CHAPTER C

# Capacity Analysis & Facility Requirements

## 1. Introduction

This chapter considers the ability of facilities at Friedman Memorial Airport (SUN or "the Airport") to accommodate existing and projected activity. Current and forecasted activity levels have been compared to the Airport's operational capacity, using established Federal Aviation Administration (FAA) criteria and the findings from previous chapters.

In 2015, the Friedman Memorial Airport Authority (FMAA) completed implementation of Alternative 6 from the 2013 *Airport Alternatives Technical Analysis* in order to comply with Congressionally-mandated Runway Safety Area (RSA) criteria by December 31, 2015. Alternative 6 involved a combination of airfield improvements and FAA Modifications of Standards (MOSs). The airfield improvements impacted landside facilities, resulting in the need to relocate those facilities.

It is important to distinguish between pre- and post-Alternative 6 conditions, to identify recent net gains and losses in overall facility capacity associated with implementation of Alternative 6 at SUN. The following information has been identified for each type of facility:

1) Existing conditions prior to the implementation of Alternative 6;
2) Existing conditions after implementation of Alternative 6; and
3) Projected facility needs beyond implementation of Alternative 6 and throughout the 20-year planning period.

This Master Plan pursues the dual path approach described in the City of Hailey and Blaine County guiding principles, by developing a plan that best meets the needs of the current Airport site while also providing planning-level analysis for a relocated Airport. Planning thresholds for improving the existing site or relocating the Airport are identified at the conclusion of this chapter. Alternatives will be developed in subsequent chapters of this Master Plan to accommodate planning threshold needs at both the existing site and a replacement site.

Following identification of key terms, local government Airport policies, and recent Airport planning efforts, the capacity analysis and facility requirements are presented in the following sections:

- **Airfield Capacity.** This section evaluates the ability of the airfield to accommodate forecasted peak operational demand.
- **Airside Facility Requirements.** This section analyzes the layout and dimensions of the airfield, as well as surrounding airspace, to determine its ability to meet operator needs and design standards.
- **Landside Facility Requirements.** This section estimates existing and future needs for landside facilities including the airport traffic control tower, passenger terminal building, automobile parking lots, aircraft parking aprons, and based aircraft hangars.
- **Support Facility Requirements.** This section reviews potential need for improvements related to airport maintenance, aircraft rescue and firefighting (ARFF), fuel storage, and snow storage.
- **Facility Requirements Summary: Dual Path Planning Thresholds.**

## *Key Terms*

Definitions for several key terms used in this chapter are provided below. **Appendix A**, *Glossary of Terms***,** also provides definitions for technical terminology, acronyms, and phrases used in this Master Plan.

**Airfield Capacity** – The maximum number of aircraft operations that a specific airfield configuration can accommodate within a specific time interval of continuous demand.

**Airports Cooperative Research Program (ACRP)** – An industry-driven, applied research program managed by the Transportation Research Board (TRB) that develops near-term, practical solutions to problems faced by airport operators.

**Airport Reference Code (ARC)** – An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely on the airport.

**Airside Facilities** – Facilities that are accessible to aircraft, such as runways and taxiways.

**"Alternative 6"** – A collection of improvements to airport facilities completed in 2014 and 2015, and described in the *Airport Alternatives Technical Analysis* report, dated January 2013.

**Annual Service Volume (ASV)** – Used by the FAA as an indicator of relative operating capacity, ASV is an estimate of an airport's annual capacity that accounts for differences in runway use, aircraft mix, weather conditions, etc. that would be encountered over a year's time. ASV assumes an acceptable level of aircraft delay as described in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*.

**Design Aircraft** – An aircraft with characteristics that determine the application of airport design standards for a specific runway, taxiway, taxilane, apron, or other facility. This aircraft can be a specific aircraft model or a composite of several aircraft currently using, expected to use, or intended to use the airport or part of the airport. Also called "critical aircraft" or "critical design aircraft".

**Displaced Threshold** – A landing threshold that is located at a point on the runway beyond the physical end of the runway pavement.

**Instrument Flight Rules (IFR) Operations** – Aircraft operations conducted by pilots with reference to instruments in the flight deck, with navigation accomplished by reference to electronic signals.

**Landside Facilities** – Facilities that support airside facilities, but are not part of the aircraft movement area, such as terminal buildings, hangars, aprons, access roads, and parking facilities.

**Large Aircraft** – An aircraft with a maximum certificated takeoff weight (MTOW) greater than 12,500 pounds.

**Modification of Standards (MOS)** – Any approved nonconformance to FAA standards, other than dimensional standards for Runway Safety Areas (RSAs), applicable to an airport design, construction, or equipment procurement project that is necessary to accommodate an unusual local condition for a specific project on a case-by-case basis while maintaining an acceptable level of safety.

**Object Free Area (OFA)** – A rectangular area centered on a runway, taxiway, or taxilane centerline, provided to enhance the safety of aircraft operations by remaining clear of objects.

**Runway Design Code (RDC)** – A code signifying the design standards to which a runway is to be built.

**Runway Safety Area (RSA)** – A rectangular area surrounding a runway that is suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from the runway.

**Runway Visual Range (RVR) –** The range over which the pilot of an aircraft on the centerline of a runway can see the runway surface markings or lights delineating the runway, reported in hundreds of feet.

**Visual Flight Rules (VFR) Operations** – Operations conducted by pilots with only visual reference to the ground, obstructions, and other aircraft.

## 1.1. FMAA Joint Powers Agreement and City/County Guiding Principles

Three local documents that are important to consider when planning for future development at SUN include:

1. The *Amended and Restated Joint Powers Agreement, Friedman Memorial Airport,* between Blaine County and the City of Hailey;
2. Blaine County's *Airport Guiding Principles;* and
3. The City of Hailey's *Guiding Principles for the Operation and Relocation and Discontinuation of the Friedman Memorial Airport*.

The *Amended and Restated Joint Powers Agreement* states that "there shall be no expansion of the land base of the Existing Airport beyond what has been established by the Master Plan" (Article VI, Section 6.1A.). "Master Plan" is defined as the 1991 Master Plan Update, or its successor. This restriction places significant constraints on development at the existing site.

In February 2012, the Blaine County Board approved "six guiding principles determined by the Board of County Commissioners to be essential to the success of the airport project." These County guiding principles support the needs of the current Airport while also supporting Airport replacement in the long term:

1. Robust commercial and general aviation transportation service are vital to the economy of Blaine County.
2. Meeting federal design and safety standards in air and ground operations is paramount in planning for air service and related infrastructure.
3. Air service and infrastructure improvements are affordable and achievable.
4. Minimizing environmental impacts is a high priority in planning for and implementing air service and infrastructure improvements.
5. Air Service is an important and interconnected mode of transportation for Blaine County and the region.
6. A replacement airport south of Bellevue along State Highway 75 is the long term solution and objective.

In March 2012, the Hailey City Council approved its own guiding principles for the operation, relocation, and discontinuation of the Airport at its existing site. These are:

1. The City believes that an airport with commercial service is important to the Wood River Valley. But, the City believes loss of commercial service, which results in a general aviation airport only, is highly undesirable.
2. The City of Hailey remains committed to the 1994 Master Plan in the long term, which calls for relocation of an airport away from cities.
3. The City knows that relocation of the Friedman Memorial Airport may be a very long term process; however, in the meantime, to keep the relocation process moving, the City will request the FMAA and the FAA to restart the EIS process.

4. The City knows that the Friedman Memorial Airport may serve as the airport for the Wood River Valley for the short, medium and even long term while airport relocation is pursued.
5. The City will support the FMAA and FAA in developing an Airport Layout Plan…that addresses potential reliability improvements, as well as FAA design standard deficiencies. Until the ALP is developed and presented for consideration by the City, the City supports the present configuration and operation of the Friedman Memorial Airport.
6. In reviewing reliability improvement issues and issues related to FAA design standard compliance, the City will balance any increased reliability with the potential for increased impacts to our citizens and the costs associated with improvements to reliability.
7. The City supports the Friedman Memorial Airport; however that support cannot continue if airport operations and/or physical layout jeopardize the health, safety or quality of life for Hailey citizens (e.g. approaches and takeoffs over north Hailey). Safety and quality of life should never be compromised in favor of any other guiding principle.
8. The joint governing authorities should develop concrete steps for a dual path approach: short term safety improvements and long term relocation.

## 1.2. Alternative 6 Runway Safety Area Improvements

Following FAA suspension of the Replacement Airport EIS process in 2011, the FMAA led an 18-month public process to determine appropriate short-term improvements at the Airport, as suggested by the FAA. The 2013 *Airport Alternatives Technical Analysis* presented a set of alternatives for improving the Airport to meet standards and to identify required MOSs where standards could not be met. After reviewing the alternatives, the community and FAA selected Alternative 6, *Less Than Full Compliance, No Land Acquisition,* as the path forward for achieving compliance with FAA RSA dimensional standards at the existing site. This section provides an overview of the Alternative 6 improvements, to establish a baseline for future needs.

The Alternative 6 improvements in combination with the MOSs brought the RSA dimensions into compliance with FAA C-III standards. The process of constructing a compliant RSA and relocating Taxiway B was completed in 2015. The related relocation and removal of other facilities planned as part of Alternative 6 will be completed as funding and timing allow. The Alternative 6 improvements and current MOSs are described below.

Airside Improvements. The Alternative 6 airfield improvements included:

- **Removal of Taxiway A;**
- **Relocation of Taxiway B at 320 feet from the runway centerline;**
- **Extension of Taxiway B as a full-length parallel taxiway; and**
- **Relocation of the Automated Weather Observing System (AWOS) to a location adjacent to the Fixed Base Operator (FBO) apron, west of its previous location.**

Landside Improvements. Several changes to landside facilities also resulted from the RSA improvements, as a number of landside facilities needed to be removed or relocated to accommodate the airfield development. The Alternative 6 landside improvements included:

- **Relocation/removal of aircraft parking as well as a number of hangars in several locations, resulting in a net loss of aircraft parking and hangars;**
- **Construction of a new taxilane to access T-hangars south of the terminal area;**

- **Relocation of the commercial aircraft parking apron and bypass taxiway;**
- **Relocation of the Airport Traffic Control Tower (ATCT) (not included in the initial projects and to be completed by 2023);**
- **Relocation and consolidation of the airport office, maintenance, and firefighting buildings; and**
- **Reconstruction of the bus route access road and closure of the winter bus route.**

**Modifications of Standards.** FAA protection and separation standards will be met through six MOSs recently approved by FAA. The MOSs stipulated specific airfield improvements while imposing restrictions on aircraft types and operating procedures. The stipulations essentially limit use of the Airport to aircraft less than 95,000 pounds gross weight, and with wingspans less than 100 feet (unless an FAA-approved operational procedure is put into place to mitigate impacts related to wingspans greater than 100 feet). The MOSs are listed in **Table C1**.

Table C1 **MODIFICATIONS OF STANDARDS**

| | Title | Description | FAA Approval Date |
|---|---|---|---|
| MOS 1 | Runway Centerline to Parallel Taxiway Centerline | Allows a Runway Centerline to Parallel Taxiway Centerline of 320 feet, while the standard is 400 feet, for a proposed full length parallel taxiway, due to man-made constraints including hangars, the Terminal Building, and airplane parking. | November 2013 |
| MOS 2 | Parallel Taxiway Object Free Area (TOFA) Width | Allows a TOFA width of 160 feet, while the standard is 186 feet, due to man-made constraints including hangars, the Terminal Building, and airplane parking. | November 2013 |
| MOS 3 | Runway Object Free Area (ROFA) Width | Allows the following structures to remain in the ROFA: State Highway 75, Perimeter Fence, and Off Airport Buildings. | November 2013 |
| MOS 4 | Runway Safety Area (RSA) Grading | Allows the existing RSA transverse grades of 0% to 1%, while the standard is 1.5% to 3%. | November 2013 |
| MOS 5 | Runway Centerline to Aircraft Parking Area | Allows a Runway Centerline to Aircraft Parking Area separation of 400 feet, while the standard is 500 feet. | November 2013 |
| MOS 8 | Taxiway Width | Allows a parallel taxiway width of 50 feet plus 10 foot paved shoulders, while the standard for width is 75 feet with taxiway edge safety margin of 15 feet. Intersections and fillets will be designed to accommodate Taxiway Design Group (TDG) 5 aircraft so that the required taxiway edge safety margin is provided for all aircraft operating at SUN. | November 2013 |

SOURCE: **Federal Aviation Administration (FAA).**
NOTE: **Draft MOS 6 and MOS 7 were initially developed to address operational restrictions that were later deemed unnecessary by the FAA; thus the number gap from MOS 5 to MOS 8.**

## 2. Airfield Capacity

Airfield capacity refers to the maximum number of aircraft operations that a specific airfield configuration can accommodate during a specified time interval of continuous demand. This theoretical level of capacity is influenced by weather conditions, number and configuration of exit taxiways, types of aircraft that use a facility, when and how that use occurs, and air traffic control/airspace handling procedures. An airfield capacity analysis was conducted for SUN using methods described in FAA Advisory Circular (AC) 150/5060-5, *Airport Capacity and Delay*, to identify possible deficiencies in the present and future airport physical plan. The purpose of the analysis is to develop a clearer picture of the capacity of the existing airfield layout, taking into account the unique circumstances at SUN in which operations are conducted almost exclusively in a head-to-head pattern. In this pattern, takeoffs and landings occur in opposite directions, while a standard arrangement would direct arrivals and departures in the same direction.

The Airfield Capacity analysis is presented in the following sections:

- **Factors Affecting Runway Capacity at SUN**
- **Annual Service Volume**
- **Comparison with ACRP Report 79 Methodology**
- **Airfield Capacity Recommendations**

### 2.1. Factors Affecting Runway Capacity at SUN

The prevailing head-to-head pattern at SUN, in which aircraft arrive from and depart to the south, negatively affects the operational efficiency of Runway 13/31, because additional delay and air traffic control coordination is needed to safely stagger operations. The tower facilitates head-to-head operations because it is the safest pattern based on the surrounding mountainous terrain, which prohibits instrument flight rules (IFR) arrivals from and departures to the north. The head-to-head pattern also supports voluntary noise abatement over the City of Hailey, although the Voluntary Noise Abatement Procedures are not the primary reason for the pattern. Although the head-to-head pattern limits runway capacity, the safety benefits of the pattern generally take precedence over any congestion concerns. The head-to-head pattern represents the general policy of the Airport.

The canyons north of the Airport sometimes contribute to challenging crosswinds at low altitudes. The runway also slopes uphill to the north, further favoring landings from and takeoffs to the south. Furthermore, the current declared distances on Runway 13/31 favor Runway 13 departures and Runway 31 arrivals due to additional runway length available for such operations (see Chapter 1 for more information on declared distances). Thus, operations to and from the north can only take place under certain conditions.

However, unusually strong southerly tailwinds sometimes make takeoffs to and landings from the north desirable. IFR departures are only possible to the south; departures to the north must be conducted during visual flight rules (VFR) conditions. Approval for departures to the north must be requested from the tower. The first operator to request reversed procedures when the tailwind is high will often cause other operators to follow suit. A large increase in IFR operations may compromise the existing Airport site's efficiency in the future, as IFR operations are currently restricted to the head-to-head pattern south of the Airport.

The FAA's capacity estimation methodologies do not provide guidance regarding single runway "head-to-head" operating environments such as SUN. The FAA methodologies assume that arrival and departure operations are conducted in the same direction on a given runway, as the FAA generally discourages opposite direction operations. In order to ensure that the head-to-head pattern is properly accounted for in the analysis, the hourly capacity of the airfield and its operating conditions were determined through conversations with Airport and control tower personnel.

## 2.2. Annual Service Volume

The formula for calculating annual service volume (ASV) contains three variables: weighted hourly capacity in terms of aircraft operations ($C_w$); the ratio of annual demand to average daily demand in the peak month (D); and the ratio of average daily demand to average peak hour demand during the peak month (H). Detailed calculations used to derive these values for SUN are included in **Appendix B**, *Runway Capacity Calculation Details*. Using these values, the theoretical ASV for 2014 is calculated as follows:

**ASV = $C_w$* D * H**

**ASV = 32.1 * 193.7 * 10.0**

**ASV = 62,200 operations**

The percentage of ASV reached may be calculated by dividing the ASV by the total annual demand. The theoretical percentage of ASV reached in 2014 is calculated as follows:

**ASV = 62,200 operations**

**Annual demand = 28,480**

**% of ASV reached = 28,480 / 62,200**

**% of ASV reached = 45.8%**

FAA Advisory Circular (AC) 150/5060-5 does not provide any direct guidance on how the ASV may change over time. Therefore, a typical airfield capacity analysis fixes the ASV at a given number (in this case 62,200 operations) throughout the planning period. Aircraft operations forecasts are then compared to the static ASV to determine if and when the airport will need additional airfield capacity in the future. Forecasted annual operations are compared to this capacity estimate in **Table C2**.

Table C2 **PROJECTED ANNUAL SERVICE VOLUME (ASV) AND DEMAND/CAPACITY**

| Year | Projected Annual Operations | Percentage of ASV Reached |
|---|---|---|
| 2019 | 30,636 | 49.3% |
| 2024 | 32,918 | 52.9% |
| 2029 | 35,189 | 56.8% |
| 2034 | 37,612 | 60.5% |

SOURCE: **Mead & Hunt analysis.**

Current FAA guidelines in the National Plan of Integrated Airport Systems (NPIAS) call for planning capacity improvements when annual operations reach 60% to 75% of the ASV. This gives an airport adequate time to plan for improvements, complete environmental review, and purchase land if necessary prior to construction, which should occur before 80% of ASV is reached.

Airfield capacity improvements at SUN would likely involve construction of a second runway. However, a second runway is not possible at the existing site given land use and airspace constraints. Therefore, this analysis identifies operational thresholds at which detailed planning for a replacement airport should be considered based on the inability of the existing single-runway site to meet demand. As shown in Table C2, aircraft operations are forecasted to approach the 60% of ASV threshold in 2034. This threshold has been identified by FAA as the point at which initial airfield capacity planning should begin. It does not indicate that the airfield is exceeding capacity. Therefore, the single runway at SUN is expected to accommodate forecasted operations and airfield capacity planning will not be needed during the 20-year planning period, based on FAA criteria.

### 2.3. Comparison with ACRP Report 79 Methodology

AC 150/5060-5 was published in 1983 and is in the process of being updated. In 2012, the Airport Cooperative Research Program (ACRP) published new capacity analysis guidelines in ACRP Report 79, *Evaluating Airfield Capacity*. ACRP Report 79 is expected to form the basis for the updated AC. Until publication of the new AC, AC 150/5060-5 is the only approved guidance for analyzing airfield capacity for SUN.

As part of ACRP Report 79, a Prototype Airfield Capacity Spreadsheet Model was developed which builds upon the base calculations and theory in AC 150/5060-5. The Prototype Model is meant to be used for a basic level of analysis for simple to moderately complex airfield configurations. It calculates hourly capacity levels and ASV for three airfield configurations: single runway, dual parallel runways, and dual intersecting runways. Through a variety of inputs and adjustments, the model can be customized to fit the conditions at the airport in question.

Similar to the AC 150/5060-5 methodology, the Prototype Model does not offer an explicit way to account for the type of head-to-head operational procedures in place at SUN. Thus, it does not present a significantly better analysis method for SUN. For that reason, a comparative capacity analysis using the ACRP Report 79 methodology was not conducted.

### 2.4. Airfield Capacity Recommendations

Based on the operations forecasts presented in Chapter B, the Airport is expected to reach 60% of ASV at the end of the 20-year planning period. Therefore, this Master Plan concludes that there is no need for the Airport to develop a detailed plan for airfield capacity improvements before 2034.

## 3. Airside Facility Requirements

This section consists of an analysis of requirements related to *airside* facilities, including the following:

- **Dimensional Criteria**
  - Runway Length
  - Airfield Design Standards
  - Taxiway Design Standards
- **Runway Pavement Strength/Condition**

- **Instrument Approaches, Navigational Aids, and Airfield Lighting**
- **FAR Part 77 and Threshold Siting Surfaces**

### 3.1. Dimensional Criteria

The types of aircraft expected to operate at the Airport in the future (the "design aircraft") determine FAA-specified design standards for the Airport. The design aircraft at SUN is based not on a single specific aircraft, but on a composite of aircraft that together comprise the current and expected future fleet for SUN. The current design aircraft is a composite of the Bombardier Q400 and several models of large general aviation aircraft including the Gulfstream G-V and Bombardier Global Express, as identified in the 2013 *Airport Alternatives Technical Analysis*.

According to FAA AC 150/5300-13A, *Airport Design*, the first step in defining an airport's design geometry is to determine its Airport Reference Code (ARC). The ARC is used for planning and design purposes only and does not limit the aircraft that may be able to operate safely on the airport. The ARC signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The RDC is comprised of three components: 1) the Aircraft Approach Category (AAC) depicted by a letter and indicative of approach speed; 2) the Airplane Design Group (ADG) depicted by a Roman numeral and indicative of either the aircraft wingspan or tail height, whichever is most restrictive; and 3) the existing or planned visibility minimums for instrument approach procedures to the runway, expressed by Runway Visual Range (RVR) values in feet.

Representative aircraft within the most demanding AAC and ADG categories operating or expected to operate at SUN are summarized in **Table C3**.

Table C3 **REPRESENTATIVE RUNWAY 13/31 DESIGN AIRCRAFT BY AAC & ADG**

| Aircraft Type | Gross Weight (lbs) | Approach Speed (knots) | Aircraft Approach Category (AAC) | Wings pan (feet) | Tail Height (feet) | Aircraft Design Group (ADG) |
|---|---|---|---|---|---|---|
| ***Commercial*** | | | | | | |
| Bombardier Q400 | 64,500 | 129 | C | 93.3 | 27.4 | III |
| Bombardier CRJ700 | 72,750 | 137 | C | 76.3 | 24.8 | II |
| Bombardier CRJ900 | 80,500 | 141 | D | 81.5 | 24.6 | III |
| Embraer E170 | 79,340 | 124 | C | 85.3 | 32.3 | III |
| Embraer E175 | 82,700 | 124 | C | 85.3 | 31.9 | III |
| Embraer E175-E2 | 97,730 | Unknown | Unknown | 101.7 | 32.7 | III |
| Mitsubishi MRJ90 | 87,303 | Unknown | Unknown | 95.9 | 34.4 | III |
| ***General Aviation / Air Taxi*** | | | | | | |
| Cessna Citation X | 36,100 | 129 | C | 63.9 | 19.3 | II |
| Gulfstream IV | 73,200 | 145 | D | 77.8 | 24.5 | II |
| Gulfstream V | 85,500 | 140 | C | 93.5 | 25.8 | III |
| Bombardier Global Express | 92,750 | 122 | C | 94.0 | 25.5 | III |

**SOURCE: AC 150/5300-13A, *Airport Design*; Aircraft Manufacturer Specifications; Mead & Hunt analysis.**
**NOTE: Performance characteristics for the Embraer E175-E2 and Mitsubishi MRJ90 are unknown at this time because initial deliveries of these aircraft have not occurred as of 2015. These aircraft are listed in the table for comparison purposes only.**

The Runway Visual Range (RVR) value for Runway 13/31 is 5000 feet, as this value applies to all runways with visibility minimums of one statute mile or greater. Given existing instrument approach technologies and airspace constraints surrounding the Airport, visibility minimums are unlikely to be reduced below one statute mile in the foreseeable future. Based on the preceding information and analysis, the existing and planned ultimate RDC for Runway 13/31 is C-III-5000.

Aircraft that fall under AAC D do currently operate at SUN in the form of heavy business jets, including the Gulfstream IV as shown in Table C3 above. However, AAC D aircraft are not the design aircraft for determination of the RDC because they only operate at SUN occasionally and are not the Airport's target user group.

### *3.1.1. Runway Length*

Runway 13/31 is currently 7,550 feet long. An airport's recommended runway length is determined by the performance characteristics of the most demanding aircraft in its operational fleet. As airlines consider establishing additional scheduled air service at the Airport, a wide variety of aircraft could ultimately end up serving the community. Seat capacities, airlines, and potential destinations for future commercial service aircraft are summarized in **Table C4**.

Table C4 **EXISTING AND POTENTIAL FUTURE COMMERCIAL AIRCRAFT AND DESTINATIONS**

| Aircraft | Seats (range) | Airline | Existing/Potential Destinations |
|---|---|---|---|
| Bombardier Q400 | 76 | Alaska | SEA, LAX, PDX |
| Bombardier CRJ700 | 65-70 | Alaska, United, American | SLC, SEA, LAX, SFO, DEN, ORD, PDX, DFW, IAH |
| Bombardier CRJ900 | 76-88 | Delta, American | SLC, SEA, LAX, DFW |
| Embraer E170 | 70-78 | Delta, United, American | SLC, SEA, LAX, SFO, DEN, ORD, DFW, IAH |
| Embraer E175 | 70-88 | United, American | LAX, SFO, DEN, ORD, DFW, IAH |
| Embraer E175-E2 | 80-88 | SkyWest | Unknown |
| Mitsubishi MRJ90 | 70-92 | SkyWest | Unknown |

SOURCE: **Aircraft manufacturer web pages, Friedman Memorial Airport flight schedule, Mead & Hunt.**
NOTES: **Existing/potential destinations for the Embraer E175-E2 and Mitsubishi MRJ90 are unknown at this time because these aircraft have not entered the commercial fleet as of 2015. These aircraft are listed in the table for comparison purposes only.**

Currently, Alaska Airlines operates scheduled service at SUN with the turboprop Bombardier Q400, while Delta Airlines and United Airlines operate with the regional jet CRJ700. The airlines currently operate with weight restrictions on Runway 13/31 in most weather conditions, which require operating with less than a full useful load. FAA Advisory Circular (AC) 150/5325-4B, *Runway Length Requirements for Airport Design*, defines an aircraft's useful load as "the difference between the maximum allowable structural gross weight and the operating empty weight…In other words, useful load consists of passengers, cargo, and usable fuel."

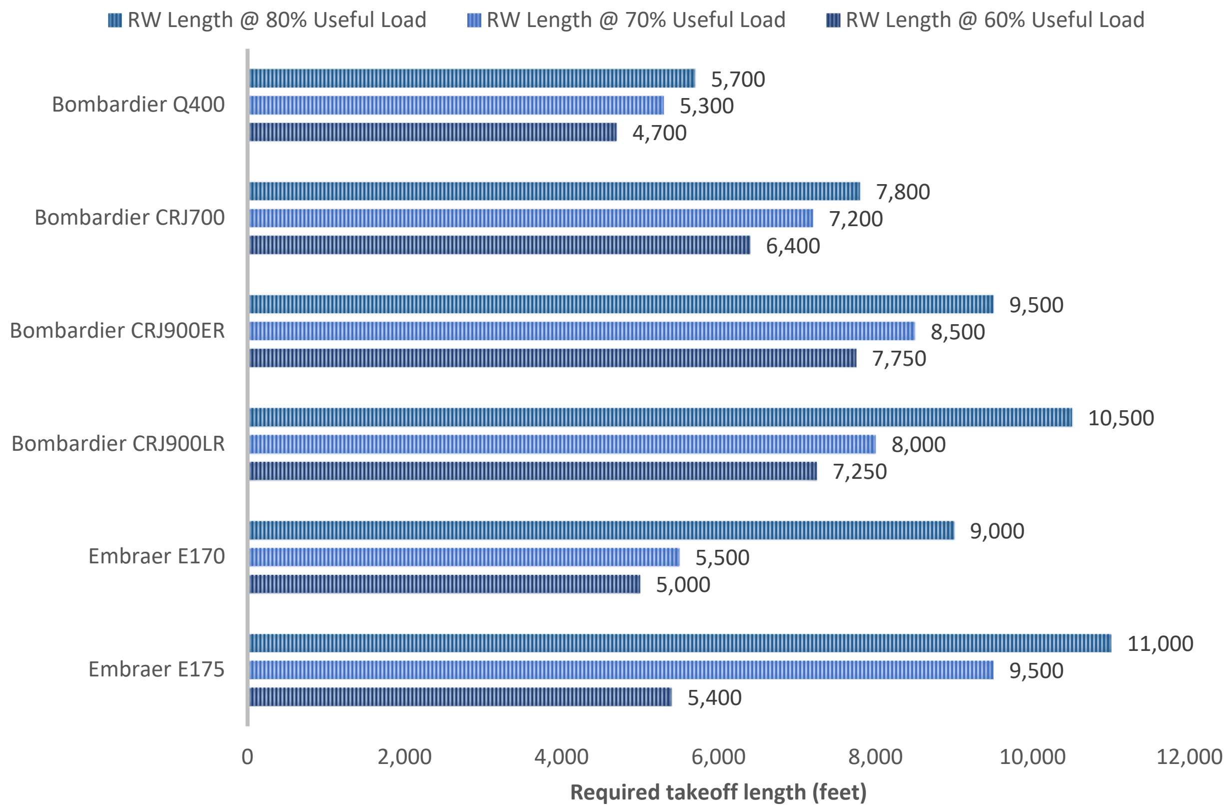
Current destinations include Seattle, San Francisco, Denver, Salt Lake City, and Los Angeles. The farthest haul length of these destinations is Los Angeles at approximately 605 nautical miles. Although these destinations do not necessitate a significant fuel load, longer haul lengths for potential future destinations may necessitate the use of aircraft with more than 70 seats in order to accommodate those destinations at SUN.

According to FAA AC 150/5325-4B, the design objective for the primary runway is to provide a runway length for all airplanes that will regularly use it without causing operational weight restrictions. Runway length requirements are determined by applying the Airport's mean high temperature (85.3 degrees Fahrenheit) for the hottest month (July); elevation (5,320 feet); and the design aircraft's typical operating weight. Airport Planning Manuals (APMs) from aircraft manufacturers are utilized, when available, to determine required runway lengths under specific operating scenarios. This runway length analysis is based on takeoff distance, not landing distance, because the takeoff distances required by the existing and expected future commercial aircraft at SUN are generally longer than landing distances.

Based on operating conditions at SUN, operating weights of 60%, 70%, and 80% of maximum useful load were used to analyze existing and potential future commercial aircraft to represent various possibilities for actual operating takeoff weight.

**Chart C1** presents a range of lengths to demonstrate the impact of aircraft size and type, haul length, and useful load on runway length requirements at SUN. Extension of Runway 13/31 beyond its existing length would be required to accommodate many of these aircraft in some scenarios. The runway lengths presented in **Chart C1** should be considered estimates meant for planning purposes only. Actual airline runway length needs may vary from these runway lengths.

Chart C1 **REQUIRED COMMERCIAL AIRCRAFT RUNWAY LENGTHS BY USEFUL LOAD PERCENTAGE**



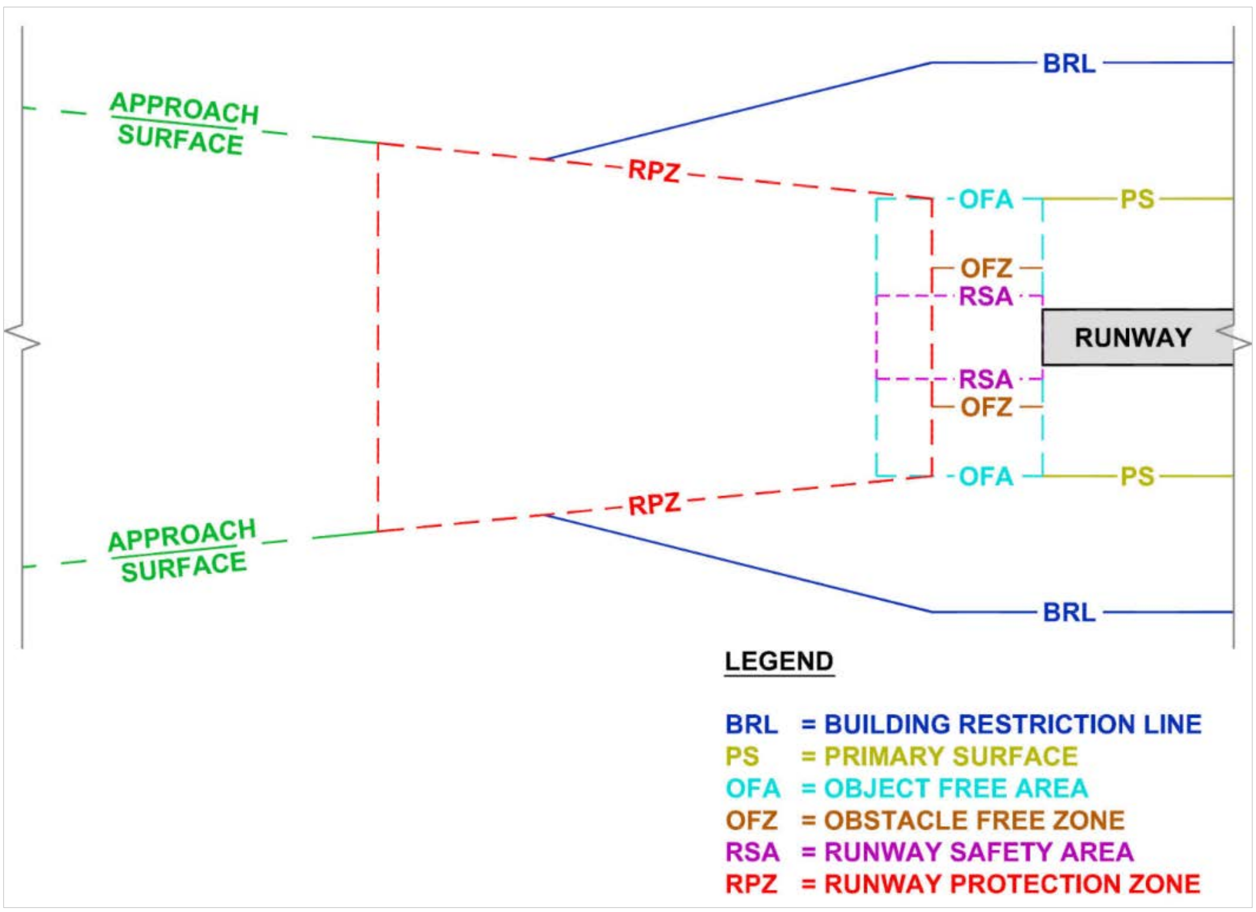

SOURCE: **Airport Planning Manuals, Mead & Hunt.**
NOTE: **Requirements shown are approximate and may not reflect actual airline needs. Assumptions include: dry runway conditions, zero effective runway gradient, zero effective wind, and airport elevation of 5,320 feet above mean sea level (AMSL).**

A significant change in airline fleet mix that cannot be accommodated by the existing runway length in accordance with airline needs will challenge the Airport's ability to adapt to changing market conditions and airline trends. One example of such a change would be a transition away from use of CRJ700s by airlines operating at SUN, which is already beginning to take place at other airports. The CRJ900 would ordinarily be considered a likely replacement, but it performs poorly at airports in mountainous environments, and is expected to require approval from the FAA to operate at SUN. Other potential replacement aircraft such as the E170 or E175 are expected to incur weight penalties at SUN that may be unacceptable to airlines serving the Airport.

### *3.1.2. Airfield Design Standards*

This section presents FAA design standards for various airfield dimensions as they relate to SUN. The purpose of this analysis is to identify design standards that might drive the need for future airfield improvements, in the event that the recent FAA MOSs were invalidated at some point in the future. A generalized visual depiction of various safety areas is shown in **Figure C1**. The dimensional criteria illustrated in **Table C5** are those required for Runway 13/31. As indicated in the table, under the Post-Alternative 6 condition, Runway 13/31 either meets or exceeds the identified requirements, or has an MOS in place for that specific design standard.

Figure C1 **AIRFIELD SAFETY AREAS**




SOURCE: AC 150/5300-13A, *Airport Design*; Mead & Hunt.

Table C5 **RDC C-III-5000 RUNWAY DIMENSIONAL STANDARDS (IN FEET)**

| Design Standard | Meets Standards as of 2015? | Pre-Alternative 6 Dimension | Post-Alternative 6 Dimension | Runway Design Code C-III-5000 Standard |
|---|---|---|---|---|
| Runway Width | Yes | 100 | 100 | 100[1] |
| Blast Pad Width | N/A[2] | N/A | N/A | 140[1] |
| Blast Pad Length | N/A[2] | N/A | N/A | 200 |
| Runway Centerline to Parallel Taxiway Centerline | No – MOS 1 | 185/250[3] | 320 | 400 |
| Runway Centerline to A/C Parking | No – MOS 5 | 260 | 400 | 500 |
| Runway Centerline to Holdline | Yes | 150/200[3] | 252 | 252 |
| Runway Safety Area (RSA) | | | | |
| Length Beyond Departure End | Yes | 1,000 | 1,000 | 1,000 |
| Length Prior to Landing Threshold | Yes | 600 | 600 | 600 |
| Width | Yes | 350 | 500 | 500 |
| Runway Object Free Area (ROFA) | | | | |
| Length Beyond RW End | Yes | 1,000 | 1,000 | 1,000 |
| Length Prior to Landing Threshold | Yes | 600 | 600 | 600 |
| Width | No – MOS 3 | 539 | 675 | 800 |
| Runway Obstacle Free Zone (ROFZ) | | | | |
| Length Beyond Runway End | Yes | 200 | 200 | 200 |
| Width | Yes | 275 | 400 | 400 |
| Precision Obstacle Free Zone (POFZ) | | | | |
| Length | N/A[4] | N/A | N/A | N/A |
| Width | N/A[4] | N/A | N/A | N/A |

**SOURCES: AC 150/5300-13A, *Airport Design*; January 2013 Airport Alternatives Technical Analysis; SUN Airport Layout Plan.**
**1. Although the runway width standard for C-III is 150 feet, for airplanes with MTOW of 150,000 lbs or less and visibility minimums of not less than ¾ mile, the standard runway width is 100 feet, shoulder width is 20 feet, and blast pad width is 140 feet.**
**2. Runway 13/31 does not currently have blast pads on either end of the runway.**
**3. The first distance is the minimum separation that applied to the east side of the runway before Alternative 6, and the second distance is the minimum separation that applied to the west side of the runway before Alternative 6.**
**4. POFZ standards apply to runway ends with vertically-guided approaches and approach minima below 250 feet cloud ceiling or ¾ statute mile. Neither end of Runway 13/31 meets both of these criteria; therefore, the POFZ does not apply to Runway 13/31.**

Existing and ultimate airfield dimensions shown in Table C5 are described below.

**Runway Width.** Runway 13/31 is 100 feet wide. Because the MOSs at SUN limit use of the Airport to aircraft less than 95,000 pounds gross weight, the required runway width is 100 feet and Runway 13/31 currently meets the width standard.

**Runway Centerline to Parallel Taxiway Centerline Separation.** Prior to implementation of Alternative 6, the Runway 13/31 centerline to parallel taxiway centerline separation did not meet the C-III-5000 standard on either side of the runway. Implementation of Alternative 6 resulted in further separation of parallel Taxiway B from the runway and removal of parallel Taxiway A. However, MOS 1 will allow the new Taxiway B separation to remain below the standard of 400 feet.

**Runway Centerline to Aircraft Parking Separation.** Prior to implementation of Alternative 6, the Runway 13/31 centerline to aircraft parking separation did not meet the C-III-5000 standard on the west side of the runway. Implementation of Alternative 6 relocated the commercial and air cargo aprons, and reduced the size of the general aviation aprons, to meet the standard separation requirement.

**Runway Centerline to Holdline Separation.** Prior to implementation of Alternative 6, the Runway 13/31 centerline to holdline separation did not meet the C-III-5000 standard on either side of the runway. Implementation of Alternative 6 resulted in all holdlines complying with the FAA runway separation standard.

**Runway Safety Area (RSA).** Prior to implementation of Alternative 6, the Runway 13/31 RSA did not meet the C-III-5000 width standard due to parallel taxiways within the RSA on both sides of the runway. Implementation of Alternative 6 resulted in the RSA meeting width and length standards; however, MOS 4 will allow existing RSA transverse grades below the standard to remain in place.

**Runway Object Free Area (ROFA).** Prior to implementation of Alternative 6, the Runway 13/31 ROFA did not meet the C-III-5000 width standard due to parallel taxiways, commercial aircraft parking, east perimeter fence, air traffic control tower, and State Highway 75 within the ROFA, among other objects. Implementation of Alternative 6 resulted in an increase of ROFA width by removing many of these objects from the ROFA; however, MOS 3 will allow the existing east perimeter fence and State Highway 75 to remain within the ROFA.

**Runway Obstacle Free Zone (ROFZ).** Prior to implementation of Alternative 6, the Runway 13/31 ROFZ did not meet the C-III-5000 width standard due to parallel taxiways within the ROFZ on both sides of the runway. Implementation of Alternative 6 resulted in the ROFZ meeting width and length standards.

**Precision Obstacle Free Zone (POFZ).** The POFZ standard does not apply to Runway 13/31 based on existing and potential future instrument approach procedures to the runway.

**Runway Protection Zones (RPZ).** Prior to implementation of Alternative 6, only portions of the approach and departure RPZs beyond either end of the runway were within the current airport property boundary and/or existing airspace easement limits. Implementation of Alternative 6 did not result in increased compliance with the RPZ standard. Based on discussion with the FAA, the existing RPZ conditions and encroachments will be allowed to remain in place at SUN. However, FAA now requires detailed review of alternatives if an incompatible land use would enter the limits of an RPZ as a result of the following:

- **An airfield project;**
- **A change in the critical design aircraft that increases the RPZ dimensions;**
- **A new or revised instrument approach procedure that increases the RPZ dimensions; or**
- **A local development proposal in the RPZ.**

### 3.1.3. Taxiway Design Standards

Taxiway design standards are based on both the Aircraft Design Group (ADG) and Taxiway Design Group (TDG) for the most demanding aircraft expected to use the taxiway in question. As mentioned previously, the ADG is based on aircraft wingspan and tail height. The TDG, a new concept introduced by recent revisions to FAA AC 150/5300-13A, is based on aircraft cockpit-to-main-gear distance (comparable to aircraft wheelbase) and main gear width. The ADG and TDG for the most demanding commercial and general aviation aircraft operating at SUN are summarized in **Table C6**.

Table C6 **REPRESENTATIVE TAXIWAY DESIGN AIRCRAFT BY ADG & TDG**

| Aircraft Type | Wingspan (feet) | Tail Height (feet) | Aircraft Design Group (ADG) | Wheelbase (feet) | Main Gear Width (feet) | Taxiway Design Group (TDG) |
|---|---|---|---|---|---|---|
| *Commercial* | | | | | | |
| Bombardier Q400 | 93.3 | 27.4 | III | 45.8 | 33.2 | 5 |
| Bombardier CRJ700 | 76.3 | 24.8 | II | 49.2 | 13.5 | 2 |
| Bombardier CRJ900 | 81.5 | 24.6 | III | 56.8 | 13.4 | 4 |
| Embraer E170 | 85.3 | 32.3 | III | 34.8 | 17.0 | 2 |
| Embraer E175 | 85.3 | 32.3 | III | 37.4 | 17.0 | 2 |
| Embraer E175-E2 | 101.7 | 32.7 | III | Unknown | Unknown | Unknown |
| Mitsubishi MRJ90 | 95.9 | 34.4 | III | Unknown | Unknown | Unknown |
| *General Aviation / Air Taxi* | | | | | | |
| Cessna Citation X | 63.9 | 19.3 | II | 29.9 | 13.0 | 1B |
| Gulfstream IV | 77.8 | 24.5 | II | 38.1 | 13.7 | 1B |
| Gulfstream V | 93.5 | 25.8 | III | 45.0 | 14.4 | 2 |

SOURCE: **Mead & Hunt analysis.**
NOTE: **Taxiway Design Groups for the Embraer E175-E2 and Mitsubishi MRJ90 are unknown at this time because initial deliveries of these aircraft have not occurred as of 2015. These aircraft are listed in the table for comparison purposes only.**

As shown in Table C6, the most demanding ADG at SUN is III (various aircraft) and the most demanding TDG is 5 (the Bombardier Q400). The taxiway dimensional standards illustrated in **Table C7** are those required for these ADG and TDG categories. As indicated in the table, under the Post-Alternative 6 condition, the Airport either meets or exceeds the identified requirements, or has an MOS in place for that specific design standard. The parallel taxiway and all terminal area taxiways should meet these design requirements; other taxiways can be designed to less demanding standards if they are not expected to be used by commercial aircraft.

Table C7 **ADG III AND TDG 5 TAXIWAY DIMENSIONAL STANDARDS (IN FEET)**

| Design Standard | Meets Standards? | Post-Alternative 6 Dimension | Runway Design Code C-III-5000 Standard |
|---|---|---|---|
| Taxiway B Width | No – MOS 8 | 50 | 75 |
| Taxiway B Shoulder Width | No – MOS 8 | 10 | 30 |
| Taxiway Safety Area Width | Yes | 118 | 118 |
| Taxiway Object Free Area Width | No – MOS 2 | 160 | 186 |
| Taxilane Object Free Area Width | Yes | 162 | 162 |

SOURCE: **Mead & Hunt analysis.**

Prior to implementation of Alternative 6, procedures were in place that required clearing the parallel taxiways of aircraft during commercial aircraft operations. These procedures were eliminated following relocation of parallel Taxiway B.

Prior to implementation of Alternative 6, parallel Taxiway A acted as a capacity "release valve" for small aircraft during peak periods to allow for takeoffs and landings by large aircraft. Removal of the taxiway under Alternative 6 therefore had a negative effect on the runway's operational capacity. To mitigate for this capacity loss and better manage aircraft entrance and exit flow from Runway 13/31, Alternative 6 included relocation of some of the runway's exit taxiways, addition of a new exit taxiway, and extension of Taxiway B for the full length of the runway. Alternative 6 also resulted in relocation of the Airport's bypass taxiways located adjacent to and west of Taxiway B.

## 3.2. Runway Pavement Strength/Condition

The pavement strength of Runway 13/31 is rated for aircraft weighing up to 65,000 pounds with single wheel main landing gear configurations, and up to 95,000 pounds for aircraft with dual wheel main landing gear configurations.  A review of the maximum gross weight and main landing gear configuration of the design aircraft types indicates the strength of the runway is sufficient to meet demand throughout the planning period. According to the most recent pavement evaluation completed in 2015, all Runway 13/31 pavements are in good condition.  Though no changes are necessary to increase the strength of the runway, it is recommended that pavement for any future runway reconstruction or rehabilitation projects be capable of retaining these existing weight bearing capacities.

## 3.3. Instrument Approaches, Navigational Aids, and Airfield Lighting

Instrument approach procedures, navigational aids, and airfield lighting at SUN are currently limited due to natural terrain obstructing required obstacle clearance surfaces and surrounding land uses constraining effective equipment siting. In 2013, the Airport Authority commissioned a feasibility study for improving approach procedures and navigational aids at the Airport to better support users. This study identified several potential improvements to approach procedures and navigational aids. At the time of this writing, potential improvements to instrument approaches are not expected to increase the design standards described in this chapter.

## 3.4. FAR Part 77 and Threshold Siting Surfaces

Obstruction clearing standards are established to create a safer environment for aircraft operations on or near the airport. These standards take the form of imaginary sloping surfaces that are trapezoidal in shape. The standards contained in Federal Aviation Regulations (FAR) Part 77, *Safe, Efficient Use, and Preservation of the Navigable Airspace*, apply to existing and proposed manmade objects and/or objects of natural growth and terrain (i.e. obstructions). The Airport should ensure that threshold siting surfaces identified by AC 150/5300-13A are also protected from proposed development and natural vegetation growth.

The specific size, slope, and starting point of the imaginary surfaces depend upon the approach and departure procedures in place for a specific runway end (or lack thereof), and the type of aircraft expected to use the runway. Procedures and aircraft types are different for each end of Runway 13/31; therefore, different imaginary surfaces apply to either end of the runway. The dimensions of these surfaces are presented in **Table C8**.

Table C8 **STANDARD AIRSPACE SURFACES FOR SUN**

| Airspace Surface Dimensions | Standard Dimension | |
|---|---|---|
| | Runway 13 | Runway 31 |
| Part 77 Approach Surface | Visual | NPI > ¾ mile |
| Surface Beginning Point Beyond Runway End | 200 | 200 |
| Inner Width | 500 | 500 |
| Length | 5,000 | 10,000 |
| Outer Width | 1,500 | 3,500 |
| Slope | 20:1 | 34:1 |
| Approach Threshold Siting Surface | Type 3 | Type 5 |
| Surface Beginning Point Beyond Runway End | 0 | 200 |
| Inner Width | 400 | 800 |
| Length | 1,500 | 10,000 |
| Outer Width | 1,000 | 3,800 |
| Slope | 20:1 | 20:1 |
| Departure Threshold Siting Surface | N/A | Type 9 |
| Surface Beginning Point Beyond Runway End | N/A | 0 |
| Inner Width | N/A | 1,000 |
| Length | N/A | 10,200 |
| Outer Width | N/A | 6,466 |
| Slope | N/A | 40:1 |

**NOTE: Type 3 approach threshold siting surface applies to the "approach end of runways expected to serve large airplanes (visual day/night); or instrument minimums >= 1 statute mile (day only)." Type 5 approach threshold siting surface applies to the "approach end of runways expected to support instrument night operations serving greater than Category B aircraft." Type 9 departure threshold siting surface does not apply to Runway 13 as IFR departures are not authorized on this runway.**

There are currently numerous penetrations to the various surfaces described in Table C8 at SUN. Some of these penetrations have been mitigated by displacing the Runway 13 threshold, installing obstruction lighting, and/or removing man-made and natural objects. However, given constraints surrounding the Airport, it is not realistic to remove all obstructions to these surfaces; therefore the Airport has approach and departure minimums that are significantly higher than standard minimums. Potential future improvements to approach and departure procedures at SUN may result in airspace surfaces with larger dimensions and/or more restrictive obstacle clearance slopes.

## 4. Landside Facility Requirements

Landside facilities support the airside facilities, but are not part of the aircraft movement area. At SUN, these facilities include the following:

- **Airport Traffic Control Tower (ATCT)**
- **Commercial Passenger Terminal Area Facilities**
    - Passenger Terminal Building
    - Automobile Parking Facilities
    - Air Carrier Apron Space
    - Terminal Area Roadway System
- **General Aviation Facilities**
    - General Aviation Hangar Facilities
    - General Aviation Apron Space
    - Air Cargo Areas

### 4.1. Airport Traffic Control Tower

The Airport Traffic Control Tower (ATCT) is currently located on the east side of the airfield. The ATCT is within the Runway Object Free Area (ROFA). The ATCT is also an FAR Part 77 transitional surface penetration, and does not meet FAA ATCT siting criteria guidance contained in FAA Order 6480.4, *Airport Traffic Control Tower Siting Process.* Thus, the ATCT does not meet FAA standards. Its facilities are also dated and cramped, and do not meet building code requirements.

The ATCT provides a number of critical safety benefits. Due to the surrounding mountainous terrain and frequent low-visibility conditions, operations at SUN are extremely technical. The presence of the tower at the Airport significantly decreases the risk of runway incursions and other accidents and provides on-site monitoring of weather conditions that is invaluable to pilots negotiating take-offs and landings. In addition, the Airport's head-to-head operational pattern and single parallel taxiway necessitate significant coordination by tower personnel to properly accommodate takeoffs and landings and maintain efficiency. The FAA has stated that SUN must have an ATCT in order to maintain commercial passenger service in the future. The ATCT therefore benefits the community and regional economy by ensuring that residents and visitors can access the Sun Valley region in a consistently safe and timely manner.

MOS 3 allowed several structures to remain in the ROFA, but is conditioned on removal of several structures including the ATCT and its supporting facilities. MOS 3 states that the ATCT in its current location is a safety risk and must be relocated as soon as possible, no more than 10 years from the MOS date of approval. Therefore, the ATCT must be relocated by November 2023.

An *ATCT Concept and Budget Report* completed in 2004 recommended relocating and upgrading the ATCT, and identified eight alternative sites throughout Airport property. Three alternative sites with the clearest line-of-sight to airport surfaces under tower control were identified, and construction concepts were studied in detail for these three sites. Chapter D of this Master Plan will re-evaluate the 2004 study, identify additional potential sites, and discuss opportunities and constraints of each site.

## 4.2. Commercial Passenger Terminal Area Facilities

The passenger terminal area is located on the west side of the runway, between the general aviation hangar areas to the north and south. Alternative 6 improvements included moving the commercial aircraft parking apron from the east side to the north side of the building to remove parked aircraft from the Taxiway B TOFA. In addition, the terminal building was expanded and reconfigured to allow the building to continue to function properly and efficiently.

The following sections identify potential future requirements for the passenger terminal building, automobile parking, air carrier apron space, and terminal area roadway system throughout the 20-year planning period. Improvements completed as part of Alternative 6 are clearly identified.

### *4.2.1. Passenger Terminal Building*

The existing terminal building houses a public waiting/queuing area, ticketing, airline ticket offices (ATOs), outbound baggage area, secure holdroom, Transportation Security Administration (TSA) security area, baggage claim, rental car counters, and three public restrooms, including a restroom within the secure holdroom. Prior to implementation of Alternative 6, the total footprint of the passenger terminal building was 14,320 square feet (SF).

After the 2015 terminal expansion and reconfiguration project, the estimated overall terminal size increased to 34,150 square feet. The project included the following elements:

- **Reconfiguration and expansion to the north and west to house new waiting areas, security screening, secure hold room, concessions, baggage claim, and rental car counters.**
- **Security Screening Checkpoint (SSCP) layout was designed in accordance with TSA Checkpoint Design Guide Rev. 5.1.**
- **Existing concessions were relocated to the secure hold room.**
- **Commercial aircraft apron, lighting, and ground service equipment (GSE) parking was added north and west of the terminal building.**
- **The terminal parking lot was reconfigured to accommodate the new building space.**

Terminal capacity is a measure of cumulative space dedicated to accommodating passengers for a certain period of time and for a certain purpose. Design capacity is based on expected flight departure and arrival schedules, with specific areas assigned to different functions, from ticketing to baggage claim, and the estimated time required for passengers to process through each functional area. Demand within a terminal building is dynamic, constantly changing in the various functional spaces, and is driven by flight schedule, aircraft size, and load factor, as well as the amount of time prior to departure that passengers arrive at the terminal. The closer passengers arrive together in any period prior to departure, the greater the demand on the facility, its functional areas, and its staff.

For the purposes of this Master Plan, terminal capacity is expressed in terms of passenger enplanements. For reference, the passenger activity forecasts presented in Chapter B are summarized in **Table C9**.

Table C9 **SUMMARY OF PASSENGER ACTIVITY FORECASTS**

| Activity Measure | 2014 (Actual/ Estimated) | 2019 (Projected) | 2024 (Projected) | 2034 (Projected) |
|---|---|---|---|---|
| Annual Passenger Enplanements | 66,409 | 78,797 | 93,496 | 131,630 |
| Annual Air Carrier Departures | 1,420 | 1,614 | 1,804 | 2,227 |
| Average Enplanements Per Departure | 47 | 49 | 52 | 59 |
| Average Passenger Load Factor | 69% | 71% | 73% | 76% |
| Average Seats Per Departure | 68 | 69 | 71 | 76 |
| Peak Hour Enplanements[1] | 102 | 115 | 136 | 192 |
| Average Daily Departures | 7 | 8 | 9 | 11 |

SOURCE: **Mead & Hunt analysis.**
[1] "Peak hour enplanements" represents the peak hour of the average day of the peak month.

The capacity of the terminal building is discussed and analyzed in the following sections:

- **Pre-Alternative 6 Terminal Capacity**
- **Post-Alternative 6 Terminal Capacity – Design Peak Hour**
- **Post-Alternative 6 Terminal Capacity – Peak Demand Management Strategies**
- **Post-Alternative 6 Terminal Capacity – Ultimate Expansion**

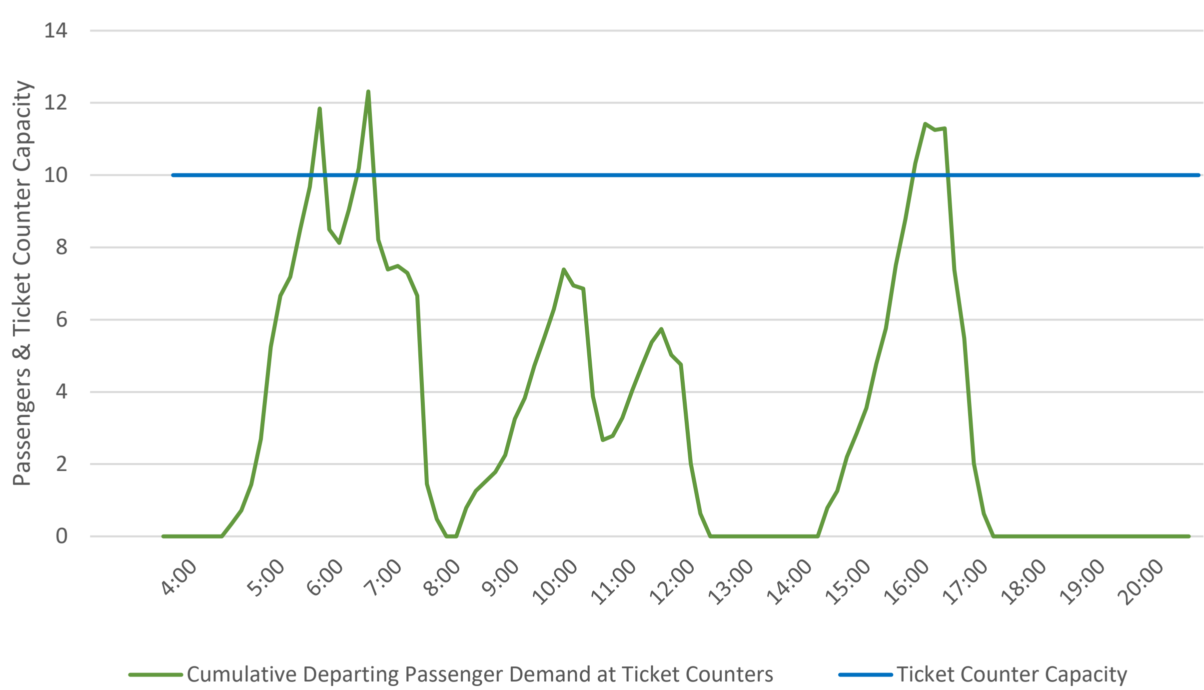
### *PRE-ALTERNATIVE 6 TERMINAL CAPACITY*

The existing terminal was built in 1985 and expanded in 1991 and 2005 to its pre-Alternative 6 configuration. The 2013 flight schedule was largely operated by Delta Airlines with Embraer 120 Brasilia turboprop aircraft. Given the Brasilia's low capacity of thirty passengers, terminal components were sufficient to handle passenger demand for this aircraft size without closely scheduled arrivals or departures. With the introduction of the Q-400 in the early 2000s and the CRJ-700 regional jet in 2014, passengers began to experience a lower level of service as measured by space per passenger and processing capability measured in time.

In the past, the Airport has employed demand management techniques to alleviate increasing congestion in the terminal building. For example, the TSA could limit passenger access to the secure holdroom for closely scheduled departures, holding the following flight's passengers in the non-secure area until the first flight boarded. An arriving flight's passengers and visitors would fill the baggage claim hall, but they occupied this area for a short time, allowing the next arriving flight's passengers to disembark to a largely empty claim hall. Under the pre-Alternative 6 layout, all arriving passengers would enter the terminal at the claim hall, increasing congestion in the hall for a short time as those passengers with carry-on luggage made their way to the exit around those who were queued throughout the space.

**Chart C2** below demonstrates passenger demand at ticket counters over a typical operating day in August 2014. Passengers arriving at the terminal do so at various times prior to a flight's departure and are summed in ten minute increments. This distribution of passengers allows the airlines to process passengers over time with fewer ticket agents and counters. Ticketing capacity is shown at ten passengers at any given time. As more flights move into the peak hour, ticketing will become constrained earlier in the 20-yearplanning period than the other functional areas.

Chart C2 **DEPARTING PASSENGER DEMAND AT TICKETING/CHECK-IN – 2014 FLIGHT SCHEDULE**



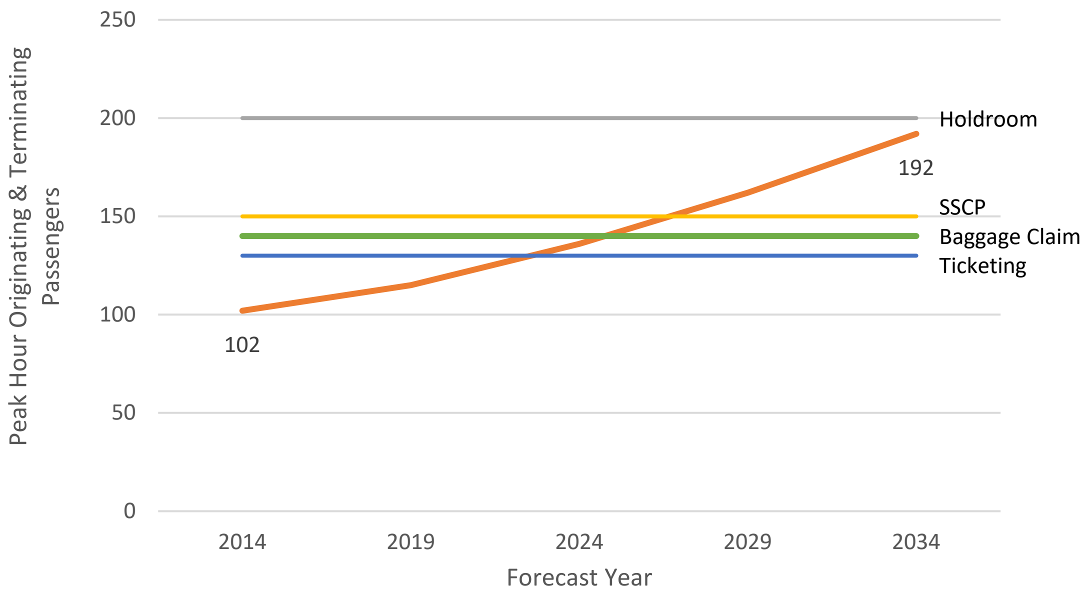

SOURCE: **Mead & Hunt analysis.**

## *POST-ALTERNATIVE 6 TERMINAL CAPACITY – DESIGN PEAK HOUR*

The primary goal of relocating some terminal components to the north side of the building was to accommodate existing operations while also providing some additional capacity for the long-term. The 2015 terminal project provided greater overall passenger capacity through an increase in secure holdroom, arrivals lobby, and baggage claim hall areas. The previous baggage claim hall area became a new passenger security checkpoint and non-secure waiting area, resulting in a more efficient building layout with greater operational flexibility. These changes will allow the Airport to handle passengers for three peak hour departures within the secure holdroom and two peak hour arrivals within the bag claim hall at a higher level of service. The layout of the reconfigured terminal building is presented in Chapter A, Figure A6.

The post-Alternative 6 design peak hour capacity for the four main terminal components is shown and compared to the peak hour enplanement forecast in **Chart C3**. These capacity estimates are predicated on the amount of available space, and chairs in the case of the secure holdroom, to accommodate passengers prior to their departures; demonstrated capacity for passenger security screening; number of ticket counters and passenger processing times; and linear feet of claim device for baggage claim. An acceptable level of service governed terminal capacity design for the 2015 expansion. The airport will be able to monitor demand and level of service to determine when future expansion of specific functional areas is required.

Chart C3 **SUMMARY FORECAST DEMAND VS. MAJOR TERMINAL COMPONENT CAPACITY POST-2015 EXPANSION**




**SOURCE: Mead & Hunt analysis.**

Continuous improvements in airline electronic ticketing, check-in, and boarding pass printing has allowed more passengers to be processed with the same or fewer traditional ticket counters. Passengers often use standalone kiosks to check-in for their flights. Ticket counter services have taken on a greater proportion of baggage check-in versus passenger check-in, requiring substantially less time per passenger. There will be a limit to these efficiency improvements as more departing passengers enter the terminal during a higher peak departures period, at which time expansion of the ticket counter area may be necessary. For the foreseeable future, the ticketing area will provide an adequate level of service.

While post-Alternative 6 holdroom capacity appears to be sufficient through the planning period, this will be dependent upon airline scheduling during the peak hour. As with other functional areas, managing demand will continue to be necessary, but holdroom capacity should be the least taxed through the 20-year planning period.

### *POST-ALTERNATIVE 6 TERMINAL CAPACITY – PEAK DEMAND MANAGEMENT STRATEGIES*

As noted in Chapter B, departing flights at a resort airport are often scheduled during the early morning hours. Additional flights during the peak hour will begin to place pressure on the functional areas – passengers will experience congestion, queuing, and increased wait times in some, but not all, areas. The Airport, working with the TSA, has the option of managing which flight's passengers are allowed into the secure holdroom while maintaining a hold on those passengers whose flights depart later in the hour until other flights have boarded or departed. A design element supporting this scenario is the airport's inclusion of a second waiting area in the existing terminal. A portion of the pre-Alternative 6 holdroom will become a pre-departure waiting area to serve as an overflow waiting area for passengers who arrive early for their departures and may find the security screening waiting area or arrivals lobby full. This multi-purpose space will have flight information displays and public address speakers to keep passengers apprised of their departures and provide an additional level of comfort in seating options similar to the arrivals lobby.

The effect of additional departing flights during the peak hour is shown in Chart C3 approximately at the mid-range of the 20-year planning period. Ticketing, baggage claim, and security screening will be affected the most by closely spaced departures. While three departures can be accommodated in the terminal during the peak hour, scheduling onto the peak hour shoulders would place additional demand on the facility as passengers increase incrementally.

Ticketing processing capacity will become a greater concern as the gains from electronic check-in are overcome by the volume of passengers checking baggage at the ticket counters. The possibility of remote self-tagging of baggage is an option, which would reduce congestion at the ticket counter as self-checked bags can be dropped at a separate take-away belt, removing these passengers from the ticket counter queues. Space for a self-tagging position is available within the ticketing area just north of the existing counters. Additional space for self-check-in kiosks is available along the west wall of the ticket hall. These kiosks will provide necessary capacity to carry a higher number of departures during the peak period, although at a lower level of service as the space is very limited and congestion will be higher than what is normally considered acceptable.

Checked baggage screening will require upgrade to an in-line system by installing a take-away belt leading directly to the screening device behind the ticket counters. This will provide additional screening capability as transportation security officers (TSO's) would be able to manage secondary screening and other tasks without having to load the bags into the screening device. TSO's would be able to work the screening device output belt, moving bags to either the airlines' baggage make-up area or to additional screening using explosive trace detection (ETD) devices.

### *POST-ALTERNATIVE 6 TERMINAL CAPACITY – ULTIMATE EXPANSION*

All terminal components will experience congestion during the peak hour toward the latter part of the 20-year planning period, if forecasted passenger levels materialize. This may cause some passengers to miss their flights if they do not allow additional time for departure processing. Terminal space will remain the main issue, as the ticket hall becomes congested and passengers queue out of the designated queuing areas into circulation and waiting areas during the peak hour. Passengers who have completed check-in will be maneuvering around queues to get to security screening, and security screening queuing will begin to back into ticketing and the arrivals lobby. Once the peak hour has passed, the terminal will resume normal operation as flights are spaced further apart.

Limited building expansion is possible and can be managed separately for different functional areas. Planning for expansion to reduce congestion and increase passenger level of service in the long-term was included in the 2015 terminal expansion design. Future expansion options will be described in more detail in Chapter D.

### *4.2.2. Automobile Parking Facilities*

Automobile parking at SUN is located west of the terminal building. SUN offers both short- and long-term parking at hourly/monthly rates. Long-term parking is located in the lower parking lot farthest from the passenger terminal building, and short-term parking is located in the upper lot adjacent to the terminal building. The pre-Alternative 6 parking facilities included 338/308 summer/winter spaces. There are fewer available spaces in winter due to space required for snow storage. The post-Alternative 6 parking facilities include 360/349 spaces. Based on these figures, an analysis of potential future parking needs was prepared based on the ratio of post-Alternative 6 parking spaces to 2014 enplanements. Enplanements are a good indicator of parking needs, as they are representative of the Airport's customer base.

In 2014, there were 10,285 enplanements during the peak month of July. Peak month enplanements are projected to increase to 21,061 in 2034. Based on the ratio of 2014 enplanements to current parking spaces, parking requirements in 2034 are projected to be approximately 737/714 summer/winter spaces. This corresponds to a 104% increase in parking needs over current available spaces by the end of the planning period.

### *4.2.3. Air Carrier Apron Space*

Prior to implementation of Alternative 6, the air carrier apron was located to the east of and immediately adjacent to the passenger terminal building. However, the majority of the apron was located within the Runway 13/31 ROFA and therefore was relocated to the north of the terminal building as part of Alternative 6. Prior to Alternative 6, the amount of apron space dedicated solely to air carrier parking was 65,619 square feet (SF). Following Alternative 6, the new air carrier apron has an area of 63,785 SF, representing a reduction of approximately 2,000 SF. The post-Alternative 6 air carrier apron is capable of accommodating simultaneous parking by three regional commercial aircraft. During peak seasons, all three of these parking positions are occupied during remain overnight (RON) operations by the airlines.

It is important to note that these apron space numbers may not capture the true loss in air carrier aircraft parking associated with Alternative 6. Although the new air carrier apron located north of the terminal building was formerly designated for air cargo use, it was also used for commercial aircraft parking overflow during peak periods. In addition, the airlines formerly used Taxiway B south of the FBO for parking during peak times as well. This area is no longer available for aircraft parking because Taxiway B will now extend all the way to the south end of the runway.

Future service by new airlines and/or to new destinations are likely to result in a more demanding peak commercial aircraft parking scenario than the current air carrier apron can handle. Several potential future commercial aircraft parking scenarios were identified corresponding to near-term (5 year), mid-term (10 year), and long-term (20 year) commercial operations forecasts presented in Chapter B. These scenarios are identified with estimated air carrier apron space requirements in **Table C10**.

Table C10 **COMMERCIAL AIRCRAFT PARKING SCENARIOS**

| Design Standard | Peak Aircraft Parking | Required Apron Space Estimate | EMB120 | Q400 | CRJ700 | CRJ900 | E170/ E175 | E175-E2 | MRJ90 |
|---|---|---|---|---|---|---|---|---|---|
| Pre-Alternative 6 | 2 | 40,000 | 1 | 1 | | | | | |
| Current Peak Scenario – 3 RONs | 3 | 60,000 | | | 3 | | | | |
| Near-term Peak Scenario #1 | 4 | 82,000 | | | 4 | | | | |
| Near-term Peak Scenario #2 | 5 | 108,000 | | 1 | 4 | | | | |
| Near-term Peak Scenario #3 | 6 | 134,000 | | 1 | 4 | 1 | | | |
| Mid-term Peak Scenario #1 | 6 | 136,000 | | 1 | 3 | 2 | | | |
| Mid-term Peak Scenario #2 | 6 | 138,000 | | 1 | 2 | 2 | 1 | | |
| Mid-term Peak Scenario #3 | 6 | 140,000 | | 1 | 1 | 2 | 2 | | |
| Long-term Peak Scenario #1 | 6 | 144,000 | | | | 2 | 2 | 1 | 1 |
| Long-term Peak Scenario #2 | 7 | 170,000 | | | | 2 | 2 | 2 | 1 |

SOURCE: **Mead & Hunt analysis.**

As shown in Table C10, any increase over three simultaneous commercial service aircraft will require either an apron expansion, aircraft towing to the FBO apron, or passenger bussing. These alternatives will be explored in the next chapter of the Master Plan.

### *4.2.4. Terminal Area Roadway System*

Ground access to the Airport is provided from the north via Airport Way, which runs north-south along the west side of the Airport and connects to State Highway 75 at its north end. State Highway 75 runs along the eastern side of the Airport. Aviation Drive continues south along the west side of the Airport, providing access to commercial/industrial development west of the Airport and the Atlantic Aviation facilities at the south end of the Airport. No major changes to the terminal road system are planned as part of Alternative 6, nor are there any known changes planned during the 20-year planning period that would impact access to the Airport. There are no known issues or problems with the current terminal area roadway system or its signage, nor any known traffic delays occurring on a regular basis, although the terminal area entrance location is not ideal due to the one mile drive from the main highway. The roadway system is expected to be adequate for handling increased traffic levels that could be associated with increased activity at the Airport during the planning period. However, alternate ground access points may need to be considered in conjunction with other potential improvements affecting the existing roadway layout, such as parking lot and commercial aircraft apron expansion.

## 4.3. General Aviation Facilities

General aviation (GA) facilities at SUN include primarily hangar facilities and aircraft parking apron. Alternative 6 resulted in a net loss of GA hangar and aircraft parking apron due to the shift of Taxiway B, relocation of the commercial aircraft parking apron, and construction of a new bypass taxiway. Analysis of GA facilities is crucial to determine whether and how the Airport can continue to operate efficiently at its current site, as peak events for GA activity tend to strain existing resources.

### 4.3.1. General Aviation Hangar Facilities

Alternative 6 resulted in a net loss of GA hangar space. Five hangars were removed; of these, one was used by the FBO for transient aircraft storage, while the remaining four were used for based aircraft storage. Two of the based aircraft hangars were rebuilt in new locations. Projected growth in based aircraft presented in Chapter B indicates that continued strong demand for hangar space is expected in the future. Based aircraft are projected to grow from 157 in 2014 to 213 in 2034. However, there is little available land for construction of new hangars within the current Airport boundary, and the ability of the Airport to acquire land for hangar construction or relocation is uncertain.

### 4.3.2. General Aviation Apron Space

GA apron capacity is an important concern at SUN. During the Airport's annual peak event in July, a large number of transient GA and air taxi aircraft must be accommodated on the aprons, which tend to overflow and experience congestion. Ideally, the Airport should comfortably accommodate the peak level of GA aircraft to reduce congestion and potential safety issues. Although July tends to host the peak event for GA apron demand, demand also approaches peak levels during holidays, such as Christmas and Presidents Day weekend.

There are two main GA aprons at SUN, the first of which is located south of the T-hangar area but north of the FBO, and the second of which is located immediately south of the FBO. Prior to implementation of Alternative 6, the combined area of these two aprons available for peak event aircraft parking was approximately 600,000 square feet (SF). The former air cargo apron north of the terminal building provided an additional 100,000 SF for overflow aircraft parking. Therefore the Airport had approximately 700,000 SF of apron available for GA and air taxi aircraft parking during peak events prior to implementation of Alternative 6. In recent years, these apron areas have been at or near capacity for the duration of the peak event.

There was a net loss in available GA and air taxi aircraft parking space after completion of Alternative 6 improvements. Approximately 180,000 SF was lost due to relocation of parallel Taxiway B and associated Taxiway Object Free Area (TOFA); new taxilanes for accessing new small aircraft tie-downs west of the T-hangar area; and the re-purposing of the former air cargo apron for commercial passenger aircraft parking. The new air cargo apron at the north end of the Airport replaced a portion of the former air cargo apron, and approximately 30,000 SF of this new apron can be used for peak event GA and air taxi parking. Therefore the net reduction in available apron for peak event GA and air taxi parking following implementation of Alternative 6 was approximately 150,000 SF.

The peak event operations forecasts presented in Chapter B project an increase in peak day GA and air taxi operations, from 285 in 2014 to 377 in 2034, with aircraft type fleet mix proportions expected to remain constant. This represents a 32 percent overall increase in peak day operations. Assuming a consistent ratio of required available apron to peak day operations, the Airport will need an additional 225,000 SF of GA and air taxi apron to meet 20-year forecast demand, over and above the 150,000 SF lost following implementation of Alternative 6.

Appendix 5 of FAA AC 150/5300-13A, states that "the total amount of apron area required is based on local conditions," and that the apron area per aircraft should be based on the design aircraft or fleet mix selected for the design. Airport Cooperative Research Program (ACRP) Report 96, *Apron Planning and Design Guidebook*, recommends determining GA apron size requirements based on the number and size of aircraft anticipated to use the apron during peak periods. The report also recommends that as much flexibility in apron size and configuration as possible should be incorporated in light of the significant fleet diversity within GA activity.

The current GA aprons have been expanded to the maximum extent possible within the existing Airport footprint considering the constraints of the airfield, airport property line, and surrounding landside facilities. **Figures C2 and C3** illustrate typical GA apron parking patterns during peak times.

Figure C2 **PEAK PERIOD APRON PARKING – AREA 1**

SOURCE: **Airport Management.**

Figure C3 **PEAK PERIOD APRON PARKING – AREA 2**

SOURCE: **Airport Management.**

### *4.3.3 Air Cargo Areas*

Prior to implementation of Alternative 6, the apron immediately north of the passenger terminal building was designated for air cargo use by Federal Express (FedEx) and the United Parcel Service (UPS). This apron had a total area of approximately 100,000 SF. The air cargo apron was relocated to the northwest corner of the airfield as part of Alternative 6. This new apron has an area of 52,800 SF and is designed to accommodate two large twin turboprop cargo aircraft and associated ground support vehicles. It can also be used for additional large aircraft overflow parking during peak periods. However, it is important to note that cargo operations were relocated to the GA apron south of the T-hangar area during construction of the new cargo apron. This arrangement worked well for cargo operators, and as a result, is likely to continue with the new air cargo apron being used for GA aircraft parking.

# 5. Support Facility Requirements

## 5.1. Maintenance Facilities

Prior to implementation of Alternative 6, storage and maintenance of airport equipment was limited to a 3,185 SF facility located south of the passenger terminal building. This facility did not meet the Airport’s needs. In order to accommodate the construction of a new bypass taxiway, the maintenance facility was relocated to a multi-purpose Airport Operations Building (AOB) located to the west. The AOB is approximately 14,000 SF in size, with approximately 50 percent of that total dedicated to equipment storage and maintenance. This facility is expected to meet Airport needs throughout the 20-year planning period.

## 5.2. ARFF Facilities

Prior to implementation of Alternative 6, Aircraft Rescue and Firefighting Facility (ARFF) equipment and staff were housed in a 4,435 SF stand-alone facility located next to the equipment storage and maintenance building. ARFF functions were also relocated to the new AOB. Approximately 20 percent of the AOB is dedicated to ARFF functions. This facility is expected to meet Airport needs for emergency response throughout the 20-year planning period.

## 5.3. Fuel Storage

The Airport’s fuel storage facility is located west of the main T-hangar area. The FBO, Atlantic Aviation, recently added a fourth 20,000-gallon Jet A fuel tank to the fuel facility. This facility is expected to meet aircraft fueling needs throughout the planning period.

## 5.4. Snow Storage

Existing snow storage capacity is limited and any future increases in overall airside or landside pavements (e.g., runway, aprons, and parking lots) will result in a corresponding increase in snow storage needs that further constrain development options at the existing Airport site.

## 6. Facility Requirements Summary: Dual Path Planning Thresholds

The Airport's current site presents several operational challenges and limitations. In accordance with the "dual path" approach of this Master Plan, this summary identifies planning thresholds indicating the practicality or necessity of either significantly reconfiguring the existing site or relocating the Airport within the next 20 years. Dual path planning thresholds are generally related to facilities that will be severely constrained in the future at the current site, and are defined in terms of potential future aviation activity levels, regulatory changes, changes in community needs, and land use considerations. Specific thresholds were not identified for those facilities that are expected to meet needs throughout the 20-year planning period.

### 6.1. Dual Path Planning Thresholds

#### *Runway Length*

This chapter identifies a likely range of runway length requirements for each commercial aircraft type that may serve the Airport in the future. It is important to recognize that actual length requirements will be dependent on airline operating needs. The following thresholds were identified pertaining to runway length:

- **Airline Fleet Transition.** A significant change in airline fleet mix that cannot be accommodated by the existing runway length in accordance with airline needs will challenge the Airport's ability to adapt to changing market conditions and airline trends. The most likely such scenario at SUN would be the airlines' eventual retirement of CRJ700 regional jets. It is not known exactly when this may occur, nor what type of aircraft airlines would prefer to replace the CRJ700. The CRJ900 would ordinarily be considered a likely replacement, but it typically performs poorly at airports in mountainous environments; furthermore, the CRJ900 is expected to require approval from the FAA to operate at SUN based on its performance characteristics. Other potential replacement aircraft such as the E170 or E175 are expected to incur weight penalties at SUN that may be unacceptable to airlines serving the Airport.
- **Longer Airline Routes.** If the community determines it is necessary to serve destinations much further afield from those currently served, larger commercial passenger aircraft may be required to serve these destinations.

#### *Runway/Taxiway Design Standards*

The current C-III design aircraft for Runway 13/31 is not expected to change during the 20-year planning period. However, the following thresholds were identified pertaining to runway/taxiway design standards, should conditions change during the planning period:

- **Airline Fleet Transition.** The CRJ900 must be certificated as an Aircraft Approach Category (AAC) D aircraft, which means that FAA approval may be required for CRJ900 operations at SUN. Therefore, future air service options are limited if Runway 13/31 remains a C-III runway.
- **MOS Invalidation.** The Airport currently operates under several Modifications of Standards (MOSs). The recently approved MOSs essentially limit use of the Airport to aircraft less than 95,000 pounds gross weight with wingspans less than 100 feet. The MOSs support the safety of operations at the Airport. However, they may limit the Airport's future air service options. FAA reviews MOSs every five to ten years; if one or more of the MOSs were invalidated by the FAA in the future, the current site would likely be unable to achieve full compliance with C-III standards without significant reconfiguration or expansion beyond its current footprint, as was determined by the 2013 *Airport Alternatives Technical Analysis*. If MOS

invalidation were to occur, the community may have the option to accept additional operational limitations rather than pursue reconfiguration, expansion, or relocation of the Airport.

### *Passenger Terminal Area Facilities*

The ability of passenger terminal facilities to accommodate future demand will be primarily dependent on peak passenger enplanements and the commercial air service schedule. Renovation of the terminal building, relocation of the aircraft parking apron, and expansion of the parking lots completed in 2015, are designed to accommodate immediately foreseeable passenger demand. However, significant increases in passenger enplanements or changes in the airline departure schedule (such as an increase in the number of flights or multiple flights having similar arrival or departure times) may necessitate further improvements at some point within the 20-year planning period. Thus, significant increases in peak enplanements and commercial operations represent thresholds indicating that a relocated airport site may accommodate the activity more effectively. The following thresholds were identified for passenger terminal area facilities:

- **Four or More Peak Hour Airline Departures.** A commercial passenger service schedule in which there are four or more near-simultaneous commercial flights is expected to require more air carrier apron space adjacent to the terminal building, and/or revisions to the airline schedule, to allow for passenger loading and unloading during peak periods. Four or more commercial remain overnight (RON) operations would require some form of tug-in/tug-out aircraft maneuvering and management, and may be more efficiently addressed with additional air carrier apron near the terminal.
- **More than 200 Peak Hour Enplanements.** A peak hour consisting of 200 or more passenger enplanements may require further expansion of certain functional areas within the terminal building to alleviate congestion.
- **Inadequate Automobile Parking Capacity.** Additional automobile parking is expected to be needed, with approximately 100 additional parking spaces required every five years to meet peak month forecast demand.
- **Improvements Requiring Reconfiguration of the Roadway System.** Alternate ground access points may need to be considered in conjunction with other potential improvements which affect the existing roadway layout, such as potential parking lot and commercial aircraft apron improvements.

### *General Aviation Facilities*

Continued strain on general aviation (GA) facilities during peak events is expected throughout the 20-year planning period. The following thresholds were identified for GA facilities:

- **Ten Percent Increase in Based Aircraft.** The based aircraft forecast indicates a future need for additional hangars. An increase of greater than 10 percent over current based aircraft numbers will likely require some new hangar facilities.
- **Inadequate GA and Air Taxi Aircraft Parking.** The two GA aprons are currently undersized for peak events. Aircraft parking capacity issues are expected to worsen over time, as the number of aircraft looking to park during peak events increases along with peak event operations.

## 6.2. Other Findings

### *Runway Capacity*

The 20-year operations forecast does not exceed the FAA-recommended capacity planning threshold for a second runway at the Airport. Runway 13/31 provides sufficient capacity to accommodate projected operations throughout the 20-year planning period and for some years beyond. However, the capacity of the runway is likely more limited than the analysis indicates due to required air traffic control procedures and clearances for both arrivals and departures, given the challenging terrain and head-to-head operating procedures at the Airport.

### *Airport Traffic Control Tower*

The tower at SUN provides critical safety and efficiency benefits given the surrounding terrain and typical weather patterns, and the FAA has indicated that a tower must remain at SUN in order for commercial air service to continue. Assuming a viable tower location is identified within the existing Airport property boundary, the relocated tower is expected to resolve issues with the existing facility and serve the Airport throughout the 20-year planning period.

### *Other Facilities*

Recent air cargo, SRE/maintenance, and ARFF facility projects are expected to provide adequate capacity throughout the 20-year planning period. Existing snow storage capacity is limited and any future increases in overall airside or landside pavements (e.g., runway, aprons, and parking lots) will result in a corresponding increase in snow storage needs that further constrain development options at the existing Airport site.

## 6.3. Other Threshold Considerations

Two other threshold considerations relate to external factors and do not fit neatly into the facility groupings above. The implications of these considerations for the identification of airport relocation thresholds are currently undefined. However, it is likely that these considerations will become critical at some point in the future, possibly within the 20-year planning period, and may prove to be a deciding factor in the dual path planning process.

### *Commercial Passenger Service*

Growth in the commercial passenger service market at SUN could be inhibited by physical constraints at the existing Airport site. Lack of flexibility to meet airline needs may result in a negative impact on the local economy over time.

### *Land Use and Noise*

Non-airport development has encroached closely upon the Airport boundary in recent years. This increases the potential for noise issues and compromises the Airport's ability to meet future needs. The Airport should work cooperatively with the communities it serves to prevent the creation of new incompatible land uses in the Airport vicinity and avoid increases in average aircraft noise levels. Encroachment of development around the Airport will continue to create tension between the Airport and its neighbors, and it will be much easier to prevent incompatible uses than to address them after they have been built.