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2022 Airport Master Plan
Tooele Valley Airport / TVY

DATE

RS&H

Tooele Valley Airport Facility Requirements

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Prepared by RS&H, Inc. at the direction of
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FACILITY REQUIREMENTS

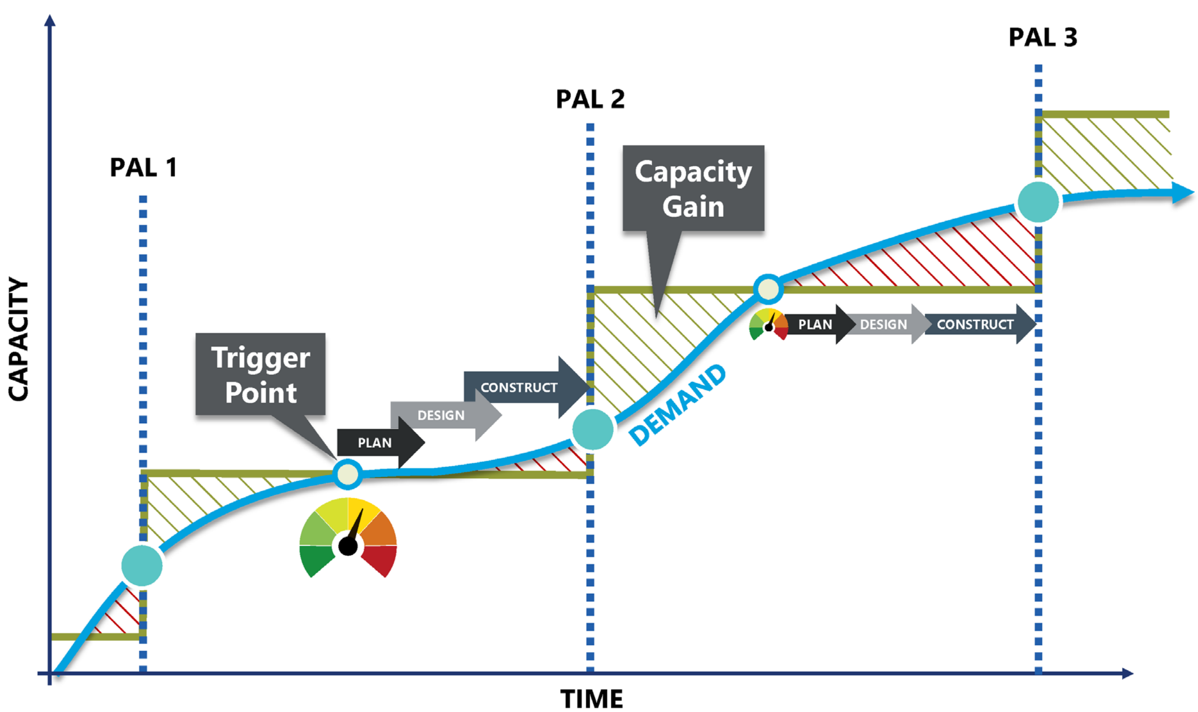
3.1 INTRODUCTION

The Tooele Valley Airport (TVY) aviation demand forecast used demographic, economic, and geographic statistical analysis to derive a preferred forecast scenario tied to real-world factors in the Greater Salt Lake City area. This analysis compared closely with the FAA 2020 update to the Terminal Area Forecast (TAF). From this analysis, aviation activity was forecast out for a twenty-year period (2020 – 2040).

Although the forecast defines aviation activity milestones for the years 2025, 2030, and 2040, it is important to understand that facility requirements at TVY are driven by levels of aircraft operations, which may or may not coincide with those specific years. Therefore, to eliminate associations between demand levels and specific years, the levels of demand that trigger facility improvements will be referred to from this point forward as Planning Activity Levels (PALs). PALs correlate with operational levels in each respective forecast year and, subsequently, are divided into three activity levels: PAL 1, PAL 2, and PAL 3.

Figure 3-1 diagrams how and when PALs trigger the need for project planning, design, and implementation at various demand levels, and the effect on overall facility capacity to meet user needs.

FIGURE 3-1
PLANNING ACTIVITY LEVEL TRIGGER POINTS



Source: RS&H, 2022

The facility requirements analysis begins with a review of industry trends, emerging challenges, and innovations requiring consideration in facility planning. While EONS (economic viability, operational efficiency, natural resource conservation, social responsibility) considerations will be critical to the upcoming analysis of development alternatives, facility requirement determinations are more quantitative and objectively determined by way of modern industry guidance, best practices, and regulatory standards. Most of this chapter is devoted to assessments in each of the following topics and functional areas of TVY:

- Emerging Trends
- Airspace and Navigation Facilities
- Instrument Procedures
- Airfield Layout and Design Criteria
- Runway and Taxiway Facilities
- Aircraft Parking and Storage
- Fixed Base Operator
- Land Use Compatibility and Zoning
- Aviation Support Facilities
- Utilities Infrastructure Requirements

This chapter concludes with a section summarizing the key findings of the facility requirement assessments which will be used to guide identification and evaluation of future development alternatives.

3.1.1 Aviation Activity Summary

Airport facility requirements for TVY, including the type, size, and quantity, are largely dependent upon the future aviation activity levels projected in the aviation demand forecasts discussed in **Chapter 2, Aviation Demand Forecasts** and summarized in **Table 3-1**.

TABLE 3-1
SUMMARY OF AIRPORT OPERATIONS PLANNING FORECAST (BASELINE CONDITION AS BASE YEAR)

Operation	Base Year Level	PAL 1	PAL 2	PAL 3
Itinerant				
Air Taxi	244	254	264	287
General aviation	27,738	28,880	30,069	32,595
Military	0	0	0	0
Local				
General aviation	15,066	15,686	16,332	17,704
Military	0	0	0	0
Total Operations	**43,048**	**44,820**	**46,665**	**50,585**

Source: SLCDA Acoustic Counter Data, SLCDA Records, RS&H Analysis, 2022

Necessary addition, upgrading, expansion, or sometimes even elimination of facilities can be driven by many factors including capacity constraints, updates to regulatory standards, or adjustments in SLCDA's strategic vision for TVY. Replacement of outdated or inefficient facilities that are cost prohibitive to maintain or modernize also inform facility needs.

3.1.2 Utah Aviation Plan Recommendations

The 2007 Utah Continuous Airport System Plan (UCASP) deemed TVY a general aviation regional airport. This means the airport primarily serves general aviation activity, including jet and multi-engine aircraft, and provides access to major population centers. Nearby South Valley Regional Airport (U42) is also categorized as a general aviation regional airport. **Table 3-2** shows how TVY meets (or does not meet) the UCASP Minimum Facility and Service Objectives.

TABLE 3-2
UCASP MINIMUM FACILITY AND SERVICE OBJECTIVES

Item	General Aviation Regional Airports	TVY Requirements Met
Airport Reference Code	C-II or greater	Yes
Runway Length	75% of large aircraft at 60% useful load	No
Runway Width	Meet ARC	Yes
Runway Strength	Single Wheel Gear - 30,000 lbs or equivalent for dual wheel	Yes
Taxiway	Partial parallel taxiway	Yes
NAVAIDs	Non-Precision Straight-In Approach	Yes
Visual Aids	GVGIs, REILs	Yes
Lighting	MIRL, beacon, windsock	Yes
Weather	Automated weather reporting	Yes
Services	Phone	No
	Restrooms	Yes[1]
	FBO - Limited service	No
	Maintenance facilities - Limited service	Yes[2]
	On-site courtesy car	No
	Perimeter fencing	Yes
Facilities	Terminal with appropriate facilities	No
	Hangars - 60% of based fleet	No
	Hangars - 25% of overnight aircraft	No
	Apron - 40% of based fleet	Yes
	Apron - 50% of transient	Yes
	Auto parking - Equal to 33% of based aircraft	Yes

Source: Utah Continuous Airport Service Plan, 2007; RS&H Analysis, 2022
Note: GVGI = Generic Visual Glideslope Indicators, REIL = Runway End Indicator Light
1) Restroom uses well water and septic system. 2) Minimal storage only.

3.2 EMERGING TRENDS

In planning for the future of TVY, it is important to consider the emerging trends of the aviation industry, as well as operational trends at the airport and in the SLCDA organization as a whole.

The aviation industry is always evolving, and history demonstrates that technological innovations often precede industry transformations. The rapid pace of development in aviation is anticipated to continue and airports will be expected to adapt quickly to facility needs and services created by the latest trends and innovations. There is substantial benefit in surveying the industry landscape to understand and project for probable changes among pilots, aircraft types, and new technological and policy developments.

3.2.1 General Aviation Trends

TVY is a reliever airport for Salt Lake City International Airport (SLCIA). Relative to other large-hub airports within the NPIAS, SLCIA has an unusually high amount of general aviation tenants and traffic, and this atypical situation is beginning to result in operational congestion and delay which interferes with efficient air carrier operations at SLCIA, and ultimately, the efficiency of the entire National Airspace System (NAS). To remedy this, SLCDA has begun efforts to fully utilize reliever airport capacity at TVY and U42 so both general aviation and air carrier operations in the greater Salt Lake City area can sustain and meet user demand.

One of the most impactful trends in aviation includes the changing demographics of pilots. Over the past decade, a decline in the number of pilots in the 40 to 60-year-old range has occurred. Historically, this has been an age group involved in recreational flying. Statistics show an ongoing corresponding decline in recreational flying is being experienced. Simultaneously, a sharp increase in the amount of flight training has occurred. This trend is associated with both regulatory changes and a strong demand for commercial airline pilots.

The types of general aviation aircraft flying have also been changing. Flights by aircraft more than 20 years old is slightly down over the past five years. New types of general aviation aircraft, such as the Cirrus SR22 and Pilatus PC-12, have been introduced and these specific aircraft are becoming two of the most popular general aviation aircraft of their kind.

Some other high-level trends occurring in the general aviation industry for consideration in this facility planning analysis include:

- Demand for small aircraft is decreasing due to the decreasing number of people pursuing pilot certificates for recreational purposes.
- Instructional flying is increasing due to high demand for commercial pilots and changes in regulations which increased necessary flight hours for entry into sought after commercial pilot positions.
- The cost of flying has sharply increased. This is especially true with relation to cost of retail aviation gasoline, which has more than quadrupled in the last 20 years.

- Operations by larger jet aircraft are increasing as a share of total operations, which results in greater demand for additional, stronger pavement and Jet A fuel availability at airports. While it might appear that larger aircraft would increase negative externalities such as noise and emissions, in fact, they operate cleaner and quieter due to engine technological advancements. Simultaneously, new aircraft often replace older, louder, and less fuel-efficient aircraft, which reduces overall noise and emission impacts on communities around airports.
- Public awareness and sentiment toward industrial environmental impacts (including aviation) is causing some communities to place higher importance on reducing aviation related emissions (as well as those from other industries). Additionally, many communities have found value in establishing community resiliency plans related to disaster response and recovery, in which airports play a key role.
- Electric aircraft have the potential to usurp traditional fossil fuel aircraft currently used in flight training and recreational flying. Electric aircraft engines would simultaneously reduce operational costs, noise, and carbon dioxide emissions, making small aircraft operations more affordable and environmentally friendly.

Although TVY currently hosts no flight training or FBO facilities, the airport is an attractive general aviation airport for the area with precision approach capability, relatively low congestion, and a less complicated or restrictive airspace than surrounding airports. It is necessary that the airport starts preparing to face new general aviation developments over the planning period covered by this master plan. New trends will affect airport facilities and might require improvements in multiple areas such as:

- FBO infrastructure
- Aircraft apron
- Hangar development
- Airfield improvements and upgrades
- Utilities improvements and upgrades
- Electric charging stations (vehicles and aircraft)

3.2.2 Advanced Air Mobility

Advanced Air Mobility (AAM) is a new concept of air transportation using electric Vertical Take Off and Landing (eVTOL) aircraft to move people and/or cargo between places not currently or easily served by existing transportation systems.

It is essential to prepare TVY and plan for specific infrastructures to support AAM development in the greater Salt Lake City area, should such a demand appear during the planning period. At the time of this report, AAM is an emerging trend and will most likely start developing on general aviation airports with easier airspace integration serving a specific type of user with both the financial means and a high sensitivity to opportunities costs. The integration of AAM into transportation networks will offer additional services and new opportunities for TVY to develop and serve the community.

For the purposes of this analysis, general requirements for AAM at TVY may include:

- Vertiport space following FAA design recommendations

- Electric chargers (up to 900 kW for fast charging) with utilities upgrade
- Maintenance and passenger handling facilities
- Departure and arrival paths above 1,000 feet AGL to limit noise exposure
- Initial integration in airspace under Visual Flight Rules (VFR)
- Operational ceiling limited to 10,000 feet MSL (not pressurized)

It should be noted that future development in eVTOL design and technology may amend some of these requirements (operational ceiling, VFR only, charging need, etc.).

3.2.3 Bureau of Land Management

The Bureau of Land Management (BLM) has expressed great interest in the airport's development. The West Desert District of the BLM has stated the addition of potable water and any Jet A fueling service at the airport would be vital for their fire and aviation personnel to conduct operations. When contracting services with aircraft, securing fuel vehicle service has been a point of difficulty and has impacted mission operations. At this time, BLM is in the process of establishing of a base on the north end of the airfield with land development and full time/seasonal staffing.

3.3 AIRSPACE AND NAVIGATION FACILITY REQUIREMENTS

The NAS is a network of both controlled and uncontrolled U.S. airspace managed by the FAA and includes airports, air navigation facilities, equipment, and airspace services. The following sections describe airspace, navigational aids, and instrument procedure requirements and considerations relative to TVY facilities as part of the Salt Lake regional system and the NPIAS as a whole.

3.3.1 Airspace, Instrument Procedures, and Navigational Aid Requirements

TVY is a non-towered airport, outside of the Class B airspace of Salt Lake City International Airport. Being located outside of SLC Class B airspace is highly beneficial to airport users for many reasons. For one, less operational requirements and constraints make it an attractive airport for recreational general aviation aircraft, especially for flight training operations in the Salt Lake City metropolitan area which can operate away from congested, large, and fast-moving traffic.

There is one area of restricted airspace (R-6403) southwest of TVY which is active daily from surface to 58,000 feet AGL Monday through Thursday between the hours of 0800-2000 local time. Existing instrument approach procedures are designed to avoid this area, but the ILS or LOC RWY 17 procedure only narrowly avoids R-6403. Any alterations to facilities or procedures need to account for this nearby restricted airspace, especially those which would move operations farther south. The non-precision RNAV (GPS) RWY 17 approach procedure at TVY currently meets all known FAA design criteria and any future runway extensions to the north would have no adverse effect on this approach. Overall, the existing two approach procedures at TVY provide excellent service to aircraft operators landing during inclement weather under current facility conditions.

TABLE 3-3
TVY APPROACH PROCEDURE SUMMARY

Approach Procedure	Minimums (CAT C)	Meets FAA Design Criteria	Impacted By New AGIS Survey	Airfield/ NAVAID/ALS Modifications	Recommended Actions
ILS or LOC RWY 17	ILS: 200' – 1/2 mile LOC: 343' – 5/8 mile	Yes	No	Maintain ILS and MALSR	Maintain
RNAV (GPS) RWY 17	LPV: 200' – 1/2 mile VNAV: 250' – 1/2 mile LNAV: 343' – 5/8 mile	Yes	No	Maintain MALSR	Maintain
Circling RWY 35	ILS: 200' – 1/2 mile LOC: 343' – 5/8 mile	Yes	No	None	Maintain

Source: Lean Engineering; Prepared by RS&H, 2022

The existing Runway 17 departure procedure (STACO 2 RNAV SID) does not comply with current FAA procedure criteria because a turn greater than 90 degrees is required to avoid R-6403. Relatively high climb gradients and early turns to fixes do ensure avoidance of obstacles and penetration of R-6403. Modification of this procedure to align with current FAA design criteria is possible but would require creation of a new flyover waypoint followed by a direct turn to the existing HOKPI or ZESER waypoints. The existing Runway 35 departure and the two obstacle departure procedures comply with FAA design criteria through existing waivers. Introduction of radar coverage to the area would remedy all issues associated with current procedures which do not meet existing design criteria or require waivers for compliance.

TABLE 3-4
TVY DEPARTURE PROCEDURE SUMMARY

Departure Procedure	Minimums (CAT C)	Meets FAA Design Criteria	Impacted By New AGIS Survey	Airfield/ NAVAID/ALS Modifications	Recommended Actions
STACO 2 RNAV DP RWY 17	350'/NM to 8,200' Std Mins (1/2 mile)	No	No	None	Modify with FAA
STACO 2 RNAV DP RWY 35	380'/NM to 9,000' Std Mins (1/2 mile)	Yes	No	None	Maintain and reduce climb gradient
Obstacle DP RWY 17	348'/NM to 9,000' Std Mins (1/2 mile) 5,600-3 (visual)	Yes (Waiver)	No	None	Maintain
Obstacle DP RWY 35	ILS: 200' – 1/2 mile LOC: 343' – 5/8 mile 5,600-3 (visual)	Yes	No	None	Maintain

Source: Lean Engineering; Prepared by RS&H, 2022

Depending on atmospheric conditions and/or flight mission, aircraft arriving to TVY can land using visual reference to facilities or by following instrument procedures making use of navigational aids (NAVAIDs). TVY also has instrument departure procedures for aircraft taking off to facilitate safe departures in all weather conditions. Instrument procedures at TVY are often used not out just of necessity, but rather for training purposes and the airport hosts a large number of the instrument training operations in the greater Salt Lake area.

Several NAVAID enhancements were identified as opportunities to either retain or enhance existing service. These include the following, ranked in order of importance:

- Maintain the existing ILS to Runway 17
- Maintain the existing MALSR to Runway 17
- Upgrade the existing Automated Weather Observing Station (AWOS)
- Install remote Automatic Dependent Surveillance-Broadcast (ADS-B) Receivers
- Modify the Runway 35 Precision Approach Path Indicator (PAPI)

3.3.1.1 Retention of Existing ILS to Runway 17

The existing ILS at TVY is designed and operated as an FAA owned, unmonitored, 14 element Thales MK20A with a DME performing at a CAT I performance level. This ILS is used with the ILS or LOC RWY 17 instrument approach procedure providing standard CAT I minimums of 200 feet and 1/2-mile visibility.

The ILS approach into TVY provides significant operational capabilities to all aircraft types serving the airport. The CAT I minimums ensure that the airport can remain open to current and future aircraft operational types under all historical weather conditions. This is demonstrated in the historical monthly/hourly likelihood of the airport to remain open to operations shown in **Table 3-5**. This table considers historical on- and off-hour weather observations and reveals that even though the airport only has two instrument approaches, both to the same runway, they can keep the airport open over 98 percent of all months/hours.

While the current RNAV (GPS) RWY 17 provides similar minimums to the ILS, many of the cargo and charter operators that may serve TVY in the future (along with older business jets) are not LPV capable. These aircraft still rely heavily on ILS and LOC procedures to operate time sensitive operations which may become the focus of TVY in the future. For cargo and freight operators in particular, the most critical hours and months of arrival operations are in the late evening hours across all 12 months, and across all hours during late November and early December. At TVY these are the periods where the reliability of CAT I approaches begins to dip by approximately 5 percent based on historical weather conditions. If a future decline in weather minimums persists, then the only option for the airport to achieve reduced weather minimums will be through the implementation of Special Approach (SA) CAT II or CAT II minimums that can only be implemented via the ILS.

TABLE 3-5
HISTORICAL LIKELIHOOD OF TVY OPEN TO ARRIVALS WITH ILS AND RNAV (GPS) RWY 17

TVY Open to Operations Overall (Existing Procedures)
At least one usable Runway and Procedure Combination

Hour (Local)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0:00	97.6%	98.8%	99.6%	99.4%	99.8%	99.4%	100.0%	99.5%	99.4%	100.0%	100.0%	95.6%
1:00	98.0%	99.0%	100.0%	99.4%	100.0%	99.6%	99.4%	99.5%	99.6%	100.0%	100.0%	96.8%
2:00	98.0%	99.0%	99.8%	99.4%	99.8%	100.0%	99.8%	99.5%	99.8%	100.0%	99.8%	97.8%
3:00	98.4%	97.9%	99.6%	99.6%	99.8%	99.8%	100.0%	99.5%	99.8%	100.0%	99.4%	98.3%
4:00	97.3%	99.2%	100.0%	99.6%	99.8%	99.6%	100.0%	99.5%	99.8%	100.0%	99.2%	97.8%
5:00	97.5%	99.6%	100.0%	99.4%	100.0%	99.4%	100.0%	99.1%	99.8%	100.0%	99.0%	96.6%
6:00	97.1%	99.2%	99.6%	100.0%	100.0%	100.0%	100.0%	99.3%	100.0%	99.8%	99.2%	96.8%
7:00	97.6%	98.1%	99.6%	100.0%	100.0%	100.0%	100.0%	99.5%	100.0%	99.8%	98.9%	95.3%
8:00	97.7%	96.6%	99.1%	99.8%	100.0%	100.0%	100.0%	99.3%	99.8%	99.8%	99.0%	95.3%
9:00	97.5%	97.5%	99.4%	100.0%	100.0%	99.8%	99.4%	99.3%	100.0%	100.0%	99.0%	95.1%
10:00	97.6%	98.5%	98.9%	99.6%	100.0%	99.8%	99.8%	99.5%	100.0%	99.6%	99.4%	96.8%
11:00	97.7%	98.1%	99.2%	99.6%	99.8%	100.0%	100.0%	99.5%	99.8%	99.5%	98.3%	96.1%
12:00	98.2%	99.8%	99.2%	99.8%	100.0%	99.4%	100.0%	99.1%	99.8%	99.5%	98.7%	97.8%
13:00	98.6%	100.0%	99.6%	98.2%	100.0%	99.6%	99.8%	100.0%	100.0%	100.0%	98.9%	96.9%
14:00	99.1%	100.0%	99.8%	98.6%	100.0%	98.8%	100.0%	99.4%	100.0%	99.1%	99.6%	96.6%
15:00	98.7%	99.8%	99.6%	98.6%	99.8%	99.8%	99.4%	99.5%	99.4%	99.8%	99.4%	96.1%
16:00	98.2%	98.6%	99.8%	98.8%	99.6%	99.4%	99.4%	98.9%	100.0%	99.8%	99.4%	96.4%
17:00	99.5%	98.8%	99.4%	98.8%	99.5%	98.3%	99.4%	99.5%	100.0%	99.8%	100.0%	97.1%
18:00	99.5%	99.4%	99.3%	99.4%	99.6%	99.6%	99.8%	99.1%	99.8%	100.0%	99.8%	96.7%
19:00	99.5%	99.2%	99.6%	99.8%	99.8%	99.8%	99.2%	98.6%	100.0%	99.8%	99.8%	97.3%
20:00	98.9%	98.5%	99.4%	99.8%	99.8%	99.4%	99.8%	99.3%	99.8%	99.8%	99.6%	96.4%
21:00	98.5%	98.6%	99.8%	99.8%	99.8%	99.6%	99.4%	99.3%	99.6%	100.0%	99.8%	97.3%
22:00	98.9%	97.5%	99.8%	100.0%	99.6%	99.4%	100.0%	98.9%	99.6%	100.0%	99.8%	97.6%
23:00	97.8%	97.9%	99.4%	100.0%	100.0%	100.0%	99.6%	99.3%	99.6%	100.0%	98.7%	95.4%

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Day	98.1%	98.7%	99.4%	99.3%	99.9%	99.6%	99.7%	99.3%	99.9%	99.7%	99.1%	96.4%
Night	98.3%	98.7%	99.7%	99.7%	99.9%	99.6%	99.8%	99.3%	99.7%	99.9%	99.5%	96.9%
24 Hours	98.2%	98.7%	99.6%	99.5%	99.9%	99.6%	99.8%	99.3%	99.8%	99.8%	99.4%	96.7%

Source: Lean Engineering, 2022

The current ILS equipment itself is quite common across this region of the NAS. However, newer ILS models are slowly being introduced with enhanced performance and self-monitoring capabilities like the MK420A. Supplemental enhancements are also commonly installed on airports that experience significant amounts of snowfall, such as the V-Ring localizer installation. Both an upgrade to the MK420A model, and the installation of a V-Ring localizer would enhance the overall performance and reliability of the TVY ILS.

It is important for TVY to retain its ILS to ensure that the current FAA ILS Optimization Plan does not inadvertently deactivate or remove the ILS at some point in the future. If that were to occur, TVY and SLCDA would need to consider the option to transition the full ILS over to the FAA Non-Federal Program. This would require SLCDA to pay for the maintenance and upgrade of the ILS, including a long-term contract for an authorized Non-Federal ILS maintainer. It is therefore recommended that SLCDA strongly support and advocate for the continued operation of the FAA-owned ILS to support existing and future operations at the airport.

3.3.1.2 Retention of the Existing MALSR to Runway 17

Runway 17 is currently supported by a full length (2,400-foot), standard, Medium Intensity Approach Light System with Runway Alignment Indicators (MALSR). These approach lighting systems are incredibly valuable safety tools extending the runway environment another 1/4 mile beyond the standard visibility limitations and, with the ILS, permitting the future adoption of an SA CAT II approach.

The existing MALSR currently provides a 1/4 to 1/2-mile visibility benefit on both the ILS or LOC RWY 17 and the RNAV (GPS) RWY 17 approaches. This visibility benefit at TVY is equivalent to an approximate 5 to 10 percent enhancement in the ability of the airport to support arrivals at a given hour/month.

There is little-to-no risk that the FAA-owned MALSR would be removed from the airport through a future optimization plan. It is important, however, to ensure that it is properly maintained and that any potential runway extensions or property development near the MALSR be carefully planned to retain the full MALSR capability.

3.3.1.3 Upgrading the Existing Automated Weather Observing System

The FAA and NWS currently list the AWOS at TVY as an SLCDA-owned AWOS III P/T. This definition implies that pilots operating at TVY can receive a significant amount of real time weather information without the need for local weather observers. This data includes several variables that are critical to aviation safety including temperature, pressure, wind direction/intensity, ceilings, visibility, precipitation, and the presence of airfield lightning.

Analysis of technical aircraft performance and instrument approach analysis detected that the AWOS III P/T precipitation sensor, and other derived precipitation reporting, may have either been inoperative or unavailable. Weather information from nearby UDOT weather reporting stations along I-80 were therefore analyzed and it was determined that the weather conditions experienced at TVY are distinctly different than those experienced at the nearest reliable ASOS, which is located at SLCIA. This difference can be seen in **Table 3-6** where positive values indicate time periods where SLCIA is potentially experiencing precipitation while TVY is not, and negative values indicate where TVY may be experiencing precipitation while SLCIA is not. Pilots that can only see precipitation data at SLCIA would likely believe that TVY is inaccessible reducing the overall usability of the airport simply due to a faulty AWOS sensor.

TABLE 3-6
DIFFERENCE BETWEEN PRECIPITATION REPORTED AT SLCIA VERSUS TVY

Hour (Local)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
0:00	18.1%	9.9%	2.6%	1.5%	-1.1%	-0.5%	-0.8%	-1.5%	1.2%	0.2%	3.4%	21.6%
1:00	18.8%	8.8%	3.3%	1.3%	-0.1%	0.4%	-0.8%	-0.8%	1.5%	0.9%	3.9%	22.6%
2:00	19.0%	10.0%	3.0%	3.2%	-0.2%	0.5%	-1.2%	-1.3%	1.5%	0.5%	5.1%	21.2%
3:00	19.1%	10.2%	3.9%	2.1%	1.1%	1.0%	-0.8%	-0.5%	1.8%	0.1%	4.2%	21.4%
4:00	19.5%	11.2%	4.9%	1.4%	1.0%	1.1%	-0.8%	-1.1%	-0.1%	0.1%	5.1%	20.9%
5:00	16.1%	10.1%	5.5%	0.9%	1.1%	0.9%	-0.3%	-1.6%	-0.3%	0.7%	2.5%	20.7%
6:00	15.7%	9.8%	5.0%	0.5%	0.6%	0.6%	-1.6%	-1.6%	-1.1%	0.2%	3.2%	21.2%
7:00	17.9%	9.0%	3.2%	3.2%	1.6%	-0.8%	-3.4%	-1.3%	0.6%	1.5%	3.5%	22.0%
8:00	18.8%	10.2%	4.9%	-0.2%	-4.3%	-9.7%	-7.5%	-4.7%	-1.6%	1.6%	5.4%	20.0%
9:00	19.3%	8.5%	2.7%	-0.4%	-6.8%	-9.6%	-8.4%	-7.2%	-6.7%	0.3%	2.8%	15.2%
10:00	16.5%	7.3%	1.3%	-2.4%	-10.1%	-11.8%	-10.7%	-8.9%	-7.6%	-1.6%	2.1%	13.1%
11:00	13.6%	8.9%	1.4%	-0.8%	-7.2%	-8.2%	-7.5%	-7.3%	-7.9%	-0.7%	1.5%	11.2%
12:00	11.6%	10.1%	1.7%	-1.6%	-5.3%	-7.4%	-6.2%	-4.7%	-5.0%	-1.2%	3.0%	7.8%
13:00	10.1%	5.5%	1.7%	0.8%	0.2%	-0.9%	0.0%	-0.6%	-0.5%	-0.6%	3.1%	8.8%
14:00	10.0%	4.3%	2.7%	-0.4%	1.0%	-0.7%	0.1%	0.8%	0.2%	0.4%	4.3%	9.9%
15:00	11.0%	5.2%	4.8%	-0.4%	2.6%	0.7%	0.0%	-0.2%	-1.0%	-0.1%	3.6%	9.3%
16:00	11.8%	6.2%	5.7%	-0.5%	2.5%	-1.0%	-0.1%	0.1%	-0.9%	-0.7%	4.8%	9.8%
17:00	13.7%	6.0%	4.4%	1.7%	1.8%	-2.3%	-0.5%	0.3%	0.1%	0.6%	3.5%	11.2%
18:00	10.7%	6.7%	2.2%	1.0%	0.4%	0.6%	-0.2%	0.0%	1.1%	-1.7%	4.7%	15.3%
19:00	10.8%	5.3%	2.5%	-0.1%	-0.5%	-0.2%	0.5%	-0.4%	0.1%	-1.4%	3.1%	18.9%
20:00	11.3%	6.3%	3.1%	0.3%	-1.3%	-0.4%	-0.8%	1.4%	0.7%	-0.8%	3.1%	19.3%
21:00	11.1%	6.1%	2.9%	1.2%	0.5%	-0.7%	-0.1%	-0.8%	0.6%	0.4%	2.7%	20.9%
22:00	14.9%	9.7%	1.5%	0.5%	0.5%	0.1%	-2.1%	-1.3%	0.0%	0.0%	4.2%	19.8%
23:00	15.0%	10.2%	3.1%	1.2%	0.8%	-0.3%	-0.2%	-1.3%	1.9%	-0.1%	5.6%	20.7%

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Day	13.7%	7.4%	3.1%	0.0%	-1.7%	-3.4%	-3.1%	-2.6%	-2.4%	-0.2%	3.4%	11.7%
Night	**15.4%**	**8.8%**	**3.5%**	**1.3%**	**0.2%**	**0.3%**	**-0.8%**	**-0.9%**	**0.7%**	**0.0%**	**3.9%**	**19.8%**
24 Hours	14.8%	8.1%	3.3%	0.6%	-0.9%	-2.0%	-2.2%	-1.9%	-0.9%	-0.1%	3.7%	16.8%

Source: Lean Engineering, 2022

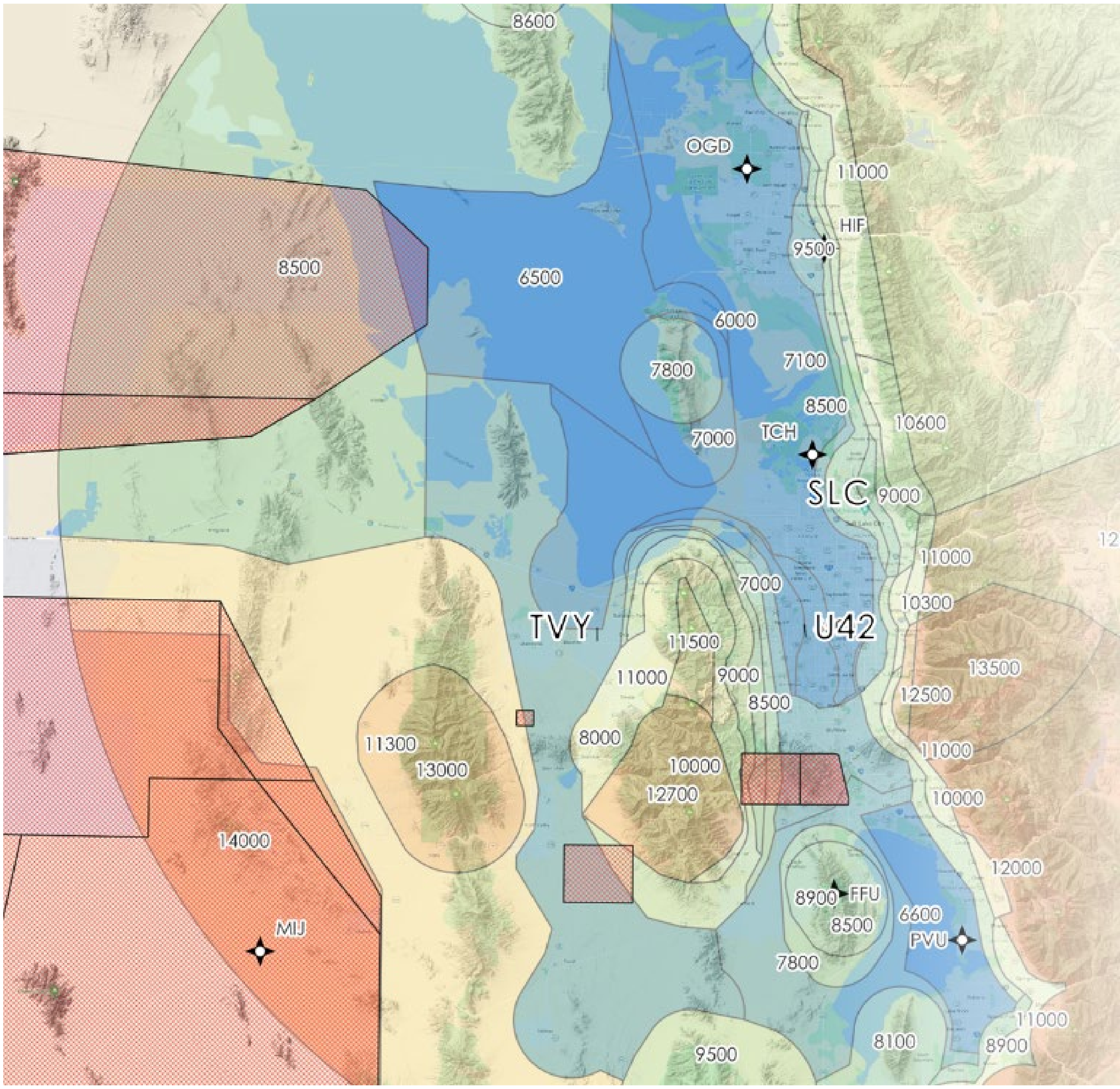
During periods where the AWOS III at TVY may be underreporting precipitation events, this could lead to safety issues where pilots would need to presume a runway condition code (RCC) of 3 or below. Because the TVY airport is currently unstaffed, and non-towered, pilots rely solely on current and historical information from the AWOS to determine if the runway may be wet or contaminated either prior to departure or as a part of their in-flight landing distance assessment.

The current length of Runway 17-35 is sufficient for dry and wet landing performance. However, it is not long enough to accommodate jet operations of Runway Condition Code (RCC) 3 or below. Therefore, to ensure the safety of landing operations at TVY for current aircraft operations during intense precipitation or winter precipitation events it is recommended that SLCDA immediately examine and upgrade any defective components for the AWOS III P/T at TVY.

3.3.1.4 Installation of ADS-B Receivers

Analysis of current, and future, instrument approach and departure procedures at TVY revealed a significant gap in radar coverage extending over the Tooele Valley. This gap is caused by the lack of Airport Surveillance Radar (ASR) installations in the area, with the primary ASR-9 site located at SLCIA. Due to the prominence of the Oquirrh Mountains between the ASR-9 site and Tooele Valley, the lack of radar coverage both restricts SLC ATCT and Salt Lake City TRACON (S56) ability to consider more significant airspace enhancements for all SLCDA owned airports (SLC, TVY, and U42). These limitations can be seen below in **Figure 3-2**.

FIGURE 3-2
MAP OF CURRENT MINIMUM VECTORING ALTITUDES NEAR S56



Source: Lean Engineering, 2022

Potential enhancements to operations created by providing radar coverage include better, more efficient, departure and arrival procedures for TVY. They could also enable new enhanced designs for arrival and departure corridors into SLC that make both TVY and U42 safer and more efficient destinations in the overall Salt Lake City aviation system.

To achieve these future airspace and instrument procedure safety and efficiency enhancements, it is recommended that SLCDA, FAA and Department of Defense (DoD) jointly examine the possibility of installing supplemental ADS-B receivers throughout the Tooele Valley that will enable FUSION radar screens at S56 to lower overall minimum vectoring altitudes (MVAs).

3.3.1.5 Modification of the Runway 35 Precision Approach Path Indicator

Analysis of possible enhancements to instrument approach procedures at TVY revealed that a new straight-in instrument approach to Runway 35 can be designed and implemented without the need for any supplemental NAVAIDs or ADS-B receivers. However, the final approach angle of a potential RNAV (GPS) RWY 35 approach would require a glide path angle (GPA) of 3.75 degrees, which is beyond the standard 3.00-degree GPA. To implement this type of approach procedure, it would be necessary to adjust the existing Runway 35 PAPI from its current 3.00 degrees to a value of at least 3.55 degrees. This is relatively straight forward to achieve but should be considered during facility alternatives analysis because it requires the PAPI to be physically relocated south of its current position to achieve this higher angle. Any on- or off-airport development immediately south and southwest of the airfield may limit the effectiveness of the PAPI Light Signal Clearance Surface (LSCS).

3.4 AIRFIELD CAPACITY AND DESIGN STANDARDS

The airfield design at TVY is driven by the type and level of existing and future aircraft at the airport. Other parameters such as elevation, airport access routes, land availability, and weather conditions also influence the airfield layout, along with other considerations such as the operating, maintenance, and buildings costs, and overall facility lifespan.

3.4.1 Airfield Capacity Analysis

The capacity analysis at TVY was achieved using assumptions and guidance provided in FAA AC 150/5060-5, *Airport Capacity and Delay*.

TVY is a single runway system, depicted by No. 1 configuration in AC 150/5060-5, shown in **Table 3-7**. The annual service volume (ASV) of a runway depends on the aircraft fleet mix index associated with that runway. The mix index relates to the percentage of heavier aircraft operations compared to total annual operations.

Small single engine aircraft operations make up the majority of the airport's total operations. Most of these operations are conducted by local flight schools flying in from surrounding airports, small piston-based aircraft, and an on-site sky diving operator. Such operations can decrease or increase substantially year-over-year, but it is estimated that the mix index is, and will remain, between 0 and 50, which equates to an ASV of 195,000 to 230,000 operations.

TABLE 3-7
RUNWAY MIX AND ANNUAL SERVICE VOLUME

Runway Configuration	Mix Index %(C+3D)	Hourly Capacity in Operations Per Hour VFR	Hourly Capacity in Operations Per Hour IFR	Annual Service Volume
	0 - 20	98	59	230,000
	21 - 50	74	57	195,000
1. 	51 - 80	63	56	205,000
	81 - 120	55	53	210,000
	121 - 130	51	50	240,000

Source: FAA AC 150/5060-5, *Airport Capacity and Delay*; RS&H Analysis, 2022

Comparing the forecasted operations to the ASV creates an ASV ratio which helps identify or anticipate any existing and/or future airfield capacity constraints. The generally accepted industry benchmark to begin planning for additional airfield capacity is when demand reaches 60 percent of the ASV, and building necessary facility upgrades when demand reaches 80 percent of the ASV. With a maximum of approximately 50,000 total aircraft operations forecasted, TVY will not require an additional runway to meet capacity needs.

3.4.2 Airfield Design Standards

Each airport has a design aircraft, which is defined as the most demanding aircraft (by size and performance) that regularly uses the airfield. The airfield must be designed to meet those needs so that regularly operating aircraft are able to safely use the runway, taxiways, and ramps. Airport design standards are established in FAA AC 150/5300-13B, *Airport Design*. This AC outlines FAA airfield design criteria which varies depending on the Airport Reference Code (ARC), which is determined by the Aircraft Approach Category (AAC) and Airplane Design Group (ADG), and the Taxiway Design Group (TDG) of the FAA-approved design aircraft.

As identified in the **Chapter 2, Aviation Activity Forecasts** of this Master Plan, the existing design aircraft at TVY is the Beechcraft Super King Air, and the proposed design aircraft is a composite of the Cessna Citation X+ and the Beechcraft Super King Air. **Table 3-4** summarizes the ARC associated with these aircraft.

TABLE 3-8
EXISTING AND FUTURE AIRPORT DESIGN CRITERIA

	Critical Aircraft	AAC	ADG	ARC	TDG
Existing	Beechcraft Super King Air	B	II	C-II	2A
Future	Beechcraft Super King Air	B	II	B-II	2A
	Cessna Citation X+	C	II	C-II	1B
	Composite	C	II	C-II	2A

Source: FAA Aircraft Characteristics Database, FAA, 2018. FAA AC 150/5300-13B, *Airport Design*. RS&H Analysis, 2022

Engineering airfield surfaces to ARC and TDG standards is critical to maintaining an airfield environment that can safely accommodate the FAA-approved critical aircraft. It should be noted that even though the existing design aircraft at TVY only requires B-II standards, the existing airfield is already designed to C-II standards.

Runway and taxiway design requirements based on the proposed C-II ARC for the airport are discussed in the following sections of this chapter.

3.5 RUNWAY DESIGN

Analysis of the TVY runway addresses the ability of the existing runway to meet both current and forecasted demand. At a minimum, the runway must have the proper length, width, and pavement strength to meet FAA recommended design standards that serve to safely accommodate the design aircraft. This section analyzes specific runway criteria and makes recommendations based on forecast demand. Elements examined in this section include the runway designation, length, width, and strength.

3.5.1 Wind Analysis and Meteorological Conditions

Weather plays a significant role in influencing airport facility needs and design requirements. Ambient temperature, precipitation, wind, visibility, cloud ceiling, and atmospheric pressure are all climate factors that affect operational parameters and future facility needs at the airport.

The warmest month on average for TVY is July, with average high temperature of 91.4 degrees as recorded between 1991 to 2020. Predominant winds arrive from the north-northwest.

FAA runway design standards recommend an airport's runway system provide a minimum of 95 percent wind coverage. The 95 percent wind coverage is computed on the basis of the crosswind component not exceeding the set value based on the Runway Design Code (RDC)[1]. If a single runway cannot provide this level of coverage, then a crosswind runway is warranted. The smaller an aircraft is, the less allowable crosswind component is allowed. For the smallest aircraft, such as the A-I and B-I categories, 10.5 knots of crosswind component is allowed. For B-II aircraft, the crosswind component allowed is 13 knots, with C-II aircraft the allowable component is 16 knots. In all-weather and instrument meteorological conditions, TVY exceeds 95 percent wind coverage in even the most restrictive aircraft types. **Table 3-9** shows the runway wind coverage percentages in all-weather for instrument meteorological conditions at TVY.

Based on these data, the existing runway at TVY provides greater than 95 percent of wind coverage for all aircraft using the airport and is sufficiently oriented to meet current and future needs.

[1] The RDC is a design standard specific to a single runway, and per FAA Advisory Circular AC 150/5300-13B, *Airport Design*, "runway standards are related to aircraft approach speed, aircraft wingspan, and designated or planned approach visibility minimums." This practice properly configures runways to meet necessary physical and operational characteristics for the most demanding aircraft operating at the airport.

TABLE 3-9
RUNWAY WIND DATA

Runway	ALL-WEATHER WIND DATA			IMC WIND DATA		
	Crosswind Component			Crosswind Component		
	10.5 Knots	13 Knots	16 Knots	10.5 Knots	13 Knots	16 Knots
Runway 17-35	98.79%	99.43%	99.83%	97.58%	98.83%	99.53%
Runway 17	68.41%	68.65%	68.85%	67.38%	67.41%	67.42%
Runway 35	45.09%	45.46%	45.69%	75.52%	76.75%	77.44%

Source: NOAA Integrated Surface Database (ISD)
All-Weather Observations: 139,284
Station: Tooele Valley Airport - AWOS III
Data Range: 2016-2020

Source: NOAA Integrated Surface Database (ISD)
IMC Weather Observations: 4,207
Station: Tooele Valley Airport - AWOS III
Data Range: 2016-2020

3.5.2 Runway Requirements

Runway requirements are dictated by the Runway Design Code (RDC). The RDC for a specific runway is composed of:

- The AAC of the design aircraft using the runway,
- The ADG of the design aircraft using the runway, and
- The Runway Visual Range (RVR) for the most stringent instrument approach to the runway end.

Runway 17-35 is the only TVY runway. It is a 6,100-foot-long, 100-foot wide, asphalt runway with a single wheel weight capacity of 30,000 pounds and a dual wheel weight capacity of 43,000 pounds. Runway 17 can support precision instrument approaches and has precision approach markings. Runway 35 has only a visual approach with visual approach markings. Runway 17 supports precision instrument approaches with visibility minima of 1/2 mile. The runway can support an AAC of C and ADG of II. This is anticipated to remain the same over the planning period. **Table 3-10** summarizes the RDC for each runway end.

TABLE 3-10
RUNWAY DESIGN CODE

Runway End	Current RDC	Future RDC
Runway 17	C-II-2400	Same
Runway 35	C-II-5000	Same

Source: AC 150/5300-13B, *Airport Design*, FAA; RS&H Analysis, 2022.

3.5.2.1 Runway Marking

The designations of each runway end are determined by their magnetic heading, rounded to the nearest whole ten value. As magnetic orientation changes through magnetic declination every year, the designation of the runways must be monitored to ensure the runway designator is updated as magnetic shift occurs.

TVY's runway has basic markings for the Runway 35 approach, and precision approach markings on the Runway 17 approach. These markings are adequate and do not need to be updated until well beyond the master planning horizon.

3.5.2.2 Runway Length and Width

Runway length is determined by the greater requirement of the takeoff or landing performance characteristics of the existing and future design aircraft, or the composite family of airplanes as represented by the design aircraft. The takeoff length, including takeoff run, takeoff distance, and accelerate-stop distance, is typically the more demanding of the runway length requirements.

As described below, there are two primary means for determining the airport's recommended runway lengths:

Guidance A **FAA Recommended Runway Length:** General runway length guidance based on FAA computer modeling software and Advisory Circular performance graphs for composite aircraft groups, as adjusted for TVY mean maximum temperature (91.4°F), field elevation (4,321.8 feet above mean sea level), difference in runway centerline elevations (48 feet for Runway 17-35) and aircraft flight range of 500 nautical miles.

Guidance B **Critical Aircraft Planning Manual (Performance Curves):** Determines runway length for specific aircraft models and engines based on data from the aircraft manufacturer, as adjusted for Tooele Valley Airport to the extent possible based on aircraft operating (payload) weights, flight range, non-standard temperatures, and field elevation.

Guidance A provides sufficient information to recommend no additional runway length is needed throughout the planning period, making Guidance B unnecessary at this time. This is based on the 6,100-foot-long Runway 17-35, the forecast of aircraft operations, and the expected aircraft stage lengths. **Table 3-11** provides the FAA recommended runway length requirement.

TABLE 3-11
RUNWAY LENGTH REQUIREMENTS

Aircraft Category	FAA Recommended Runway Length
Existing Runway 17-35 Length	6,100'
Small airplanes with <30 knot approach speed	430'
Small airplanes with <50 knot approach speed	1,150'
Small airplanes (12,500 lbs) with <10 passenger seats	
75% of Fleet	4,210'
95% of Fleet	5,530'
100% of Fleet	5,820'
Small airplanes (12,500 lbs) with 10 or more passenger seats	5,820'
Large airplanes (12,501 lbs - 60,000 lbs)	
75% of Fleet at 60% useful load	6,860'
75% of Fleet at 90% useful load	9,080'
100% of Fleet at 60% useful load	9,670'
100% of Fleet at 90% useful load	11,240'
Large Airplanes (>60,000 lbs)	
500 Mile Stage Length	Approximately 6,530'
1,000 Mile Stage Length	Approximately 7,750'
1,500 Mile Stage Length	Approximately 8,870'

Source: FAA Advisory Circular 150/5325-4, Runway length Requirements for Airport Design, using FAA Airport Design Microcomputer Program 4.2D

In addition, analysis was conducted to determine the runway's ability to accommodate a variety of turboprop and business jet aircraft that have historically and consistently landed at TVY. Using each aircraft's Aircraft Flight Manual (AFM) and Pilot Operating Handbook (POH) with standard flying conditions assumed, as well as consideration of AC 150/5325-4, *Runway Length Requirements for Airport Design*, supplemental aircraft runway length requirements have been generated. **Table 3-12** contains these runway length requirements, as well as if these runway length requirements are within the requirements of the airport.

TABLE 3-12
AIRCRAFT REQUIRED RUNWAY LENGTH ANALYSIS

Aircraft	Required Runway Length	Current Runway Length 6,100' Adequate
Turboprops		
Pilatus PC-12NG	4,905'	Yes
Cessna 208 Caravan	3,796'	Yes
SOCATA TBM 850	3,965'	Yes
Mitsubishi MU-2	4,700'	Yes
Cessna 441 Conquest II	3,729'	Yes
Beechcraft King Air 200	4,410'	Yes
Business Jets		
Cessna Citation X	8,283'	No
Eclipse 500	4,514'	Yes
Cessna Sovereign	5,179'	Yes
Cessna CJ2+	5,905'	Yes
Falcon 900EX (East Coast)	5,630'	Yes
Falcon 900EX (Hawaii)	7,266'	No
Cessna 560XLS	6,922'	No

Source: Lean Engineering, 2022
Notes: Turboprop and business jet runway length requirements were determined using the following methods/assumptions: 14 CFR Part 23/25 certified pilots operating handbooks or aircraft flight manuals as sources; Takeoff to 50' (turboprops only), balanced field length (business jets only), climb limited performance, brake energy limitations (business jets only); Takeoff thrust; Average daily maximum temperature for hottest month; 29.92 inHg pressure; Calm winds; Dry runway conditions; Runway slopes in both directions were assessed and the longer value was presented; No obstacle accountability; No SID climb gradient accountability; NBAA IFR Reserves flight planning; Most restrictive of MIA, JFK, and LAX destination based on annual enroute weather conditions; 90 percent usable payload.

The TVY runway slopes up from the Runway 17 threshold end (low end) to the Runway 35 threshold end (high end) by roughly 0.8 percent grade. South departures require significantly more length for Citation X at 90 percent useful load. A future extension for Runway 17-35 may be desired to allow greater stage lengths for larger business jet aircraft and comply with the UCASP analysis. It is recommended that SLCDA preserve and acquire available land to allow a future extension of Runway 17-35 to 8,283 feet to accommodate the Citation X.

The width of Runway 17-35 and its shoulders are important considerations for the airport's capabilities. As shown in **Table 3-13**, the runway and its shoulders will not need to be widened to meet current or projected traffic.

TABLE 3-13
AIRCRAFT APPROACH CATEGORY RUNWAY REQUIREMENTS

Runway Criteria	Width (ft.)	Shoulder (ft.)	Meets Requirement
Current	100'	20'	Yes
C-II	100'	10'	Yes

Source: FAA AC 150/5300-13B, *Airport Design*; RS&H Analysis, 2022

3.5.2.3 Runway Pavement Strength

Pavement strength is an important criterion in determining the usability of the airfield because an aircraft with a weight exceeding the pavement surface strength runs the risk of damaging the runway. General aviation aircraft weights can range from 2,000 to 50,000 pounds, with smaller aircraft having a single wheel gear (SWG) configuration. Aircraft with a maximum takeoff weight (MTOW) over 20,000 pounds typically have a dual wheel gear (DWG) configuration.

Current strength of the asphalt runway has a single wheel capacity of 30,000 pounds and a dual wheel capacity of 43,000 pounds. **Table 3-14** details typical maximum takeoff weights for general aviation aircraft that have historically operated out of the airport demonstrating that the current design pavement strength is sufficient to accommodate the existing and forecast design aircraft.

TABLE 3-14
TYPICAL AIRCRAFT MINIMUM TAKEOFF WEIGHTS

Aircraft	Aircraft Size (Passengers)	ARC	Gear Type	MTOW (lbs.)
Small Piston Aircraft	0-5	A-I to B-II	Single	1,000 to 12,000
Turboprop Aircraft	4-11	A-I to B-II	Single or Dual	10,000 to 18,000
Beechcraft Super King Air	10-11	B-II	Dual	12,500
Light/Small Business Jet	5-8	B-II to C-II	Single or Dual	12,500 to 43,000
Cessna Citation X+	8	C-II	Dual	36,600

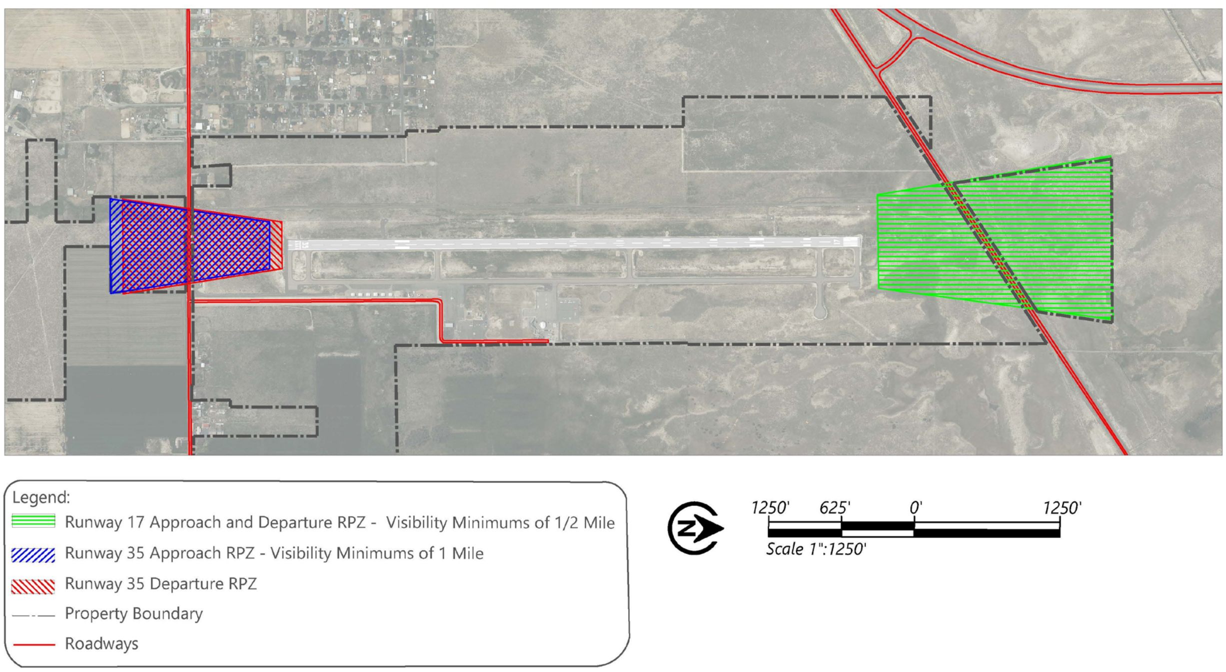
Sources: FAA Aircraft Characteristics Database, FAA; RS&H Analysis, 2022

3.5.2.4 Runway Protection Zones

For the protection of people and property on the ground, the FAA has identified an area of land located off each runway end as the Runway Protection Zone (RPZ) which should be under airport control and free of incompatible objects and activities. The size of an RPZ varies according to the critical aircraft characteristics and the lowest instrument approach visibility minimum defined for each runway. FAA guidance and preference is for airports to own, in fee simple, all land within the RPZ.

At the south end of TVY property, the RPZ for the Runway 35 approach extends over W Erda Way but is otherwise contained within airport property. To the north, the approach for Runway 17 is also owned by the airport, excluding Utah State Route 138 (SR-138) which runs through the Runway 17 RPZ. The RPZs for both runway ends are depicted on **Figure 3-3**.

FIGURE 3-3
TVY RUNWAY PROTECTION ZONES



Source: RS&H Analysis, 2022

Because no changes are anticipated for the runway geometry and approaches, the current RPZs will remain unchanged throughout the planning period and no action is needed to accommodate potential incompatible land use in these zones at TVY.

3.5.2.5 Runway Protection Standards

Table 3-15 displays runway protection standards that apply to each approach at TVY. The standards for the Runway 17 approach are more restrictive due to the instrument approach minima being lower and the RVR being lower (2,400 feet compared to Runway 35's 5,000 feet). A windsock currently sits within the ROFA but is not considered a fixed-by-function navigational aid. Multiple hangars lie within the BRL and impact the Part 77 transitional surface necessitating their removal.

TABLE 3-15
RUNWAY PROTECTION STANDARDS

Airfield Components	Runway		Rwy Stds 17 Reqs C-II-2400	Rwy 17 Criteria Met	Rwy Stds 35 Reqs C-II-5000	Rwy 35 Criteria Met
	17	35				
Blast Pad Design						
Runway Blast Pad Width	N/A		120'	N/A	120'	N/A[1]
Runway Blast Pad Length	N/A		150'	N/A	150'	N/A[1]
Runway Protection						
Runway Safety Area (RSA)						
Length beyond departure end	1,020'	1,115'	1,000'	Yes	1,000'	Yes
Length prior to threshold	1115'	1,140'	600'	Yes	600'	Yes
Width	500'	500'	500'	Yes	500'	Yes
Runway Object Free Area (ROFA)						
Length beyond departure end	1,020'	1115'	1,000'	Yes	1,000'	Yes
Length prior to threshold	1,115'	1,140'	600'	Yes	600'	Yes
Width	500'	500'	800'	No	800'	No
Runway Obstacle Free Zone (ROFZ)						
Length	1,115'	1,020'	200'	Yes	200'	Yes
Width	1,030'	1,100'	400'	Yes	400'	Yes
Precision Obstacle Free Zone (POFZ)						
Length	1,115	1,020'	200'	Yes	N/A	Yes
Width	1,030'	1,100'	800'	Yes	N/A	Yes
Runway Separation						
Runway centerline to:						
Holding position	250'		250'	Yes	250'	Yes
Parallel Taxiway/Taxiway *Centerline*	400'		300'	Yes	400'	Yes
Aircraft parking area	440'		500'	Yes	500'	Yes
20' Building Restriction Line	640'		515'	No	515'	No

Source: FAA AC 150/5300-13B, *Airport Design*; RS&H Analysis, 2022

Note: (1) Blast pads are not required for Runway 17-35. They are recommended for runways serving ADG-III critical aircraft and above as well as those experiencing soil erosion adjacent to the runway, should these circumstances exist at a later time.

3.6 TAXIWAY DESIGN

This taxiway analysis addresses specific requirements relative to FAA design criteria and the ability of the existing taxiways to accommodate the current and projected demand. At a minimum, taxiways must provide efficient circulation, have the proper pavement strength, and meet FAA design standards to safely accommodate the design aircraft. Airport runways should be supported by a system of taxiways that provide access between the runways and the aircraft parking and hangar areas.

Taxiways are classified as follows:

- Parallel Taxiway – Facilitate the movement of aircraft to and from the runway.
- Entrance/Exit Taxiway – Provide a means of entering and exiting the runway (does not include those taxiways designated as connector, parallel, or apron edge taxiway).
- Crossover or Traverse/Connector Taxiway – Provide increased taxiway flexibility between two parallel taxiways.
- Apron Taxiway – Provide primary aircraft access in an aircraft parking apron.

Classifications for TVY taxiways are shown in **Table 3-16**.

TABLE 3-16
TVY TAXIWAYS

Taxiway Designation	Taxiway Classification
Taxiway A	Parallel Taxiway
Taxiway A1	Connection Taxiway
Taxiway A2	Connection Taxiway
Taxiway A3	Connection Taxiway
Taxiway A4	Connection Taxiway
Taxiway A5	Connection Taxiway
Taxiway A6	Connection Taxiway

Source: FAA Advisory Circular 150/5300-13B, *Airport Design*; RS&H Analysis, 2022

The goal of an effective taxiway system is to maintain traffic flow using taxi routing with a minimum number of points requiring a change in the airplane's taxiing speed. Compared to many larger or more complex airports, TVY does not experience significant congestion. Taxiway A is a parallel taxiway running the full length of Runaway 17-35 on the east side. Taxiways A1-A6 are connection taxiways that provide access between Taxiway A and the runway. These taxiways allow access into and out of key points of the runway, minimizing taxing on the runway and maximizing time available for takeoff and landing operations.

The TVY design aircraft determines taxiway design standards and dimensional criteria. Taxiway pavement width is determined by the TDG of the design aircraft. Separation standards are determined by the ADG of the design aircraft. To accommodate the design aircraft, it is recommended that critical airfield taxiways be designed and built to ADG II/TDG 2A standards.

TABLE 3-17
TAXIWAY COMPONENT CRITERIA

Taxiway Components	Taxiway Width	Taxiway Shoulder Width	Taxiway Safety Area Width	Taxiway Object Free Area Width	Centerline to Parallel Taxiway	Centerline to Fixed or Movable Object
Requirement ADG II, TDG 2A	35'	15'	79'	131'	105'	65.5'
TWY A	✓	✓	✓	✓	✓	✓
TWY A1	✓	✓	✓	✓	✓	✓
TWY A2	✓	✓	✓	✓	✓	✓
TWY A3	✓	✓	✓	✓	✓	✓
TWY A4	✓	✓	✓	✓	✓	✓
TWY A5	✓	✓	✓	✓	✓	✓
TWY A6	✓	✓	✓	✓	✓	✓

Source: FAA Advisory Circular 150/5300-13B, *Airport Design*; RS&H Analysis, 2022
Notes: ✓ indicates taxiway meets FAA AC 150/5300-13B, *Airport Design* criteria.
(1) See Section 406, paragraph (b) in FAA AC 150/5300-13B, *Airport Design* for fillet design dimensions.

Taxiway A3 provides aircraft direct access to the runway from the ramp, which is non-standard as it increases the risk of a runway incursion. There are also some areas along the taxiways at TVY with degraded shoulders, however they are not presently a concern and can be addressed during pavement rehabilitation or reconstruction projects as appropriate.

3.7 AIRCRAFT PARKING AND STORAGE

This section outlines the requirements for general aviation aircraft parking and storage facilities for based and transient aircraft. The areas evaluated in this section include aircraft hangars, tie-downs, and apron space. The analysis divides aircraft storage needs between based and transient aircraft.

The quantity and type of parking and storage space is driven by many different factors including total number of based aircraft, fleet mix, local weather conditions, airport security, user preference, and varying market factors. This section outlines requirements for tie-downs, covered tie-downs, T-hangars, conventional hangars, and corporate hangars. These hangar types are general terms for different sized parking and storage facilities serving slightly different uses. Broad definitions for how each hangar space is programmed within the context of this Master Plan are as follows:

» *Based Aircraft Tie-Downs* – Uncovered defined locations on the apron with anchors to secure aircraft while parked at the airport. These spaces are leased to based aircraft. Tie-downs are used for itinerant aircraft and will be discussed in the following section.

- *Covered Tie-Downs* – Similar to tie-downs, but the defined location is covered with a roof to shelter from sun exposure and inclement weather.
- *T-hangars* – Small hangars that are typically arranged so small aircraft are "nested" next to each other in alternating directions.
- *Conventional/Box hangars* – Hangars that are larger than a T-hangar, most often used to house large corporate jets but can also store multiple smaller aircraft.
- *Corporate hangars* – The largest type of hangar which can contain multiple aircraft. They contain ancillary space for other uses such as offices, crew lounge, reception, restrooms, and other needs of business travelers.

The baseline forecast for based aircraft (shown in **Table 3-18**) indicates steady growth in based aircraft demand. **Chapter 2, Aviation Demand Forecasts**, and the *2019 SLCDA General Aviation Strategy Plan* both forecast a growth of based aircraft at TVY, primarily single engine piston aircraft. However, tenant surveys conducted early in the master planning process indicated strong unmet demand for new hangar development at both TVY and its general aviation reliever counterpart, U42. Additionally, the majority of growth anticipated to occur at TVY is driven by demand for based aircraft storage which is not currently provided as well as the movement of smaller general aviation aircraft from SLCIA. This demand is reflected in the high growth based aircraft scenario in the aviation demand forecast, shown in **Table 3-19**.

TABLE 3-18
TVY BASELINE BASED AIRCRAFT FORECAST

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Total
2020	19	0	1	0	0	20
2025	19	0	2	0	0	21
2030	20	0	2	0	0	22
2040	20	0	3	1	0	24
CAGR (2020-2040)	0.3%	-	5.6%	-	-	0.8%

Source: FAA-approved 2022 TVY Aviation Demand Forecast (Chapter 2); RS&H Analysis, 2022
Notes: 2020 is baseline historical year.

TABLE 3-19
TVY HIGH GROWTH BASED AIRCRAFT FORECAST

Year	Single Engine Piston	Multi-Engine Piston	Turboprop	Jet	Helicopter	Total
2020	19	0	1	0	0	20
2025	32	0	1	0	0	33
2030	32	0	2	0	0	34
2040	33	0	3	1	0	37
CAGR (2020-2040)	2.8%	-	5.6%	-	-	3.2%

Source: FAA-approved 2022 TVY Aviation Demand Forecast (Chapter 2); RS&H Analysis, 2022
Notes: 2020 is baseline historical year.

There are currently 44 tiedowns on the apron with 24 actively used and the remaining 20 reserved for airport growth. TVY has six box hangars measuring 30 feet by 40 feet (1,200 square feet) and, in all, totaling 7,200 square feet.

Using the high growth based aircraft forecast as the basis, **Table 3-20** summarizes needed apron space and hangars at TVY, under the following assumptions:

» Hangars to be built as demand warrants for 100 percent of based fleet and tenants need.

» Tie-downs provided for 80 percent of daily transient operations (assumed to be 70 percent of daily itinerant operations at TVY).

» 20 percent additional apron space/tie-downs equipped with charging stations for AAM aircraft and electrical aircraft.

Though this analysis determined specific requirements based on hangar type, it is useful to determine the total amount of land that may be required to meet future demand. Aircraft parking and storage space requirements were developed using the high growth based aircraft scenario.

TABLE 3-20
AIRCRAFT PARKING AND STORAGE REQUIREMENTS

Hangar Type	Existing 2022	Aircraft Parking / Storage		
		PAL 1	PAL 2	PAL 3
Tie-Downs				
Positions Required	44	53	55	60
Square Footage Required	67,980	81,576	85,136	92,403
Surplus / (Deficit)	-	(13,596)	(17,156)	(24,423)
Total Additional Tie-Downs Required	**0**	**9**	**11**	**16**
T-Hangars				
Hangar Bays Required	0	11	24	26
Square Footage Required	0	15,400	33,169	37,088
Surplus / (Deficit)	-	(15,400)	(33,169)	(37,088)
Box Hangars				
Hangars[1] Required	6	8	10	11
Square Footage Required	7,200	16,900	26,600	31,450
Surplus / (Deficit)	-	(9,700)	(19,400)	(24,250)
Total Hangars Required	**6**	**19**	**34**	**37**

Source: RS&H Analysis, 2022

Notes: (1) Six existing box hangars are within the building restriction line and are recommended to be removed and replaced in an appropriate location.

Based aircraft tie-downs assumed to be 1,545 square feet. Covered tie-downs assumed to be 1,275 square feet. T-hangars assumed to be 1,400 square feet. Conventional hangars assumed to be 4,850 square feet. Corporate hangar assumed to be 30,000 square feet.

3.8 FIXED BASE OPERATOR

As enplanements and operations increase at SLCIA, there is growing market pressure for increasing lease rates and relocating smaller aircraft operations to general aviation reliever airports such as TVY. This same demand within the regional airport system is why demand for facilities and services is anticipated to drive significant growth at TVY, including the potential for introduction of a fixed base operations (FBO). One of the primary TVY tenants, Skydive Utah, already provides its own supply of Jet A fuel on the airfield, and airport users have noted a desire for formal Jet A fueling services at the airport. As local airspace and airport operations increase, traffic at TVY will likely grow as well and users will seek out traditional FBO services, such as fuel sales, flight planning space, and parking and storage.

It is recommended for SLCDA plan for space sufficient to accommodate a future FBO development. Similar to surrounding airports, an initial area of 30,000 square feet is a sound initial planning factor for building and apron space, however, a best planning practice is providing additional space around the FBO for future expansion.

3.9 LAND USE COMPATIBILITY AND ZONING

It is critical that SLCDA promotes aviation compatible land development on and around TVY through the adoption and maintenance of proper zoning ordinances which protect airport safety areas (including RPZ), CFR Part 77 Airspace Surfaces, and Terminal Instrument Procedures (TERPS), to prevent obstructions to air navigation and protect the utility of the airport for the community.

A 2021 land use and zoning study for TVY and the surrounding jurisdictions was completed for the purpose of promoting and protecting public health, safety, and welfare, while also protecting the utility of the airport. The study developed and recommended adoption of an airport overlay zone by all impacted jurisdictions to promote economic viability, restrict incompatible land uses, and prevent development that penetrated protected Part 77 airspace surfaces and existing instrument procedures (see **Appendix X** for zoning study). It is recommended that SLCDA continue pursuing implementation of this zoning code within the affected jurisdictions.

Currently, all RPZs, safety areas, and 65 DNL noise contours are contained on airport property, aside from W Erda Way to the south and SR-138 to the north. As is reasonable and justified, these roads should not be expanded and should be considered for realignment within any future development plans. It is recommended that facility alternatives consider impacts for the relocation of both roads in case of a runway extension evaluation.

3.10 SUPPORT FACILITIES REQUIREMENTS

Support facilities at an airport encompass a broad set of functions that exist to ensure the airport can fulfill its primary role and mission in a safe and operationally efficient manner. The following sections outline the requirements for these facilities at TVY.

3.10.1 Airport Maintenance and Snow Removal Equipment

There is currently no snow removal equipment (SRE) at the TVY, and the on-site maintenance vehicles are limited to a runway snow blower, a tractor motor for vegetation control, and an ATV. Therefore, TVY relies on road capable SRE driven from SLCIA after they conclude with snow removal at that airport to conduct snow removal at TVY. This creates significant interference with TVY operational continuity during winter operations, as there can be extended times when the runway cannot be cleared of snow and aircraft operators cannot safely land on at the airport. Eliminating these operational interruptions during winter weather events is highly desirable, therefore, another solution to snow removal should be considered to keep the runway and surrounding surfaces in operation. The primary solution to this issue is constructing SRE storage facilities at TVY to house on-site dedicated equipment, however, it is important to note that this would also require having staff available to operate the equipment.

3.10.2 Aircraft Fuel Storage

TVY currently offers a 12,000-gallon tank of self-service 100LL fuel at a 24-hour station on the north apron area. Fuel sale records indicate an average of approximately 9,000 gallons are purchased to replenish 100LL supply every 8-12 months. With no existing FBO, this is the only option for crews to purchase fuel, and there is no Jet A fuel available for purchase. One of the tenants, Skydive Utah, has a personal use, 4,870-gallon Jet A fuel tank stored on the airfield. **Table 3-21** shows fuel storage requirements over the planning period.

TABLE 3-21
FUEL STORAGE REQUIREMENTS

	Fiscal Year 2016-2020	Planning Activity Level		
		PAL 1	PAL 2	PAL 3
Aircraft Operations Growth Rate	-	1.04	1.04	1.08
Average Annual 100LL Fuel Usage (gallons)	8,888	9,254	9,635	10,445
Available Storage (gallons)	12,000	12,000	12,000	12,000
Estimated Resupply Time (months)	8-12	8-12	8-12	7-11
Privately Owned Jet A Storage (gallons)	4,870	4,870	4,870	4,870

Source: Airport Fuel Sales Records; RS&H Analysis, 2022
Notes: No usage data available for Jet A fuel.

Providing Jet A fuel for sale benefits jet aircraft flying into TVY which are currently required to fly to a different airfield to purchase their fuel. This recommendation was also made by the existing tenant, Bureau of Land Management (BLM), to help support their activity at the airport. Jet A service could be facilitated through a future FBO or as a self-service and would be financially beneficial to SLCDA.

3.10.3 Advanced Air Mobility Facilities

The development of AAM at TVY is still very uncertain but it is recommended that SLCDA plan for AAM space at the airport, including future vertiport development. Considering current AAM aircraft types, designs, and space requirements, a standard vertiport is anticipated to require approximately 20,000 square feet.

3.11 UTILITY INFRASTRUCTURE REQUIREMENTS

Access to utility infrastructure is critical to the development of any airport. This section will look at what utilities are needed at TVY.

3.11.1 General Utilities

Tooele Valley Airport's utility infrastructure needs improvement as highlighted by the existing Utility Inventory document in **Appendix X**. Currently, there is no public water or sewer system serving buildings on the airfield, and users of the airport must use portable restrooms. The water provided at the airport is through an on-site well that currently does not meet potable standards by the Tooele County Health Department. To enable facility development, TVY must connect to proper water and sewer systems.

3.11.2 Advanced Air Mobility and Electric Aircraft

In order to prepare for the evolution of AAM technology and electrification of aircraft, it is recommended that TVY plan to install charging stations on the apron and/or at future hangar and FBO facilities. Such charging stations would require upgrade of the utilities at the airport to meet higher electrical requirements. Even though detailed specifications for aircraft charging stations remain uncertain, emerging electrical aircraft models are anticipated to require high AC Voltage Connection (480 Vac, 3 Phase, 60Hz) and high AC Grid Current (450 Amps).

3.12 LANDSIDE FACILITIES

Landside facilities consist of those elements providing vehicular access, egress, and general circulation within the public areas surrounding the Airport. At TVY, these include the regional roadway system, on-airport roadways, and public and private parking.

Completion of the Midvalley Highway connecting I-80 to SR-138 immediately northwest of TVY offers new convenient access to the airport via Sheep Lane and Erda Way. The next phase of the Midvalley Highway is in the environmental process to help determine how right-of-way should continue south from the new SR-138 intersection. Airport development alternatives need to consider and coordinate how access will occur with the next phase of Midvalley Highway extension.

N Airport Road provides access to airfield facilities. Toward the north end of the airfield the road provides adequate distance to develop airside and landside facilities, however the southern portion of the road hinders safe and efficient facility development along the south end of the airfield. Land has been acquired to accommodate a realignment of this section of N Airport Road and it is recommended that it be done in coordination with utilities development and provide sufficient area to develop airside and landside facilities at the south end of the airfield.

Vehicle parking at TVY is minimal and often necessitates parking along the shoulder of N Airport Road during peak sky dive operations. Development of minimum standards can ensure development includes safe and adequate parking facilities.

3.13 CONCLUSION

TVY is an airport with many important assets and great potential to serve the community. The existing airfield layout and navigational aids make it a safe and operationally effective airport but there needs to be a focus placed on developing utilities to support the demand for facility growth. In summary, the primary facility requirements SLCDA needs to address at TVY include:

- Plan for the impacts of a potential future runway extension beyond the planning period
- Remove the six existing hangars within the 20’ BRL and replace them in an appropriate location
- Provide additional tie-downs/apron space
- Determine hangar development mix based on market conditions
- Construct new hangars (market driven mix) within FAA standards
- Upgrade utilities, including water, sewer, and electrical power
- Provide charging stations for electric aircraft and electric vehicles
- Relocate PAPI equipment in ROFA to outside the ROFA
- Provide Jet A and FBO services (if possible) to aircraft, such as transient or BLM aircraft
- Work with FAA to ensure ILS capabilities are maintained
- Work with FAA and Department of Defense (DoD) jointly to study installation of supplemental ADS-B receivers throughout the Tooele Valley to enable FUSION radar screens at S56 and lower overall minimum vectoring altitudes (MVAs)
- Upgrade AWOS III equipment to AWOS III P/T