Runway 2-20. Purchase price: $24,000
5a	14.6	110-010-004	Fee Simple	USA	July 7, 1967	Deed	430 O.R. 213 (Nevada Co.) 1171 O.R. 486 (Placer Co.)	Local Purchase	N/A	Original airport property, 1200-foot strip in Section 18 only. Reserves mineral and timber rights; contains reversion clause if used for other than airport purposes.
5b	61.2	49-004-10								
6	23.7	49-004-13	Fee Simple	USA	April 24, 1968	Deed	450 OR 472 (Nevada Co.)	Local Purchase	N/A	500-foot strip in the West half of Section 18 obtained for Runway 2-20. Reserves mineral and timber rights; contains reversion clause if used for other than Airport purposes.
7	13.3	110-010-003	Fee Simple	Woolverton	June 2, 1970	Grant Deed	1300 OR 696 (Placer Co.)	Local Purchase	N/A	Parcel in SE portion Section 19 adjacent to 3a. Purchase price: $17,000.
8	26.9	110-010-006	Fee Simple	Woolverton	October 6, 1970	Grant Deed	1319 OR 519 (Placer Co.)	Local Purchase	N/A	26.88 acre parcel; SE and abutting SE end of Runway 11-29. Eastern boundary is Martis Dam Road Section 19. Purchase price: $34,000.
9	78.0	49-004-16	Fee Simple	Waddle	March 10, 1971	Grant Deed	549 OR 34 (Nevada Co.)	Local Purchase	N/A	77.96 acre parcel in E½ Section 18 E of Runway 2-20. This purchase supersedes the easements obtained in 'i'. Purchase price: $85,000.
10	32.0	19-440-68	Fee Simple	Woolverton	May 26, 1972	Grant Deed	604 OR 395 (Nevada Co.)	Local Purchase	N/A	32.02 acre parcel in Section 13 along NE line of the original airport parcel in 1960. Purchase price: $32,500.
11a	3.5	49-004-08	Fee Simple	USA	June 3, 1976	Deed	804 OR 574 (Nevada Co.)	Local Purchase	N/A	10.52 acre parcel in SW¼ SW¼, Section 18 adjacent to the SW corner of Section 18. No Cost.
11b	7.0	110-010-001								
12a	106.9	49-004-11	Fee Simple	Topol	October 26, 1982	Grant Deed	1982-025550 (Nevada Co.) 1982-0038406 (Placer Co.) [2537 OR 526 (Placer Co.)]	Local Purchase	N/A	3 parcels: Nevada Co.-106.95 acre parcel in W½ Section 18 65.74 acre parcel adjacent to NE line of original (1960) Airport property, Section 18. Purchase price: $399,000.
12b	59.7	49-004-27								
12c	6.1	110-010-006								
13a	1.5	080-270-042	Fee Simple	Koregelos	July 19, 1988	Grant Deed	1988-0036734 (Placer Co.) [3446 OR 473 (Placer Co.)]	Local Purchase	N/A	Parcel across the intersection of Hwy. 267 and Schaefer Mill Road. Per assessors 7.8 acre parcel (later diminished by 0.475 acre parcel in sale in 'g' and 0.67 in 'h'). Purchase price: $99,500
13b	5.1									
14	27.7	080-270-044	Fee Simple	USA	May 8, 1991	Grant Deed	1991-0043928 (Placer Co.)	Local Purchase	N/A	Per assessor, 30 acre parcel (later diminished by 1.6 acre parcel traded to Scardigli in exchange for Parcel 16 below).
15	148.6	110-010-031	Fee Simple	McKinley	October 29, 1991	Condemnation	91-0068458 (Placer Co.)	Local Purchase	N/A	Parcel in Section 19, SE of Parcel 7, abutts Martis Dam Rd. on SE.
16	1.21	080-270-047	Fee Simple	Scardigli Exchange	February 2, 1999	Grant Deed	1999-0036029 (Placer Co.) 1999-0036027 (Placer Co.)	FAA Grant	AIP 3-06-0262-10	TTAD to Scardigli, 1.57 acre parcel from Parcel 14 in exchange for boundary line adjustment giving TTAD 1.21 acre parcel for snow storage abutting S line in Section 13.
17	22.6	19-620-037	Fee Simple	Woolverton	Sept. 30, 2003	Condemnation	2003-052304 (Nevada Co.)	FAA Grant	AIP 3-06-0262-14	22.6 acre parcel at southwest portion of airport AIP No. 3-06-0262-14.
18	2.6	19-620-032	Fee Simple	Woolverton	Sept. 30, 2003	Condemnation	2003-052304 (Nevada Co.)	FAA Grant	AIP 3-06-0262-14	2.64 acre parcel at southwest portion of airport AIP No. 3-06-0262-14.
19	1.1	080-270-026	Fee Simple	DMD/Highlands Group,LLC	June 24, 2002	Grant Deed	2002-0111597 (Placer Co.)	Local Purchase	N/A	1.12 acre parcel to be deeded to TTAD in exchange for 0.67 acres of Parcel 13 (APN 080-270-042).

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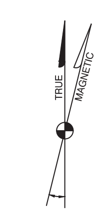
LEASE AND EASEMENT DATA

PARCEL ID	ACRES	GRANTOR	GRANTEE	DATE ACQUIRED	CONVEYANCE	BOOK AND PAGE RECORDING	NOTES
a	9.64	TTAD	State of California	July 28, 1999	Grant Deed	2000-003136 (Nevada Co.)	9.64 acres from Parcel 1 for Highway 267 bypass.
b	N/A	TTAD	State of California	July 28, 1999	Grant of Easement	2000-003136 (Nevada Co.)	TTAD granted a drainage easement to the State of California.
c	N/A						
d	N/A						TTAD granted an easement for a public road.
e	N/A	Joerger et ux (Reservation by Grantor)	TTAD	June 22, 1960	Easement	283 O.R. 177 (Nevada Co.)	20-foot easement along the most westerly boundary of the property conveyed by Deed for Parcel 1 reserved by Grantors.
f	N/A	Rafton et ux	TTAD	April, 26, 1968	Grant of Easement	N/A	Gives TTAD: 80-foot right-of-way for access, utilities, and drainage along Airport Road in Section 24; a 4-foot easement and a 15-foot easement, providing utility access in Section 24 along the North side of Hwy. 267 and Northwest of Airport Road.
g	0.475	TTAD	M.Cr LLC	Sept. 13, 1996	Grant Deed	96-053944 (Placer Co.)	0.475 acres parcel Schaefer Road bisects Parcel 13.
h	0.67	TTAD	MDB/Highlands Grp. LLC	Sept. 19, 2002	Grant Deed	2002-0111597 (Placer Co.)	0.67 acres deeded to MDB/Highlands Group LLC in exchange for 1.12 acres of Parcel 20 (APN 080-270-026).
i	N/A	Waddles et ux	TTAD	July 25, 1967	Easement	425 O.R. 609 (Nevada Co.)	Gives TTAD the right to limit the height of trees and structures on a strip of land 350-feet in width, lying east, adjacent and parallel with the land obtained in Parcel 4.
j	N/A	Waddles et ux	Fibreboard Corp.	March 24, 1959	Grant of Easement	216 O.R. 320 (Nevada Co.) 795 O.R. 621 (Placer Co.)	Exception 5, Title Policy 1.06; Grants an exclusive easement, 66-feet in width, affecting the extreme northerly corner of the property obtained in Parcel 4.
k	1.45	TTAD	CDF and TFPD	March 31, 1998	Lease	N/A	TTAD leased 1.45 acres to California Department of Forestry and Truckee Fire Protection District. Fifty (50) year lease dated 3-31-98.
l	N/A	TTAD	Nevada County	July 18, 1961	Quitclaim Deed	301 O.R. 2 (Nevada Co.)	Gives Nevada and Placer Co. a 60-foot strip of land, the centerline of which is identical of the 80-foot strip obtained in parcel 2b above, Section 13. Deed made on the provision that the County's build and maintain an airport access road.
m	N/A	TTAD	Placer County	July 18, 1961	Quitclaim Deed	945 O.R. 56 (Placer Co.)	
n	N/A	TTAD	Joerger et al	Dec. 12, 1966	Easement	415 O.R. 288 (Nevada Co.) 1143 O.R. 527 (Placer Co.)	Grants an easement for access, streets and utilities across the 10-foot strips of land flanking Airport Road right-of-way in Section 13.
o	N/A	N/A	N/A	N/A	Easement	N/A	Sewer line easement (15' wide)



MAGNETIC DECLINATION 13° 50' 4" E
ANNUAL CHANGE: 0° 7.1' WEST
FEBRUARY 2014

500'
0 FEET 1,000'

NO.	REVISION	SPONSOR	DATE
4	Airport Master Plan Update (Rwy 2-20 extension, 13A requirements)	Mead & Hunt, Inc.	2015
3	ALP Update	PBS&J	2009
2	ALP Update	PBS&J	2007
1	ALP Update	PBS&J	2005

TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

EXHIBIT 'A' PROPERTY MAP

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TRUCKEE TAHOE AIRPORT

DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 10 OF 11

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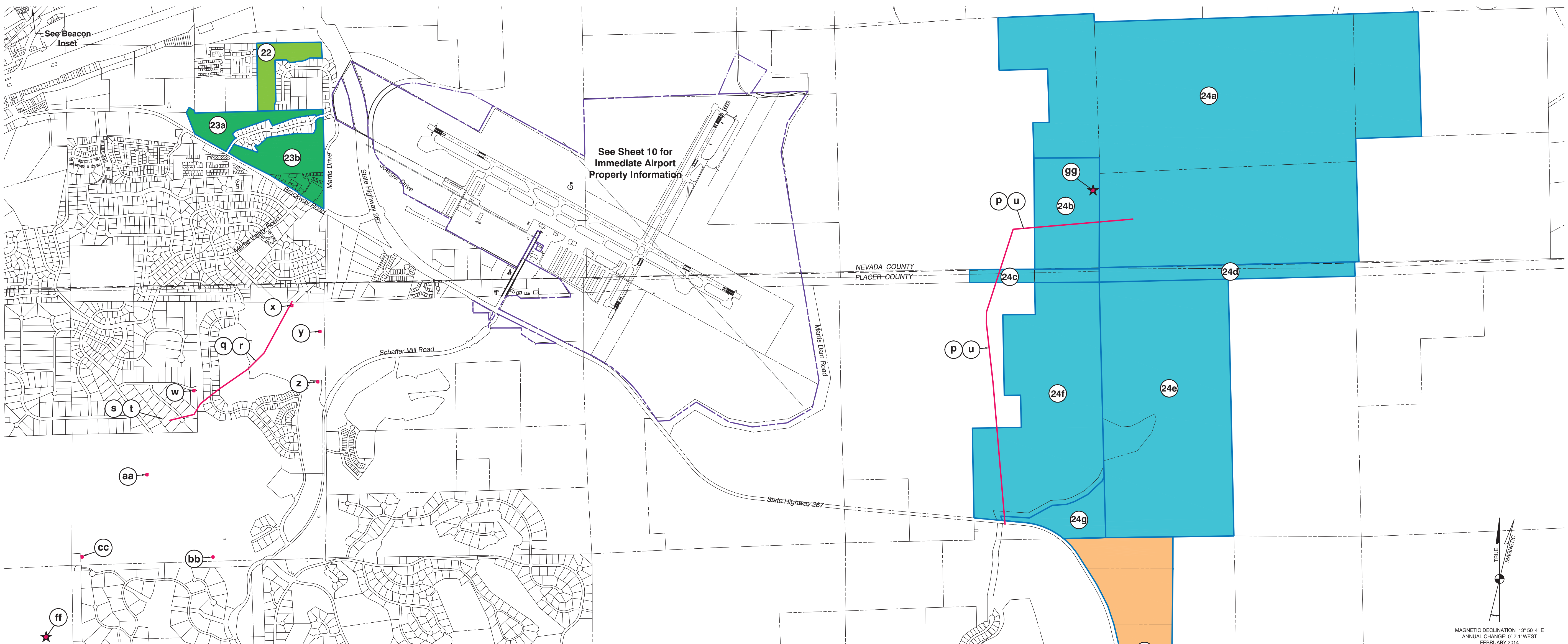

AIRPORT PROPERTY DATA									
PARCEL ID	ACRES	TYPE OF INTEREST	GRANTOR	DATE ACQUIRED	CONVEYANCE	BOOK AND PAGE RECORDING	TYPE OF ACQUISTION	FAA GRANT NUMBER	DESCRIPTION
22	18.46	Fee Simple	Clare C. Winter	December 8, 2003	Grant Deed	2003-639-85	FAA Grant	AIP 3-06-0262-14	Purchase Price: $613,000. FAA funding $569,700, balance TTAD.
23a	23.11	Fee Simple	Ponderosa Greens	2008	Grant Deed	N/A	Local Purchase	N/A	Purchase price: $2,771,261 by TTAD. Leased by TTAD to golf course.
23b	29.74								
24a	796.54	Fee Simple	Waddel	2008	Grant Deed	N/A	Local Purchase	N/A	Property owned in fee by TTAD. Memo of Land Contract with Truckee Donner Land Trust (Spet. 17, 2007) for conservation easement with TDLT.
24b	71.28								
24c	8.20								
24d	28.50								
24e	304.00								
24f	208.00	Fee Simple	Waddel	Sept. 19, 1969	Grant Deed	N/A	Local Purchase	N/A	
24g	27.00	Fee Simple	Waddel	May 29, 1958	Grant Deed	N/A	Local Purchase	N/A	
25	141.14								

LEASE AND EASEMENT DATA							
PARCEL ID	ACRES	GRANTOR	GRANTEE	DATE ACQUIRED	CONVEYANCE	BOOK AND PAGE RECORDING	NOTES
p	N/A	Waddles et ux	TTAD	Nov. 27, 1963	Right-of-Way	357 O.R. 419 (Nevada Co.) 1014 O.R. 422 (Placer Co.)	TTAD obtained a 10-foot power line right-of-way and Beacon Site over portions of Sections 16, 17 & 20. Cost: $3,500.
q	N/A	Joerger et al	TTAD	May 31, 1964	Right-of-Way	1017 O.R. 199 (Placer Co.)	TTAD obtained a 10-foot power line right-of-way in NE¼ of Section 23. Cost: $1,150.
r	N/A	TTAD	Sierra Pacific Power Co.	June 1, 1964	Right-of-Way	1027 O.R. 469 (Placer Co.)	TTAD granted Sierra Pacific Power Company rights obtained in 'q' above.
s	N/A	Beavers et al	TTAD	May 25, 1964	Right-of-Way	1017 O.R. 478 (Placer Co.)	TTAD obtained a 10-foot power line right-of-way plus a beacon site in SE¼ of NW¼, Section 23; contains an obligation to move poles to conform with future subdivision requirements.
t	N/A	TTAD	Sierra Pacific Power Co.	June 1, 1964	Right-of-Way	1027 O.R. 466 (Placer Co.)	TTAD granted Sierra Pacific Power Company rights obtained in 's' above together with same obligation.
u	N/A	TTAD	Sierra Pacific Power Co.	April 27, 1964	Right-of-Way	N/A	TTAD granted Sierra Pacific Power Company rights obtained in 'p' above together with the same obligations.
v	N/A	U.S. Forest Service	TTAD	Sept. 25, 1963	Agreement	N/A	The Forest Service allowed the TTAD to install a beacon light on Alder Hill and to have access to same. Period of Agreement: Until 6-30-73 or sooner, upon 30 days written notice of cancellation by either party.
w	N/A	Timilick Tahoe Homeowners Assoc.	TTAD	N/A	Easement	N/A	Airport Monitor Easement #1
x	N/A	Martis Valley Associates LLC	TTAD	N/A	Easement	N/A	Airport Monitor Easement #2
y	N/A	Martis Valley Associates LLC	TTAD	N/A	Easement	N/A	Airport Monitor Easement #3
z	N/A	Martis Valley Associates LLC	TTAD	N/A	Easement	N/A	Airport Monitor Easement #4
aa	N/A	Martis Valley Associates LLC	TTAD	N/A	Easement	N/A	Airport Monitor Easement #5
bb	N/A	Martis Valley Associates LLC	TTAD	N/A	Easement	N/A	Airport Monitor Easement #6
cc	N/A	Martis Valley Associates LLC	TTAD	N/A	Easement	N/A	Airport Monitor Easement #7
dd	141.14	Jones	TTAD		Conservation Easement	N/A	Conservation Easement
ff	N/A					N/A	Bald Mountain Beacon Light
gg	N/A					N/A	Dry Lake Beacon Light

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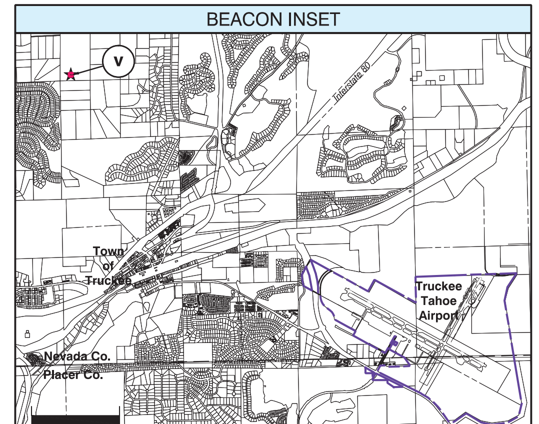
BEACON INSET



DRAWING LEGEND	EXISTING	FUTURE
ACTIVE AIRFIELD PAVEMENT		
AIRPORT PROPERTY		
AIRPORT PARCEL BOUNDARY		N/A
EXTERNAL PARCEL BOUNDARY		N/A
COUNTY BOUNDARY		N/A
TOWN OF TRUCKEE BOUNDARY		N/A
EASEMENT		N/A
REMOTE BEACON	★	N/A

NO.	REVISION	SPONSOR	DATE
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TRUCKEE-TAHOE AIRPORT
TRUCKEE, CALIFORNIA

TTAD PROPERTY MAP

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DESIGN: BM | DRAWN: TE/BM | DATE: JULY 2015 | SHEET 11 OF 11

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MASTER PLAN

Appendix

Appendix D. **Runway 2-20 Extension Analysis**

MASTER PLAN

APPENDIX D

Runway 2-20 Extension Analysis

1. OVERVIEW

In a letter dated May 28, 2015, the FAA provided the following comments on the extension to Runway 2-20 at Truckee Tahoe Airport (TRK or the Airport): "The Draft Airport Master Plan will need to provide a detailed justification for the proposed 405-foot extension and 100-foot widening, on Runway 02-20, based on the Critical Aircraft (Citation V) performance characteristics. There should also be a discussion on the target planning horizon for this proposal and the expected level of National Environmental Policy Act (NEPA) documentation that may be required."

Appendix D was created to provide this analysis and justification. FAA guidance in Advisory Circular 150/5325-4B – Runway Length Requirements for Airport Design (AC 150/5325-4B) was followed and data from a private charter operator is presented to help justify extension.

2. RUNWAY 2-20 EXTENSION JUSTIFICATION

The selected forecasts show that operations by turboprops and business jets will increase over the next 15 years. The FAA Aerospace Forecasts 2015-2035 shows national jet and turboprop operations growing at 2.9 percent over the next 20 years, compared to piston aircraft decreasing by 0.5 percent. It is expected that activity at TRK will follow this trend.

Master Plan forecasts show that Runway 2-20 will need to accommodate more operations by turboprops and business jets in the future. It is expected that many of these operations will use Runway 20 because it is equipped with a straight-in instrument approach with the lowest minimums (1-mile), and favored by the prevailing winds. As activity on Runway 2-20 increases, additional length and width are recommended for the purpose of safety and efficient operations.

The existing length of Runway 2-20 imposes some operational restrictions on the Cessna Citation V design aircraft, forcing limitations to takeoff payloads and fuel when it is necessary to use this runway. Extending Runway 2-20 would likely encourage operators to use the runway. This will help distribute aircraft operations between Runway 2-20 and Runway 11-29, and help mitigate noise impacts on nearby residences – particularly west of the approach end of Runway 11. Detailed analysis of noise impacts on these residences is presented in Chapter 4.

The primary goals in extending Runway 2-20 are to increase safety margins for jet and turboprop operators and distribute aircraft operations to help disperse noise and overflight impacts away from residential areas.

2.1 Preferred Runway 2-20 Alternative

The preferred alternative for Runway 2-20 is to increase the length of the runway to at least 5,000 feet. Industry standards for charter companies generally cite 5,000 feet of runway length as a benchmark for being able to land and depart on.

To accomplish this, Runway 2-20 would be lengthened to the south and declared distances would be applied for operations in both directions. Lengthening to the north is impractical due to steep terrain at the approach end of

Runway 20. The preferred alternative extends Runway 2-20, 465 feet to the south so total length of the runway equals 5,055 feet. The landing threshold for Runway 2 is displaced 611 feet from the proposed runway end. The proposed alternative for extending Runway 2-20 is presented in Chapter 4 (page 4-21). Runway 2-20 should also incorporate RDC B-II design upgrade.

The application of declared distances and threshold displacement shifts the Runway 2 RPZ north, onto Airport controlled property, and off of Highway 267. This approach conforms to FAA interim RPZ guidance by eliminating an incompatible land use (Highway 267) from the RPZ, and moving the RPZ onto Airport property. The future layout of Runway 2-20 and declared distances, with runway design surfaces and airspace surfaces, are presented on Sheet 8 of the airport layout plan (see Appendix C). Extending Runway 2-20 to 5,055 feet and widening to 100 feet increases safety margins and should improve traffic dispersion across the surrounding area.

3. RUNWAY LENGTH ANALYSIS

FAA guidance in AC 150/5325-4B is the standard for determining appropriate runway length at airports. This AC prescribes steps and formulas to determine runway length, based on various inputs: the critical aircraft and fleet mix, airport elevation, temperature, and other aircraft and runway conditions. The goal of the process is to plan runway length that is suitable for the forecasted critical design aircraft.

AC 150/5325-4B outlines a five-step procedure to help determine recommended runway lengths for a selected list of critical design aircraft.

- **Step 1 – Identify the list of critical design airplanes that will make regular use of the proposed runway.**

The existing and future critical aircraft at TRK is a medium-sized business jet, the Cessna Citation V (Model 560). Other aircraft that are prominent at TRK and fall within the turboprop/jet category include: Beechcraft King Air and Super King Air series, Cessna 441 and Cessna Citation jets (500 series).

- **Step #2 – Identify the airplanes that will require the longest runway lengths at maximum certificated takeoff weight (MTOW).**

The Cessna 560 series is the aircraft that regularly uses TRK that requires the longest runway length. Other aircraft operating at TRK that require similar runway lengths are other small and medium jets, with a certified MTOW under 60,000 pounds. Aircraft with a MTOW over 60,000 pounds rarely operate at TRK.

- **Step #3 – Use table 1-1 and the airplanes identified in step #2 to determine the method that will be used for establishing the recommended runway length.**

Table 1-1 in AC 150/5325-4B shows that the airplane weight category that should be analyzed for runway length at TRK is 'over 12,500 pounds but less than 60,000 pounds'. Four different graphs developed by the FAA will be used in Step 4 that will indicate preferred runway length for aircraft within this weight class family.

- **Step #4 – Select the recommended runway length from among the various runway lengths generated by Step #3.**

Four runway length graphs are developed by the FAA for operations by aircraft over 12,500 pounds but less than 60,000 pounds. These graphs are contained in Figures 3-1 and 3-2 in AC 150/5325-4B.

Figure 3-1 in AC 150/5325-4B takes into account aircraft that comprise the "75 percent of the fleet" category and the recommended runway lengths for these aircraft. The "75 percent of the fleet at 60 percent useful load" curve provides a runway length sufficient to satisfy the operational requirements of approximately 75 percent of the fleet at 60 percent useful load.

Figure 3-2 in AC 150/5325-4B provides recommended runway lengths for 100 percent of the fleet of aircraft over 12,500 pounds but less than 60,000 pounds.

A list of aircraft provided in AC 150/5325-4B shows that aircraft that fall into the 75 percent of the fleet are the prevalent jets operating at TRK. However, aircraft within the other 25 percent of the fleet do use TRK. Both graphs in Figures 3-1 and 3-2 are used to evaluate runway length for TRK. The distinction between the tables is that airplanes listed in table 3-2 require at least 5,000-foot runways at mean sea level and at the standard day temperature of 59° F.

The design procedure requires the following information: airport elevation above mean sea level, mean daily maximum temperature of the hottest month at the airport, the critical design airplanes under evaluation with their respective useful loads.

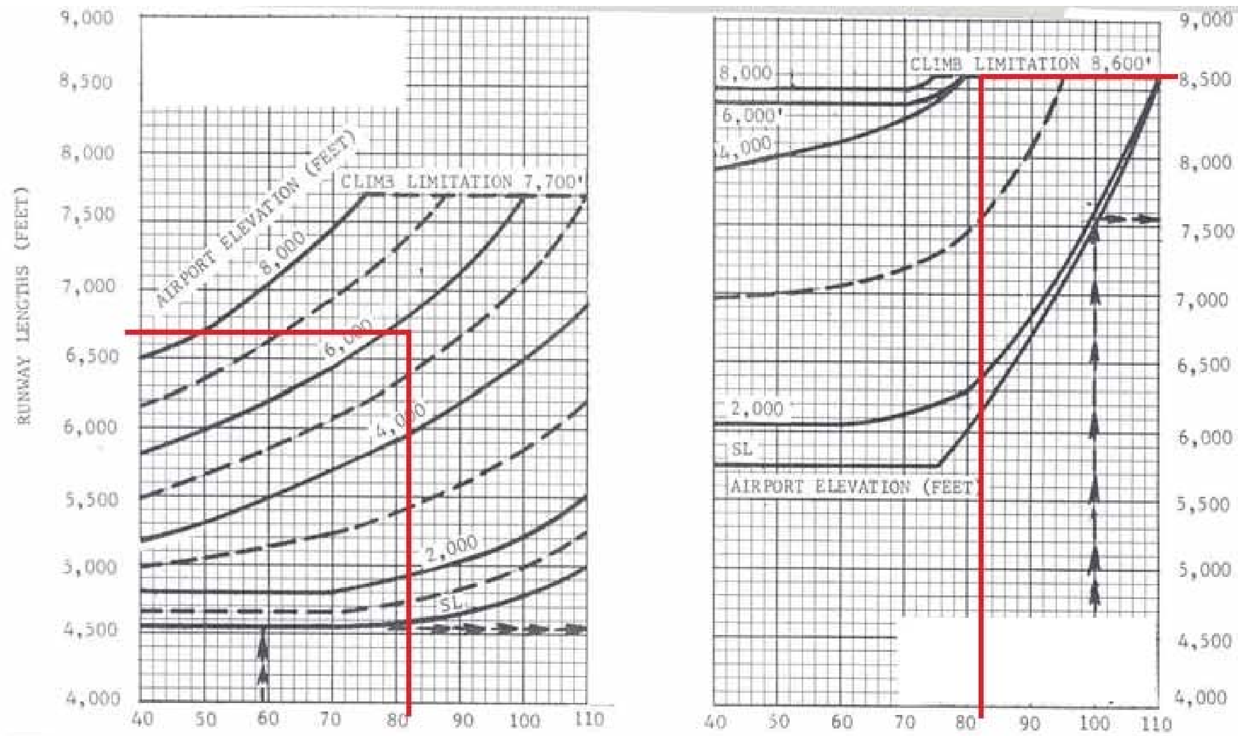
- **Airport Elevation: 5,904 feet MSL**
- **Mean Maximum Temperature: 82.3 degrees Fahrenheit (July)**

Temperature source: Western Regional Climate Center, Station ID: Truckee Ranger Station, CA #049043

Aircraft that comprise the "75 percent of fleet" category can be accommodated by the runway lengths in Figure 3-1 from AC 150/5325-4B.

AC 150/5325-4B Figure 3-1: 75 Percent of Fleet at 60 or 90 Percent Useful Load:

75 percent of fleet at 60 percent useful load   75 percent of fleet at 90 percent useful load



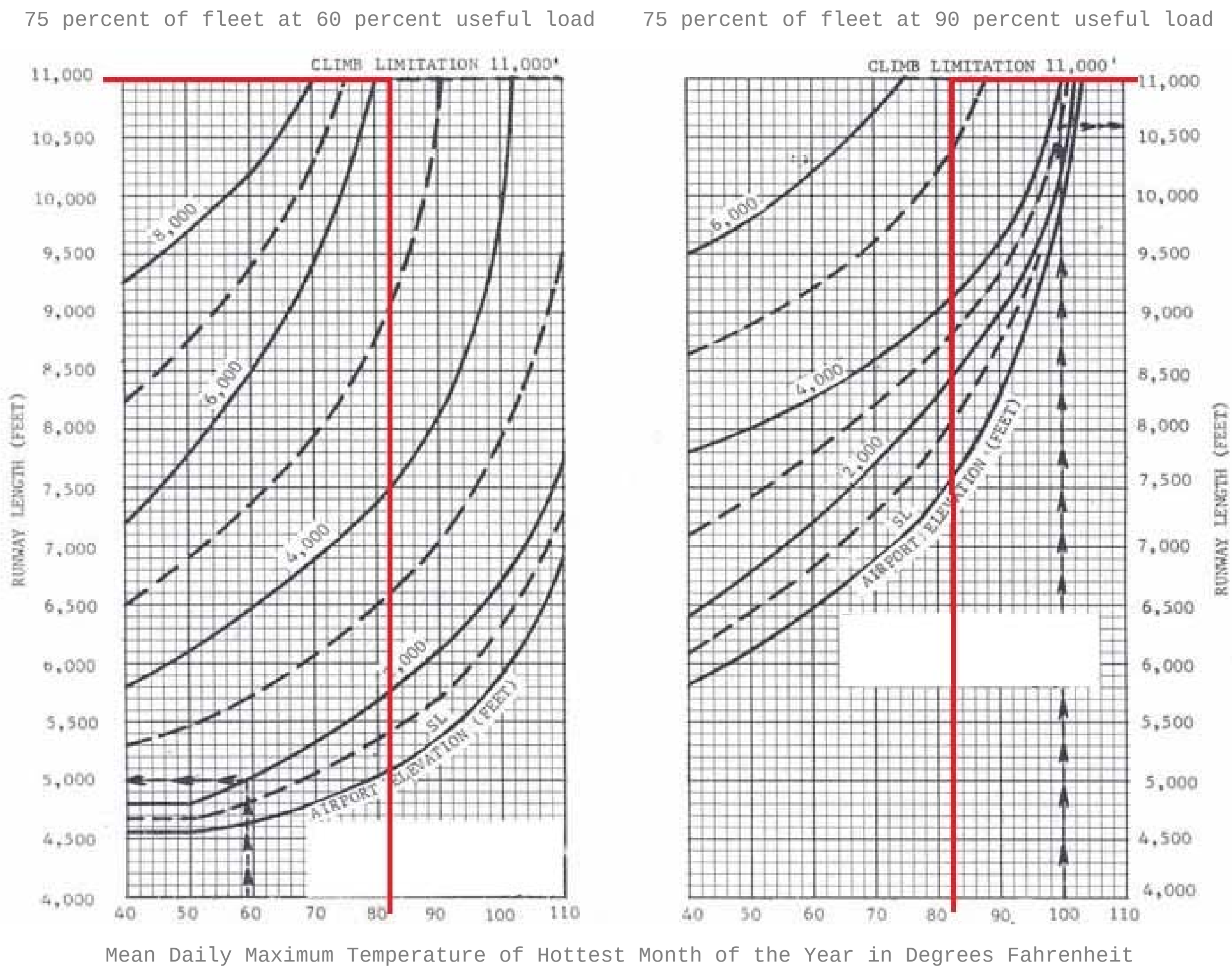
Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

The red lines indicate performance parameters for an airport with TRK temps and elevation. Based on temperature and Airport elevation, the following lengths are recommended for 75 percent of the fleet (greater than 12,500 pounds and less than 60,000 pounds):

- **75 percent of fleet at 60 percent useful load = 6,700'**
- **75 percent of fleet at 90 percent useful load = 8,600' (climb limitation)**

AC 150/5325-4B Figure 3-2, provides the remaining airplanes beyond that of table 3-1 that comprise the “100 percent of fleet” category.

AC 150/5325-4B Figure 3-2: 100 Percent of Fleet at 60 or 90 Percent Useful Load:



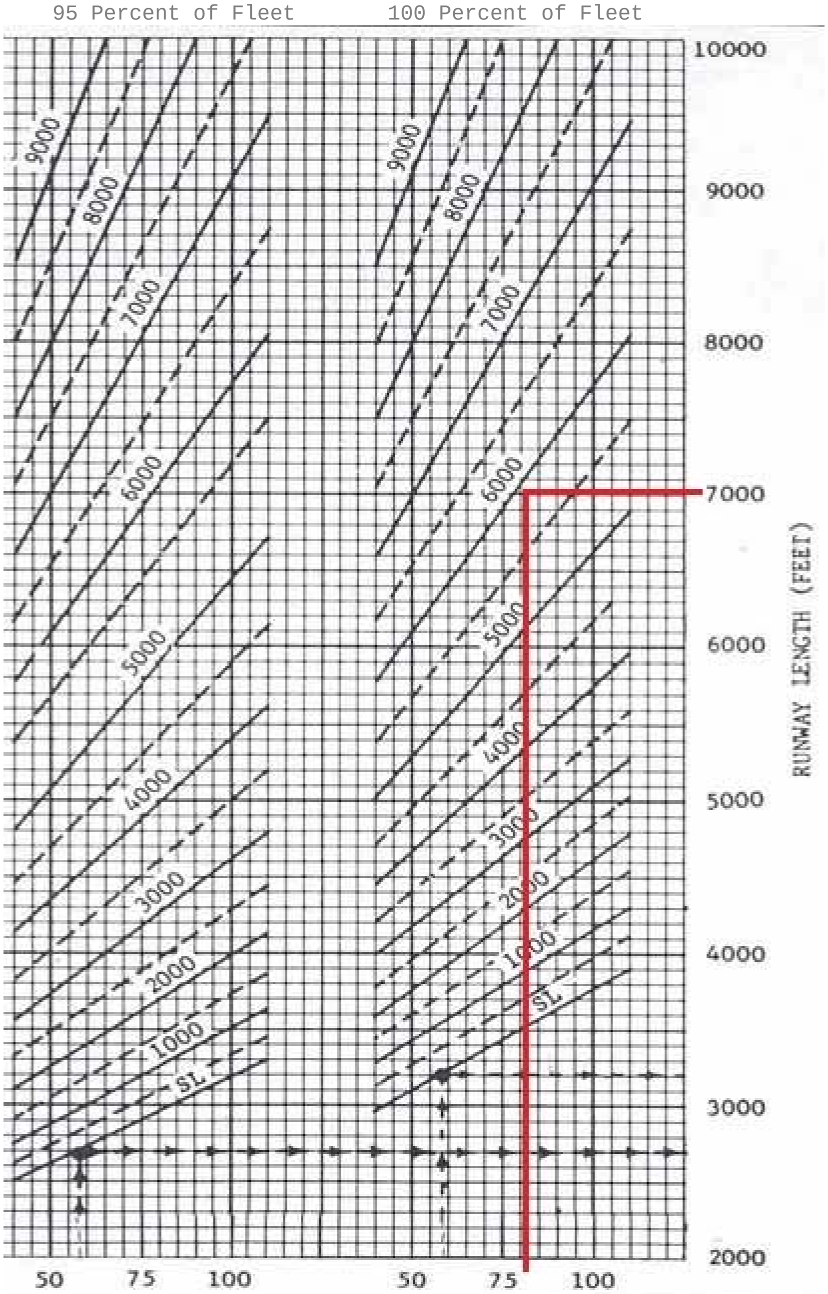
The red lines indicate performance parameters for an airport with TRK temps and elevation. Based on temperature and Airport elevation, the following lengths are recommended for 100 percent of the fleet (greater than 12,500 pounds and less than 60,000 pounds):

- **100 percent of fleet at 60 percent useful load = 11,000’ (climb limitation)**
- **100 percent of fleet at 90 percent useful load = 11,000’ (climb limitation)**

At elevations over 5,000 feet above mean sea level, the recommended runway length obtained for small airplanes from may be greater than those obtained by Figures 3-1 and 3-2. In this case, the requirements for the small airplanes govern. For airport elevations above 3,000 feet (915 m), the 100 percent of fleet grouping in Figure 2-1 from AC 150/5325-4B is used for this analysis.

AC 150/5325-4B Figure 2-1. Small Airplanes with Fewer than 10 Passenger Seats:

Airport Elevation (feet)
95 Percent of Fleet 100 Percent of Fleet



Mean Daily Maximum Temperature of Hottest
Month of the Year in Degrees Fahrenheit

The graph above shows runway length requirement for small aircraft (less than 12,500 pounds MTOW) at TRK is 7,000 feet. A sample list of these aircraft provided in AC 150/5325-4B include: Raytheon B80 Queen Air, Raytheon E90 King Air, Raytheon B99 Airliner, Raytheon A100 King Air (Raytheon formerly Beech Aircraft), Mitsubishi MU-2L, Swearigen Merlin III-A, Merlin IV-A and Metro II.

This runway length is greater than what was acquired for 75 Percent of Fleet (greater than 12,500 pounds and less than 60,000 pounds) at 60 percent useful load. This is relevant for the runways at TRK since these aircraft also operate one regular basis and are more likely to operate on Runway 2-20. This provides more justification for lengthening Runway 2-20, since the prevailing wind favors operations on Runway 2 and the the runway has GPS approach with 1-mile visibility minimums.

- **Step #5 – Apply any necessary adjustment to the obtained runway length**

The runway lengths obtained from Figures 3-1 and 3-2 in AC 150/5325-4B are based on no wind, a dry runway surface, and zero effective runway gradient. Two formulas are provided in AC 150/5325-4B to calculate runway length adjustments for runway gradient and wet runways.

Effective Runway Gradient (Takeoff Only): The runway lengths obtained from figures 3-1 or 3-2 are increased at the rate of 10 feet for each foot of elevation difference between the high and low points of the runway centerline.

The ends of Runway 2-20 are currently at the same value: 5,890 feet above mean sea level. There is not expected to be a major change in either runway end elevation when the runway is extended. Therefore, no runway length adjustment is necessary for effective runway gradient.

Wet and Slippery Runways: (Applicable Only to Landing Operations of Turbojet-Powered Airplanes). The runway length for turbojet-powered airplanes obtained from the “60 percent useful load” curves are increased by 15 percent or up to 5,500 feet, whichever is less. The runway lengths for turbojet powered airplanes obtained from the “90 percent useful load” curves are also increased by 15 percent or up to 7,000 feet, whichever is less.

Values obtained from Figures 3-1 and 3-2 for the “60 percent useful load” are greater than 5,500 feet, and the runway requirements from Figure 3-2 for “90 percent useful load” are more than 7,000 feet. No runway length adjustment is applicable at TRK for wet runways.

Analysis above shows the required runway length at TRK for various aircraft, based on Airport elevations and the average maximum temperature of the hottest month, ranges from 6,700 feet to 11,000 feet.

3.1 Supplemental Runway Length Analysis

A private charter jet company (NetJets) that regularly operates at TRK provided calculations for runway length requirements of the Cessna 560 series at Truckee. NetJets calculations used the same variables and values (mean maximum temperature and airport elevation) but looked specifically at the aircraft model, as opposed to the previous analysis that looked at a group of aircraft. NetJets analysis for the Cessna 560 follows.

Runway requirements for the Cessna 560 series at MTOW, 82.3° F, 5900 feet elevation, unlimited runway, 15° and 7° flaps:			
Aircraft Model	**Flaps**	**Weight**	**Runway Length Required**
CE560E	15°	16,630 lbs. (MTOW)	6,750’
	7°	16,630 lbs. (MTOW)	7,282’
CE560EP	15°	16,830 lbs. (MTOW)	6,816’
	7°	16,830 lbs. (MTOW)	7,359’
CE560XL	15°	18,937 lbs.*	5,985’
	7°	19,380 lbs.*	8,662’
CE560XLS	15°	19,824 lbs.*	6,177’
	7°	20,200 lbs. (MTOW)	8,430’

*Note: that the elevation placed climb limitations on the Excel fleets during calculations.

This table shows that runway lengths required for the Cessna 560 series are greater than 5000 feet, from 6,000 to 8,600 feet at TRK during the hottest month.

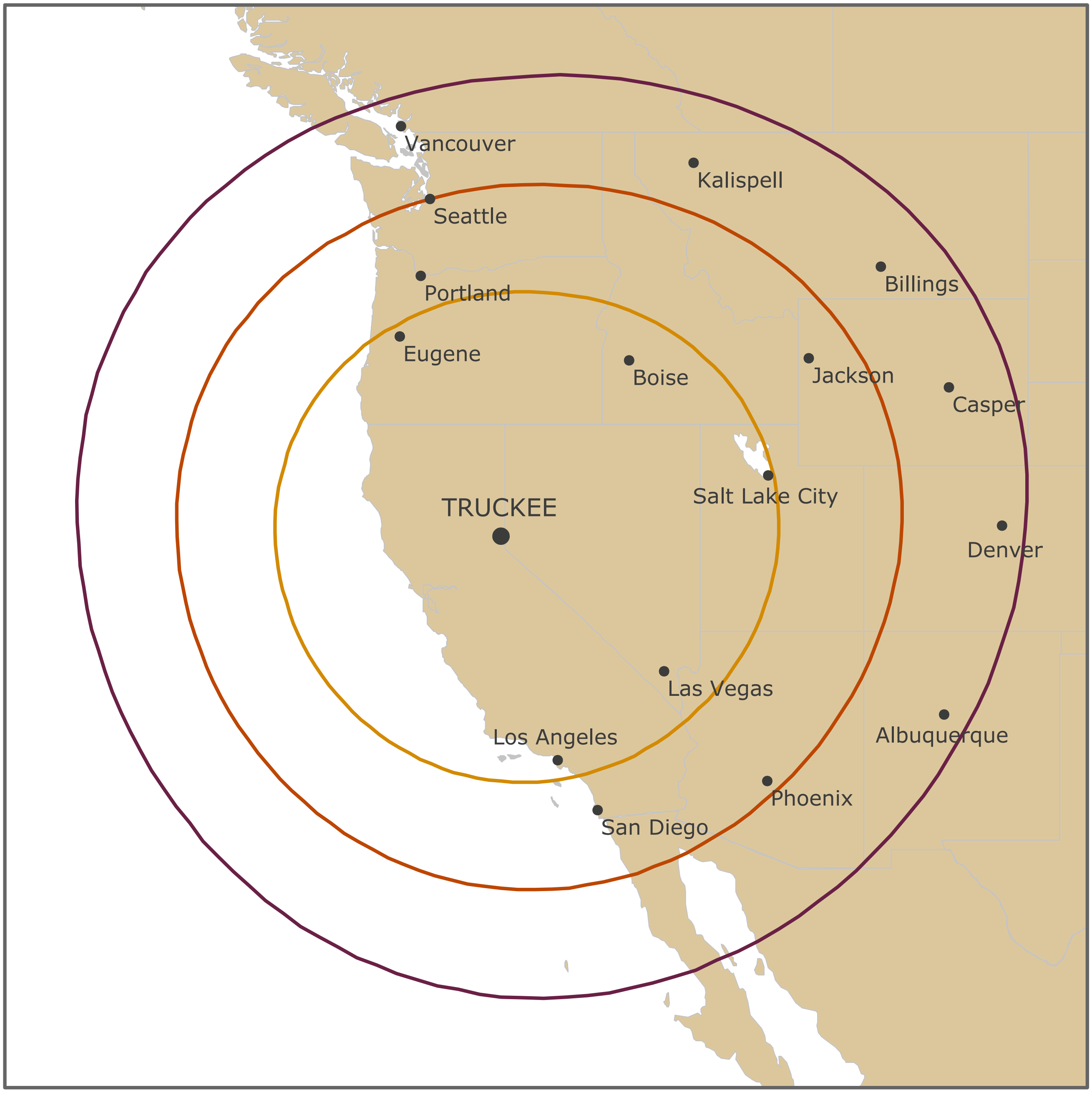
The calculations for maximum takeoff weight at 82.3° F, 5,900 feet MSL on a 5,000 foot runway:					
Airport Elevation	**Mean Max Temperature**	**Runway Length**	**Aircraft Model (15° flaps)**	**Allowable Takeoff Weight**	**Percent of MTOW**
5,904 feet MSL	82.3° F	5000’ (Dry)	CE560E	14,933	90%
			CE560EP	15,048	89%
			CE560XL	17,524	87%
			CE560XLS	18,136	90%

Based on a 5,000-foot runway at TRK NetJets was able to calculate range rings for departures from TRK for 2, 4, and 6 passengers. The range rings graphics are presented below. At 5,000 feet, the operator is more likely to reach typical destinations at conventional takeoff weights.

NETJETS®

Citation Encore

Approximate Maximum Range from Truckee Departing at 28°C/82°F**



The maximum range approximations shown above are based on the aircraft operating at high speed cruise under standard atmospheric and wind conditions* with standard NetJets fuel reserves.

** ISA conditions & 85% statistical annual winds*

*** Also assumes a runway length of 5,000ft using NetJets standard departure procedures from KTRK.*

Map Key

- 2 passengers
- 4 passengers
- 6 passengers

Note: The information contained in this document is intended for comparison purposes only and is not to be used for actual flight planning. Actual performance is subject to day of flight conditions.

NETJETS®

Citation Encore+

Approximate Maximum Range from Truckee Departing at 28°C/82°F**

The maximum range approximations shown above are based on the aircraft operating at high speed cruise under standard atmospheric and wind conditions* with standard NetJets fuel reserves.

** ISA conditions & 85% statistical annual winds*
*** Also assumes a runway length of 5,000ft using NetJets standard departure procedures from KTRK.*

Map Key

- 2 passengers
- 4 passengers
- 6 passengers

Note: The information contained in this document is intended for comparison purposes only and is not to be used for actual flight planning. Actual performance is subject to day of flight conditions.

NetJets® Inc. is a Berkshire Hathaway company.

NETJETS®

Citation XLS

Approximate Maximum Range from Truckee Departing at 28°C/82°F**

The maximum range approximations shown above are based on the aircraft operating at high speed cruise under standard atmospheric and wind conditions* with standard NetJets fuel reserves.

** ISA conditions & 85% statistical annual winds*

*** Also assumes a runway length of 5,000ft using NetJets standard departure procedures from KTRK.*

Map Key

- 2 passengers
- 4 passengers
- 6 passengers

Note: The information contained in this document is intended for comparison purposes only and is not to be used for actual flight planning. Actual performance is subject to day of flight conditions.

4. NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) DOCUMENTATION

For this Master Plan, alternatives for extending Runway 2-20 were analyzed at planning level detail. The selected extension to Runway 2-20 is in the conceptual planning stages. Design and environmental documentation is expected between 5 and 10 years after this Master Plan is approved. At that time, more project level analysis will be competed.

Although it may be possible to qualify for a Categorical Exclusion, an Environmental Assessment will likely be required for compliance with NEPA. A cultural resources investigation prepared as part of the CEQA documentation identified one historic cultural resource located in an area that might be affected by the runway extension that is potentially eligible for inclusion in the California Register of Historic Resources (California Register). A project-level design would be needed to determine whether the potentially eligible cultural resource would be affected. If the historic resource would be affected consultation would be needed to determine if the project would qualify for inclusion in either the California Register or the National Register of Historic Places. A biological reconnaissance prepared as part of the CEQA documentation identified a wetland feature that may qualify as Water of the US under the Clean Water Act. Depending on the amount of wetlands identified during project level analysis, the project may qualify for either a nationwide or local permit. This will then determine if a Categorical Exclusion or an Environmental Assessment will be required. No threatened or endangered species were identified within the area affected by the runway extension. However, endangered or threatened animal species were identified that may transit or forage on the project site.

5. CONCLUSIONS

Based on terrain limitations (step terrain to the north, wetlands to the south), lengthening Runway 2-20 to a total of 5,055 feet is likely the longest practical length. The application of declared distances will keep runway critical areas (the RPZ) on Airport controlled property.

Analysis above shows the recommended runway length at TRK ranges from 6,700 feet to 11,000 feet. Lengthening to at least 5,000 feet will provide greater safety for aircraft. Due to its mountain location, TRK is subject to periods of low visibility and winter weather (rain, snow, and icing); therefore a longer runway with the lowest instrument minimums will enhance safety and operational utility of the Airport.

Based on Airport records, and detailed in Chapter 2, there tends to be a greater amount of jet and turboprop activity in summer when temperatures are highest. Chapter 2 also shows there has been a shift in fleet mix distribution from piston to turboprops and jets. This trends is expected to continue in the future, as shown in the FAA Aerospace Forecast 2015-2035. These aircraft will likely utilize Runway 2-20 on a more regular basis.

Runway length analysis from NetJets shows that at 5,000 feet, the Cessna 560 can depart with sufficient fuel to reach common destinations from TRK. However, greater length is required for the Cessna 560 at MTOW.

Also from AC 150/5325-4B: “Over the years business jets have proved themselves to be a tremendous asset to corporations by satisfying their executive needs for flexibility in scheduling, speed, and privacy. In response to these types of needs, GA airports that receive regular usage by large airplanes over 12,500 pounds MTOW, in addition to business jets, should provide a runway length comparable to non-GA airports. That is, the extension of an existing runway can be justified at an existing GA airport that has a need to accommodate heavier airplanes on a frequent basis.”

For these reasons, Runway 2-20 should be lengthened to the maximum practical length based on terrain (5,055 feet) to provide greater safety for all aircraft operating on it. This may also have the secondary effect of moving some air traffic arriving or departing on Runway 11-29 and help alleviate some noise impacts on residences west of the Airport. Design and planning for the extension to Runway 2-20 will likely take place in 5-10 years.

TRUCKEE TAHOE AIRPORT

MASTER PLAN

Errata Sheet

MASTER PLAN

MASTER PLAN Errata Sheet

1. INTRODUCTION

The Errata Sheet summarizes changes made to the Master Plan after the Draft Plan was completed in June 2015. Changes to the Master Plan were made to address changed conditions, to respond to comments from the FAA, TTAD staff, and the public, reflect the new instrument approach to Runway 11 (published January 2015), and the property survey performed by AT GeoSystems .

2. CHAPTER 2 – AVIATION FORECASTS

The FAA reviewed the Airport Master Plan Draft (June 2014) and provided comments on the Aviation Forecasts, Chapter 2 (letter dated May 26, 2015). The FAA typically approves two elements of an airport master plan: the aviation forecasts (operations and based aircraft), and the airport layout plan. The FAA had the following comments on Aviation Forecasts, Chapter 2:

1. Generally concur with the unconstrained aviation activity forecast methodology. The forecast assumptions presented are considered reasonable and well supported.

2. Concur with the Operations forecast abridged in Table 2-26, Forecast Summary. The Operations forecast, along with the presented summer and winter peak activity operations, are considered reasonable and well supported.

3. Do not concur with the Based Aircraft forecast summarized in Table 2-17, Selected Based Aircraft Demand Forecast and Table 2-26, Forecast Summary. While the applied growth rates could be considered reasonable, the baseline year value of based aircraft is not consistent with the FAA National Based Aircraft Inventory Program validated aircraft counts or FAA Terminal Area Forecasts (TAF).

Based on comments 1 and 2, the FAA finds the forecast methodology and the future operation numbers as reasonable, and accepted for inclusion on the FAA's Terminal Area Forecast (TAF) for the Airport. Comment 3 refers to the number of based aircraft that are being counted as permanently 'based' at the Airport. This number should equal what is in the FAA *National Based Aircraft Inventory Program's* database.

Changes were made to the Aviation Forecast Chapter that separate based aircraft to reflect what is in the FAA National Based Aircraft Inventory Program's database. These changes provide greater detail to based aircraft totals, but do not cause overall based aircraft or operation forecast numbers to change. Specific modifications made to the Chapter include:

- Expanded discussion on based versus seasonal aircraft, with regards to how these are counted FAA's National Based Aircraft Inventory Program and how these used in the Forecast Chapter (page 2-13)
- Enhanced discussion on the fact that seasonal based aircraft do use facilities at TRK and need to be accounted for when considering future hangar requirements (pages 2-18 and 2-20).

- Added note to Based Aircraft forecast tables (Tables 2-12, 2-14 and 2-16): "Includes seasonal and year-round based aircraft."
- Based aircraft totals in Table 2-17 were separated to show based aircraft that reflect the numbers in the FAA National Based Aircraft Inventory Program's database, and seasonal aircraft.
- Added note to Table 2-26: "Based aircraft totals equal permanent and seasonally based aircraft. Permanent based aircraft mirror what is in the FAA's National Based Aircraft Inventory Program. See Table 2-17 for more detailed based aircraft info."

3. CHAPTER 3 – FACILITY REQUIREMENTS

Modifications made to Chapter 3 include:

- Updated the Approach Visibility Minimums section (page 3-5 and Table 3-4) to reflect current published instrument approaches. A new instrument approach to Runway 11 was published in January 2015 and instrument approaches to Runway 20 were updated since the Draft Master Plan was produced.
- Added the Straight-in instrument approach procedure to Runway 20 (1-mile, GPS) to the Runway 11-29 significant features (page 3-7).
- Expanded discussion on the purpose for lengthening and widening Runway 2-20 (page 3-9 and 3-11).

4. CHAPTER 4 – ALTERNATIVES ANALYSIS

Changes made to Chapter 4:

- Added a sentence stating that detailed technical analysis for Runway 2-20 length requirements is provided in Appendix D (page 4-31).
- Revised acreages on Table 4-3 to match new property data from the AT GeoSystems property survey (page 4-40).
- Modified development areas and acreages on Figure 4-35 to match new property data from the AT GeoSystems property survey (page 4-41).

5. APPENDIX D – RUNWAY LENGTH ANALYSIS

The FAA provided comments (letter dated May 28, 2015) on the extension to Runway 2-20: The Draft Airport Master Plan will need to provide a detailed justification for the proposed 405-foot extension and 100-foot widening, on Runway 02/20, based on the Critical Aircraft (Citation V) performance characteristics. There should also be a discussion on the target planning horizon for this proposal and the expected level of National Environmental Policy Act (NEPA) documentation that may be required.

Appendix D was created to provide analysis and justification to support the extension of Runway 2-20. FAA guidance in Advisory Circular 150/5325-4B – Runway Length Requirements for Airport Design was followed and data from a private charter operator is presented to help justify extension.

6. AIRPORT LAYOUT PLAN

The FAA provided comments (letter dated May 28, 2015) on the airport layout plan (ALP) that required edits to multiple sheets. ALP changes were made to satisfy FAA comments, plus other minor additions were made to ensure the ALP meets the current and future needs of the Airport. The following changes were made:

Sheet 2, ALP:

- Added text to Note 'a': Proposed Runway 2-20 extension and widening project, along with relocation of Parallel Taxiway G will require a National Environmental Policy Act (NEPA) determination prior to design, and an Aeronautical Survey for support of amended Instrument Approach Procedures.
- Added apron dimensions to the facility legend.
- Now illustrating existing runway and taxiway lights (existing and future), and runway and taxiway signs (existing and future).

Sheet 3, Airport Data:

- Updated the airport property acreage in the Airport Data Table to match acreages based on the AT GeoSystems property survey
- Updated the Approach Visibility Minimums to reflect current published instrument approaches. A new instrument approach to Runway 11 was published in January 2015 and instrument approaches to Runway 20 were updated since the Draft ALP was produced.

Sheet 5, Inner-Approach: Runway 11-29:

- Added the 40:1 Departure Surface for departures on Runway 11 (to the southeast).

Sheet 8, Runway 2-20 Declared Distances:

- A new plan sheet was created to show the proposed declared distances for the future Runway 2-20 extension. Sheet 8 depicts plan and profile views of Runway 2-20 with values for the future declared distances. Other items illustrated included the future runway RSA, OFA, OFZ, RPZ, threshold siting surface, departure surface, and Part 77 approach surface. The Declared Distance Sheet is inserted as Sheet '8' and the following sheets were renumbered accordingly.

Sheet 9, Building Area Plan:

- Added apron dimensions.
- Now illustrating existing runway and taxiway lights (existing and future), and runway and taxiway signs (existing and future).
- Sheet details a proposed expanded rental car facility and warehouse or office, with expanded automobile parking, southwest of the administration building.
- Refined the building footprint of the proposed multi-use hangar south of the administration building.

Sheet 10, Exhibit 'A' Property Map:

- Changes were made to parcel lines and acreages based on the AT GeoSystems property survey conducted in 2014. New parcel line work was provided to Mead & Hunt to update the Exhibit 'A' based on the survey results. AT GeoSystems also reviewed the Airport Property Data and Lease and Easement Data Tables, and these Tables were updated based on current information.

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