CHAPTER 3

Airport Facility Requirements

The evaluation of airport facility requirements is intended to determine the facility needs for the Sanderson Field for the current 20-year planning period based on conformance to established airport design criteria.

Introduction

The evaluation of airport facility goals and requirements combines the results of the inventory with needs of the existing and future critical aircraft, and application of established planning criteria to determine the future facility needs for the Airport during the 20-year planning period. All airfield facility requirements definitions are based on Federal Aviation Administration (FAA) airport design and airspace planning standards, and locally defined goals for the Airport. The facility requirements evaluation identifies the adequacy of existing facilities and identifies what new facilities may be needed based on anticipated demand or conformance to FAA standards. Potential options for accommodating current and future facility needs will be evaluated in Chapter 4 – Airport Development Alternatives.

The evaluation of airport activity confirmed that annual aircraft operations at Sanderson Field are currently well below the FAA-defined threshold of 90,000 used to determine forecast requirements for the airport master plan (see Summary of Airport Activity on the following page). The evaluation was also used to identify the current and future critical aircraft for each runway and the corresponding design standards. The evaluation of demand-driven elements will quantify facility needs such as runway length, hangar space, and aircraft parking requirements based on future demand and the type of aircraft being accommodated. Items such as lighting, navigational aids, and approach capabilities are evaluated based on overall airport activity and facility classification.

Airside facilities focus on the movement of aircraft associated with operations, which includes runways, taxiways, navigational aids and lighting systems. Landside facilities provide aircraft storage and support, which includes hangars, aircraft parking apron(s), terminal and fixed base operator (FBO) facilities. Support facility needs include aviation fuel storage and dispensing, security/perimeter fencing, surface access, automobile parking, and utilities.

Summary of Airport Activity

Recently, the Federal Aviation Administration (FAA) changed its forecasting guidance for airports with less than 90,000 annual operations through release of its August 2024 Memorandum – Forecast Review and Approval Instructions (8/12/2024).

The FAA guidance for "smaller general aviation (GA) airports with less than 90,000 annual operations" is that planning forecasts can be streamlined to focus on the existing and likely future critical aircraft for each runway. The guidance also indicates that the normal forecast consistency checks with the FAA Terminal Area Forecast (TAF) are not required.

Where applicable, the FAA indicates that airport sponsors may attest that their current and anticipated aircraft operations will not exceed 90,000 in the foreseeable future (defined by FAA as "through the mid-term period).

Based on this guidance and a review of recent activity at Sanderson Field, it is determined that annual aircraft operations at the Airport for the foreseeable future will be less than 90,000. As a result, preparation of a full aviation activity forecast in the current Airport Master Plan is not required.

The following section in the noted FAA memorandum provides guidance relevant for Sanderson Field:

Section 5. Forecasts at Non-towered, Low-activity Airports (defined as having less than 90,000 annual operations) recommend streamlining the analysis to focus on the existing critical aircraft by runway, and the likely future critical aircraft by runway.

The memorandum further recommends the following:

> *"The airport sponsor may attest that 'Current operations at the airport are less than 90,000 operations annually and are not expected to exceed 90,000 operations in the foreseeable future. Therefore, preparation of a detailed forecast is not warranted."*

A review of recent historical aircraft operations counting data and the updated 2024 (baseline) aircraft operations estimate confirms that annual aircraft operations levels at Sanderson Field are less than 90,000 operations and are not expected to reach 90,000 operations by the mid-term period in the current 20-year planning period (2024-2044).

June 2025

Port of Shelton, Washington

Sanderson Field (SHN)

The sponsor provides the following statement attesting activity at Sanderson Field, consistent with FAA guidance:

"Current operations at the airport are less than 90,000 operations annually, and not expected to exceed 90,000 operations in the foreseeable future. Therefore, preparation of a detailed forecast is not warranted."

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CURRENT ACTIVITY (2024 BASELINE)

A review of available data was conducted by the Century West airport master planning team for use in developing an updated baseline aircraft operations count for 2024. The baseline operations estimate is intended to document current activity levels for comparison with the FAA's 90,000 operations threshold noted earlier.

The largest individual generator of flight activity at Sanderson Field is Kapowsin Air Sports/Skydive Kapowsin. Kapowsin is based at the Airport and currently operates a fleet of four fixed wing aircraft in its commercial skydiving business. To evaluate this activity segment, one year (3/1/24 to 3/1/25) of FAA Automatic Dependent Surveillance – Broadcast (ADS-B) data was downloaded for each of Kapowsin's four jump aircraft. The four Kapowsin aircraft that were queried included:

- N200KS – Cessna 208 Caravan (Single-Engine Turboprop - ADG II)
- N593EX – Cessna 208 Caravan (Single-Engine Turboprop - ADG II)
- N3914D – Cessna 182 Skylane (Single-Engine Piston - ADG I)
- N669JW – DeHavilland Twin Otter (Multi-Engine Turboprop - ADG II)

The data confirm information provided by the operator that their skydiving activity varies by season. An evaluation of the ADS-B flight tracks, altitude data, and time stamps showed that the jump aircraft followed regular pattern for skydiving flights where they ascend to jump altitude (typically 13,000 ft MSL) above the Sanderson Field jump zone as quickly as possible, and return directly to the Airport after the skydivers have jumped from the aircraft. On average, the process of loading, climbing to the designated jump altitude, completing the jump sequence, and returning to the Airport takes 30 minutes or less for each load of skydivers. This 30-minute threshold was used to estimate the number of flights by comparing to the time stamps in each ADS-B record (assuming two operations per load).

A total of 4,554 aircraft operations were documented in the ADS-B data over this 12-month period for the four Kapowsin aircraft. 4,246 (93%) of these operations were conducted by ADG II aircraft.

Instrument flight plan data (FAA TFMSC) for Sanderson Field was also reviewed to help define current aircraft operations levels. A review of eleven years (2014-2024) of TFMSC data indicates that the Airport's instrument activity has steadily increased during this period. The 2024 activity is consistent with the four previous "post-COVID" years, all of which were above the average for the 11-year period.

For 2024, the instrument flight plan filings for Sanderson Field represented a total of 844 aircraft operations. Based on the relatively low volume involved, the TFMSC activity is effectively captured in the operations per based aircraft (OPBA) ratio described below, in the calculation of the overall aircraft operations total for 2024.

The majority of flight activity at Sanderson Field is generated by locally-based and transient GA fixed wing aircraft and rotorcraft. Fixed wing activity includes single-engine and multi-engine piston and turbine aircraft (turboprop and jet). For non-towered airports without traffic counts, a common method for estimating air traffic is to apply an operations to based aircraft (OPBA) ratio to an airport's fleet of based aircraft (see based aircraft discussion below). This metric is intended to capture the activity generated by locally-based and transient aircraft operating at the airport. Activity generated by defined users is not duplicated in the OPBA (the four Kapowsin skydiving aircraft noted earlier, were excluded from the OPBA calculation since the activity was captured in ADS-B data and is accounted for separately). Based on the 2024 validated based aircraft count (65) and an OPBA of 350, this segment of activity is estimated at 22,750 annual operations.

Current military activity at Sanderson Field is estimated at 500 annual operations, which are predominantly helicopter training flights from nearby Joint Base Lewis-McChord (JBLM). Updated contact with military officials at JBLM confirmed typical flight activity at Sanderson Field.

The 2024 aircraft operations for Sanderson Field are summarized in **Table 3-1**.

Table 3-1: Sanderson Field Aircraft Operations (2024 Baseline)

	Activity Segment	Base Metric (Aircraft Fleet)	Multiplier	ADS-B Data (Operations)	Total Operations
A	Kapowsin			4,554[3]	4,554
B	OPBA	65[1]	350[2]		22,750
C	Military				500
Total Aircraft Operations					27,804

1. Validated Based Aircraft Count (less Kapowsin Aircraft)
2. OPBA typical multiplier of 350 to include TMFSC ops
3. Recorded ADS-B operations for 12 months for 4 Kapowsin Aircraft

An updated count of 69 based aircraft at Sanderson Field was verified by airport management and FAA in December of 2024 following a review of the FAA's National Based Aircraft Inventory (www.basedaircraft.com). This update provides the "validated count" based aircraft, using FAA criteria, to represent the baseline activity level for the master plan evaluations. The 2024 based aircraft total for the Airport is summarized in **Table 3-2**.

Table 3-2: Based Aircraft and Fleet Mix (2024)

Aircraft Type	
Single-Engine	61
Multi-Engine	4
Jet	0
Helicopter	4
Total	69

Source: FAA National Based Aircraft Inventory Report – 2024 (Validated Count Sanderson Field Airport)

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FUTURE ACTIVITY

To provide a reasonable estimate of future aeronautic activity at the Airport, the FAA National Aerospace Forecast 2024-2044 growth rates for Active GA and Air Taxi Aircraft, and GA and Air Taxi Hours Flown were applied to the 2024 baseline activity numbers discussed above to develop forward-looking projections of base aircraft and operations respectively. The 2024 baseline numbers and projected estimates for based aircraft, and operations are presented in **Table 3-3**. These projections assume that aeronautical activity at Sanderson Field will follow national trends over the 20-year planning period.

Table 3-3: Future Aeronautical Activity Projections

Aeronautical Activity Projections						
	AAG[2,3]	2024[1]	2029	2034	2039	2044
Based Aircraft	0.4%	69	70	72	73	75
Operations	0.8%	27,804	28,934	30,110	31,334	32,608

1. 2024 AMP Baseline Numbers
2. Based Aircraft: FAA National Aerospace Forecast 2024 - 2044 Active General Aviation and Air Taxi Aircraft Growth Rate
3. Operations: FAA National Aerospace Forecast 2024-2044 Active General Aviation and Air Taxi Hours Flown Growth Rate

Demand/Capacity Analysis

The evaluation of runway capacity is used to identify existing or future operational constraints that may require specific facility improvements such as taxiways, aircraft hold areas, etc. As noted earlier, Runway 5/23 has a full-length parallel taxiway and four exit taxiways.

Annual service volume (ASV) is a broad measure of airport capacity and delay used for long-term planning as defined in *FAA Advisory Circular (AC) 150/5060-5, Airport Capacity and Delay.* Although the generic ASV calculation assumes optimal conditions (air traffic control, terminal radar, etc.) that do not exist at Sanderson Field, it provides a reasonable basis for approximating existing and future capacity for master planning purposes.

The FAA estimates the ASV for a single runway with no air carrier traffic is approximately 230,000 annual operations. Hourly capacity is estimated to be 98 operations during visual flight rules (VFR) conditions and 59 operations during instrument flight rules (IFR) conditions.

The existing and future demand-capacity ratios for Runway 5/23 were calculated based on the 2024 base operations estimate and the projected activity estimate for 2044 discussed previously. The results are presented below:

- *Existing Capacity: 27,804 Annual Operations / 230,000 ASV = 12% (demand/capacity ratio)*
- Future Capacity: 32,608 Annual Operations / 230,000 ASV = 14% (demand/capacity ratio)

Hourly capacity is also expected to be adequate to accommodate normal demand and the average delay per aircraft is expected to remain below one minute throughout the planning period.

Critical Aircraft and Airport Design Standards Discussion

CRITICAL AIRCRAFT

Critical aircraft (also referred to as “design aircraft”) are determined for individual runways based on the current and projected level of flight activity defined in the airport master plan. The applicable design standards of the runway and their associated facilities correspond to applicable codes assigned to the aircraft, consistent with FAA criteria.

A critical aircraft represents the most demanding aircraft using the runway on a regular basis (defined by FAA as at least 500 annual operations). Each aircraft has an Aircraft Approach Category (AAC) and Airplane Design Group (ADG) defined by FAA based on its physical and performance characteristics. These two components are combined to create the Runway Design Code (RDC). This definition was formerly referred to as the Airport Reference Code (ARC), which was also applied independently to a runway. RDCs also include a visibility component, whereas ARCs previously added secondary visibility minimum definitions within the applicable runway design tables. RDC is discussed in more detail in the next section.

A review of documented (TFMSC and ADSB) and estimated (OPBA) activity indicated that the existing critical aircraft for Sanderson Field Airport is best characterized by AAC B and ADG II (RDC B-II). An appropriate representative B-II aircraft is the Beechcraft King Air 300, a multi-engine turboprop. The B-II classification and Beechcraft King Air 300 representative aircraft match the existing critical aircraft identified on the current signed ALP and align with the current configuration of the runway and taxiway system at Sanderson Field.

Considering the low levels of activity by aircraft with AAC greater than B or ADG greater than II, it is unlikely that the future critical aircraft AAC or ADG will increase during the planning period. Furthermore, based on a review of historic TFMSC jet operations, a change in representative aircraft from a multi-engine turboprop to a jet is also unlikely, as jet operations have shown modest growth over the past decade. As such, an appropriate future critical aircraft is also B-II, represented by the Beechcraft King Air 300. The existing and future critical aircraft are summarized in **Table 3-4**. The critical aircraft evaluation process is described in more detail in **Appendix F**.

Table 3-4: Existing and Future Critical Aircraft Summary

EXISTING CRITICAL AIRCRAFT				
Representative Aircraft	RDC	ARC	TDG	Annual Operations
Beechcraft King Air 300	B-II-4000	B-II	2A	>500[1]
FUTURE CRITICAL AIRCRAFT				
Representative Aircraft	RDC	ARC	TDG	Annual Operations
Beechcraft King Air 300	B-II-2400[2]	B-II	2A	>500[1]

1. Justification is based on a combination of documented and estimated activity by AAC and ADG assessed independently. Operations totals for a single aircraft are not available. 2. A future ½ mile approach procedure was identified on the previous ALP and is anticipated to be carried forward.

RUNWAY DESIGN CODE

The RDC defines the design standards used for runway construction. For airports with more than one runway, each runway will have its own RDC. The RDC is comprised of the two inputs related to the critical aircraft, combined with approach visibility minimums for the runway:

- **Aircraft Approach Category (AAC)** – based on the approach speed of the aircraft
- **Airplane Design Group (ADG)** – based on the wingspan and tail height of the aircraft
- The lowest **Approach Visibility Minimums** established for the runway:
  - » Approach visibility minimums are determined by FAA for each runway based on the category of approach (visual, non-precision instrument, or precision instrument) and the most capable existing or future approach procedure. Lower visibility minimums generally correspond to instrument approaches that allow aircraft to descend to lower altitudes before requiring visual contact to be established with the runway environment prior to landing.
  - » RDC visibility minimums for each runway end are expressed in Runway Visual Range (RVR). Ground-based RVR transmitters project horizontal beams of light near the runway to measure forward visibility levels. The RVR values (measured in feet) correspond to visibility measurements commonly expressed in fractions of statute miles (e.g., 1-mile, 3/4-mile, etc.). The RVR for a runway reflects the most capable approach type or procedure for either runway end.

DESIGN STANDARDS

Specific design standards and conditions applicable to Sanderson Field facilities are presented in the following sections of this chapter and the "FAA Design Standards" text boxes. For additional information reference appropriate sections in AC 150/5300-13B.

As discussed in the Critical Aircraft section above the existing and future AAC and ADG are B and II respectively. The instrument approach procedure with the lowest approach visibility minimums published for Runway 5/23 is an RNAV LPV approach to Runway 23 with an approach visibility minimum of 3/4-mile, resulting in an existing RDC of B-II-4000. The 2013 ALP lists a future approach visibility minimum of less than 3/4-mile for Runway 23, resulting in a future RDC of B-II-2400. The future RDC from the 2013 ALP is presented for reference only. The future RDC may be updated to reflect changes in planned instrument approach procedures identified in the preferred development alternative.

RUNWAY DESIGN CODES (RDC)

Runway 5/23

- The **existing RDC is B-II-4000**
- The **future RDC is B-II-2400***

* Future instrument approach visibility minimums will be determined through the development alternatives process

FAA DESIGN STANDARDS

FAA AC 150/5300-13B Change 1, Airport Design, serves as the primary reference in establishing the geometry of airfield facilities. The existing condition dimensions and design standards for each runway are summarized in **Table 3-5**. Standards that reflect the future conditions depicted on the 2013 ALP are also listed for reference. The future standards may be updated through the development alternatives process to reflect anticipated changes to approach procedures.

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Table 3-5: Runway 5/23 Design Standards Summary (Dimensions in Feet)

FAA Standard	Runway 5/23 Existing Conditions	Runway 5/23 RDC B-II-4000 (Existing Standard)	Runway 5/23 RDC B-II-2400 (2013 ALP Future Standard)
Runway Length	5,005	See Runway Length Analysis Discussion	
Runway Width	100	75	100
Shoulder Width	10	10	10
Blast Pad Width Blast Pad Length	None None	95 150	120 150
Runway Shoulder Width	10	10	10
Runway Safety Area • Width • Beyond RWY End • Prior to Landing Threshold	 150 300 300	 150 300 300	 300 600 600
Runway Obstacle Free Area • Width • Beyond RWY End • Prior to Landing Threshold	 500 300 300	 500 300 300	 500 300 300
Runway Obstacle Free Zone • Width • Beyond RWY End • Prior to Landing Threshold	 250 200 200	 400 200 200	 400 200 200
Precision Obstacle Free Zone • Width • Beyond RWY End • Prior to Landing Threshold	 N/A N/A N/A	 N/A N/A N/A	RWY 23: 300 200 200
Inner-approach OFZ	N/A	N/A	Rwy 23: Begins 200 feet beyond runway end, extending 200 feet past last ALS unit at a slope of 50:1
Inner-transitional OFZ	N/A	N/A	Rwy 23: Begins at the edges of the ROFZ and inner-approach OFZ then rises laterally at a slope of 6:1 to a height of 150 feet above the airport elevation.
Approach Runway Protection Zone-Length	RWY 5: 1,000 RWY 23: 1,700	RWY 5: 1,000 RWY 23: 1,700	RWY 5: 1,700 RWY 23: 2,500
Approach Runway Protection Zone-Inner Width	RWY 5: 500 RWY 23: 1,000	RWY 5: 500 RWY 23: 1,000	RWY 5: 500 RWY 23: 1,000
Approach Runway Protection Zone - Outer Width	RWY 5: 700 RWY 23: 1,510	RWY 5: 700 RWY 23: 1,510	RWY 5: 1,510 RWY 23: 1,750
Departure Runway Protection Zone - Length	RWY 5: 1,000 RWY 23: 1,000	RWY 5: 1,000 RWY 23: 1,000	RWY 5: 1,000 RWY 23: 1,000
Departure Runway Protection Zone - Inner Width	RWY 5: 500 RWY 23: 500	RWY 5: 500 RWY 23: 500	RWY 5: 500 RWY 23: 500
Departure Runway Protection Zone-Outer Width	RWY 5: 700 RWY 23: 700	RWY 5: 700 RWY 23: 700	RWY 5: 700 RWY 23: 700
Runway Centerline to: Parallel Taxiway/ Taxilane CL Aircraft Hold Position	 500 200	 240 200	 300 250

Source: FAA AC 150/5300-13B, Change 1

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TAXIWAY DESIGN GROUP

Taxiway Design Group (TDG), see **Figure 3-1**, is based on the dimensions of the aircraft landing gear, including distance from the cockpit to the main gear (CMG) and main gear width (MGW). These dimensions affect an aircraft's ability to safely maneuver around the airport taxiways and dictate pavement fillet design. Taxiways and taxilanes can be constructed to different TDGs based on the expected use of that taxiway/taxilane by aircraft type. See **Table 3-6** for applicable TDG dimensions.

Based on the existing and future critical aircraft designation (Beechcraft King Air 300) discussed previously, the corresponding TDG standard for the associated taxiways are:

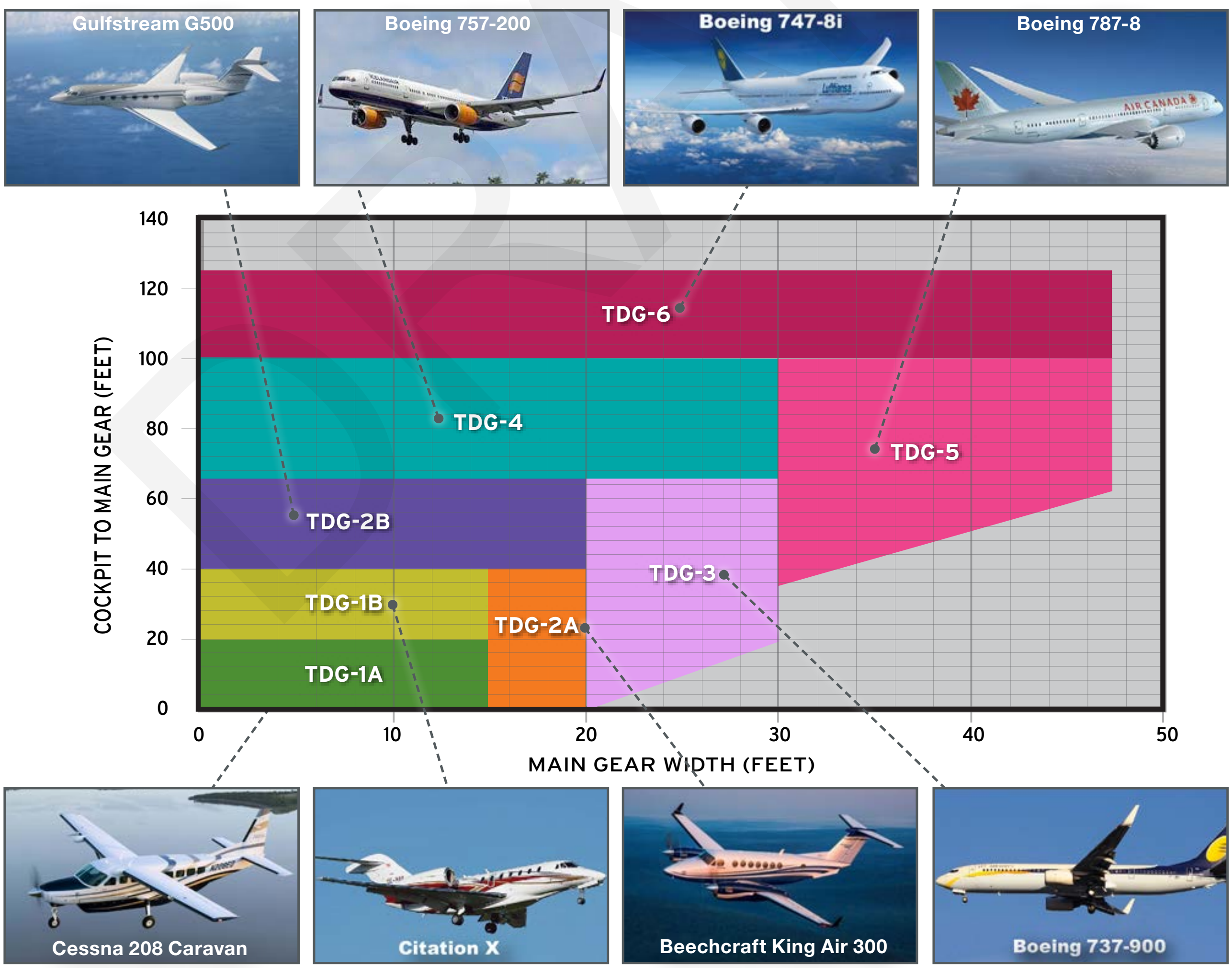
- **Taxiway A: TDG-2A (existing and future)**
- **Taxiway B: TDG-2A (existing and future)**

Table 3-6: Taxiway Design Standards (dimensions in feet)

	Current Conditions	Current/Future Standard (2013 ALP Future Standard)
Taxiway A		**ADG II / TDG 2A**
Taxiway Width	50	35
Taxiway Shoulder Width	15	15
TSA Width	79	79
TOFA Width	124	124
Taxiway B		**ADG II / TDG 2A**
Taxiway Width	50	35
Taxiway Shoulder Width	15	15
TSA Width	79	79
TOFA Width	124	124

Source: Century West Engineering

Figure 3-1: Taxiway Design Group Components



Source: Century West Engineering

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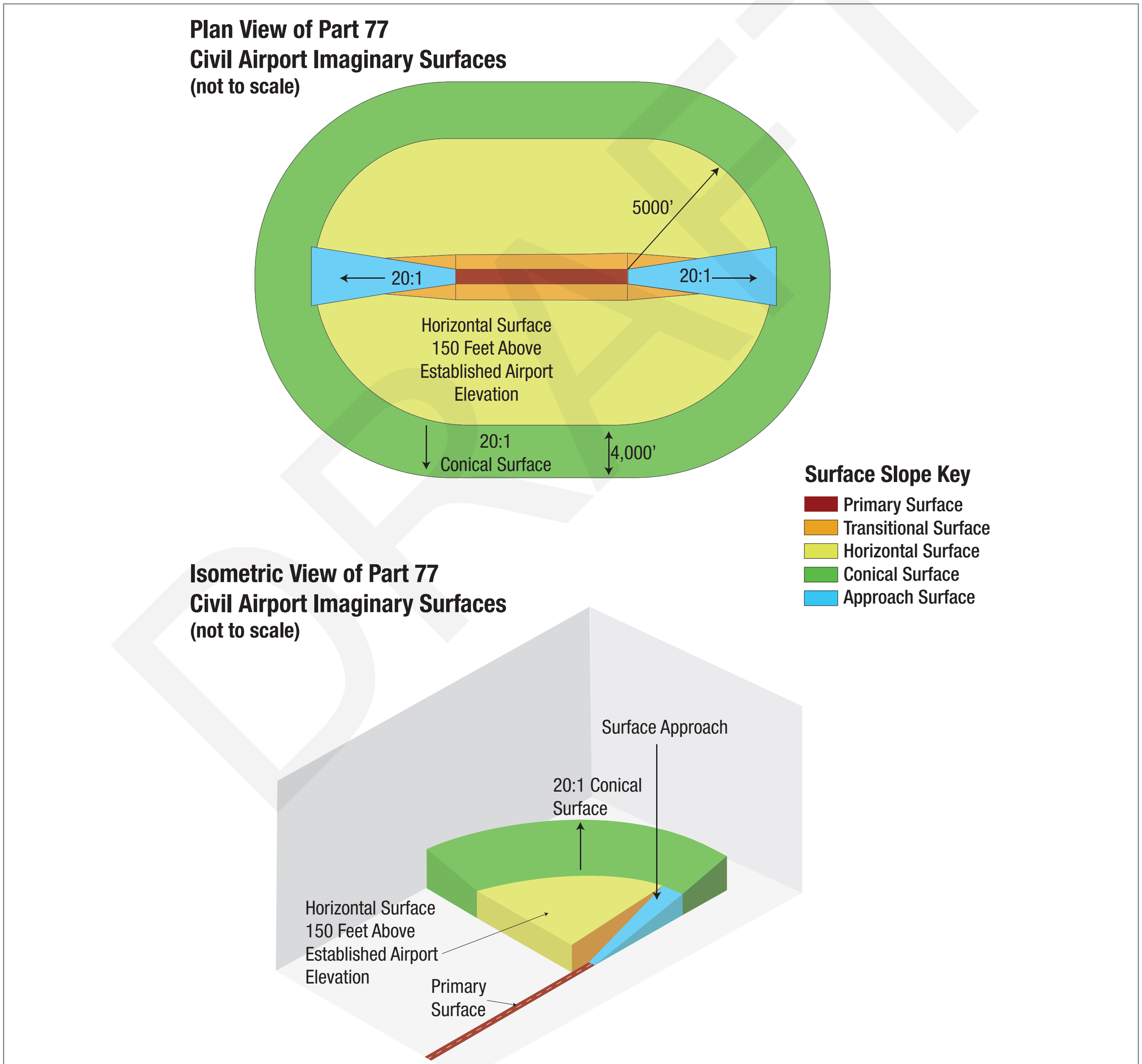
Airside Facility Requirements

PART 77 AIRSPACE

U.S. airspace for airports is defined by Title 14, Code of Federal Regulations (CFR) Part 77 – Safe, Efficient Use, and Preservation of the Navigable Airspace. Part 77 defines airport imaginary surfaces that are established to protect the airspace immediately surrounding a runway. The airspace surfaces and ground areas surrounding a runway should be free of obstructions (i.e., structures, parked aircraft, trees, etc.) to the maximum extent possible to provide a safe aircraft operating environment. A generic Part 77 diagram illustrating each type of airspace surface is provided in **Figure 3-2**.

Figure 3-2: Part 77 Airspace (Generic)



Source: Century West Engineering, Airspace Plan; Part 77

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The definition of Part 77 surfaces at an airport reflects a variety of factors, but primary defining factors include the runway instrument approach category (visual, non-precision instrument, or precision instrument) and the size of the aircraft using the runway (Utility or Larger than Utility). Utility runways primarily serve aircraft with a maximum take-off weight (MTOW) of 12,500 pounds or less (also designated as "small" aircraft), and larger than utility runways serve aircraft with MTOW of greater than 12,500 pounds. Existing Runway 5/23 is a larger than utility runway and has non-precision instrument approach procedures published with approach visibility minimums as low as 3/4-mile.

It is appropriate to protect airport airspace based on the future configuration of the runway, which will be determined in the development alternatives analysis process. For reference the 2013 ALP depicts a larger than utility runway with a precision instrument approach on Runway 23 and a non-precision instrument approach on Runway 5

The Part 77 surfaces for the existing runway and the 2013 ALP depicted future runway at Sanderson Field are summarized in **Table 3-7**. The 2013 ALP surfaces are presented for reference only. The future runway configuration and Part 77 surfaces will be determined through the development alternatives process.

Table 3-7: Part 77 Airspace Summary (SHN)

	Existing Condition	2013 ALP Depicted Future Condition
Part 77 Runway Designation	Larger than Utility Non-Precision Instrument As low as 3/4-mile	Larger than Utility Precision Instrument
Width of Primary Surface	1,000 feet	1,000 feet
Approach Surface Length	10,000 feet (Rwy 23) 10,000 feet (Rwy 5)	50,000 feet (Rwy 23) 10,000 feet (Rwy 5)
Approach Surface Width (Outer End)	4,000 feet (Rwy 23) 4,000 feet (Rwy 5)	16,000feet (Rwy 23) 4,000 feet (Rwy 5)
Approach Surface Slope	34:1 (Rwy 23) 34:1 (Rwy 5)	50:1/40:1 (Rwy 23) 34:1 (Rwy 5)
Transitional Surface	7:1 Slope to 150 feet above runway	7:1 Slope to 150 feet above runway
Horizontal Surface Elevation	150 feet above airport elevation	150 feet above airport elevation
Horizontal Surface Radius	10,000 feet	10,000 feet
Conical Surface	20:1 for 4,000 feet	20:1 for 4,000 feet

Source: Code of Federal Regulations (CFR), Title 14, Subpart E, Part 77

PART 77 AIRSPACE SURFACES AND OBSTRUCTIONS

This section provides descriptions of Part 77 airspace surfaces for Runway 5/23 depicted on the 2013 Airspace Plan drawing, based on the runway configuration in place at the time. Part 77 surfaces and obstructions may be updated through the development alternatives process to reflect changes in runway geometry and approach procedures identified in the preferred alternative. Each surface is described below.

Updated AGIS obstruction survey data were acquired from a fall 2024 mapping flight as part of the master plan. The AGIS data will be incorporated into the updated Part 77 Airspace Plan, and related drawings. Objects obstructing Part 77 surfaces should be mitigated through removal, lighting, and/or marking. The ALP and Airspace drawings will be updated to reflect the AGIS obstruction analysis, prior to submitting to FAA. Updated tables will be included for all identified obstructions, with precise location and elevation data. The updated ALP drawing set will serve as the primary reference for any future obstacle removal projects to be identified in the Airport Capital Improvement Plan (ACIP).

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Approach Surface

Approach Surfaces extend outward and upward from each end of the primary surface, along the extended runway centerline. The dimensions and slope of the approach surfaces are determined by the type of aircraft intended to use the runway, and the most demanding approach type planned for the runway.

Primary Surface

The Primary Surface is a rectangular plane longitudinally centered on the runway (at centerline elevation) extending 200 feet beyond each runway end. The width of the primary surface depends on runway category, approach capability, and approach visibility minimums. The primary surface should be free of any penetration, except items with locations that are “fixed-by-function” (i.e., approach lighting, runway or taxiway edge lights, etc.). The outer ends of the primary surface connect to the inner portion of the runway approach surfaces

Transitional Surface

The transitional surface is located along the lateral edges of the primary surface for each runway and is represented by a plane rising perpendicularly to the runway centerline at a slope of 7 to 1. The transitional surfaces extend outward and upward to an elevation 150 feet above the airport elevation. The outer edges of the transitional surface connect with the horizontal surface. The transitional surface should be free of obstructions (i.e., parked aircraft, structures, trees, terrain, etc.).

Horizontal Surface

The Horizontal Surface is a flat plane located 150 feet above the airport elevation. The horizontal surface boundaries are defined by the radii constructed from the center of the primary surface/inner approach surface edge (10,000 feet for Runway 5/23). The outer edges of the radii for each runway end are connected with tangent lines to complete the horizontal surface.

Conical Surface

The Conical Surface is an outer band of airspace that encircles the horizontal surface. The conical surface begins at the outer edge of the horizontal surface and extends outward 4,000 feet and upward at a slope of 20:1.

Airfield Pavement Strength and Condition

Airfield pavements are considered the most important asset at most airports. Monitoring and planning for future improvements to the strength and condition of airfield pavements is critical to satisfying existing and future aeronautical demand.

AIRFIELD PAVEMENT STRENGTH

Pavement strength ratings for Runway 5/23 are published for pilot use in the FAA Chart Supplement:

- 55,000 pounds (single wheel landing gear)
- 72,000 pounds (dual wheel landing gear)
- 130,000 pounds (double dual wheel landing gear in tandem)

The pavement strength for runway 5/23 is adequate to accommodate the critical aircraft. Use by heavier aircraft may accelerate pavement wear and increase the frequency of runway rehabilitation projects.

The pavement sections for major taxiways and the primary aircraft parking aprons correspond to the runways they serve. The main apron is constructed of Portland Cement Concrete (PCC), which is common for aircraft parking aprons or hardstands that accommodate heavier aircraft. Small aircraft aprons and hangar taxilanes are typically designed to accommodate aircraft weighing 12,500 pounds or less.

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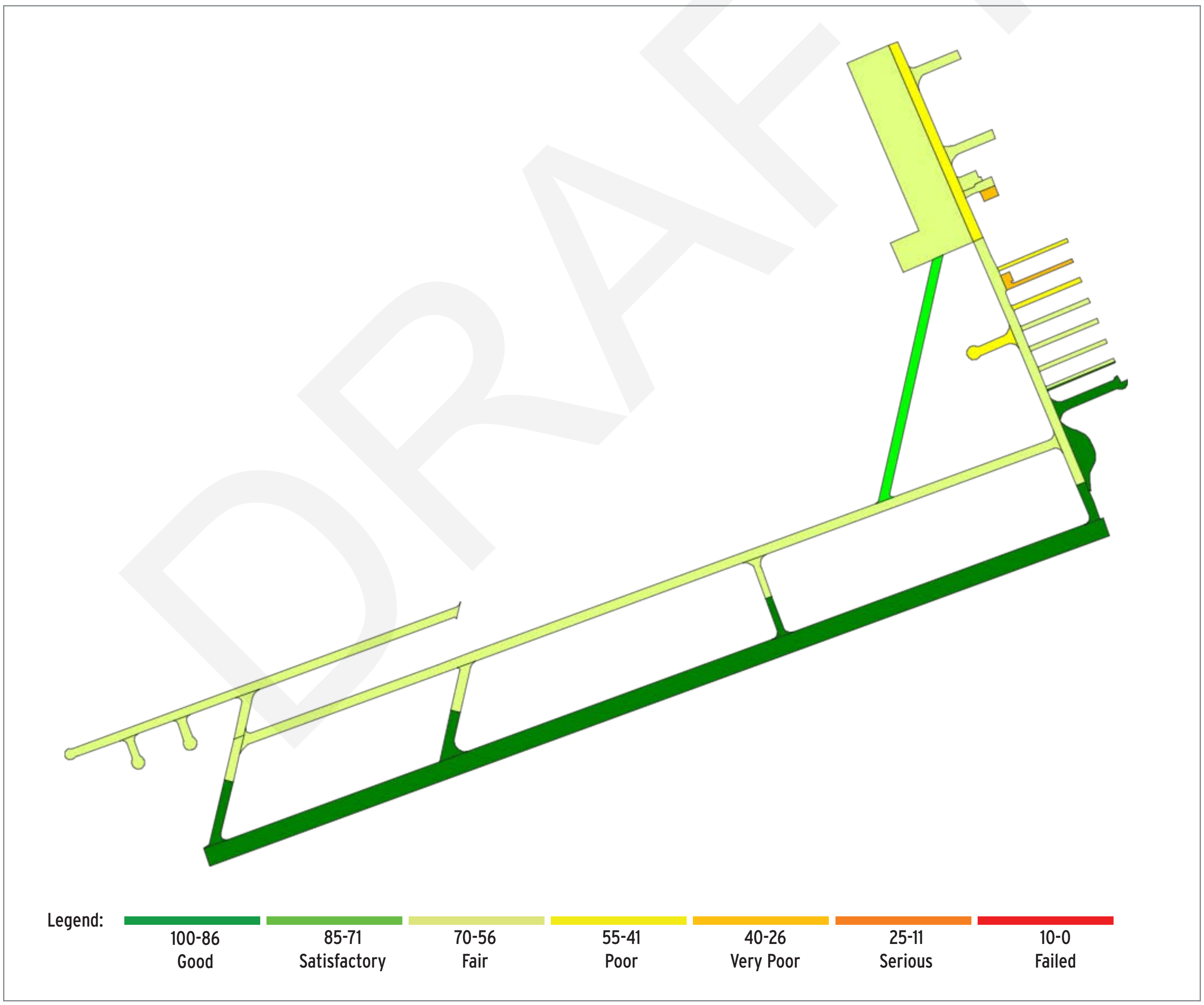
Airfield Pavement Condition

The Washington State Department of Transportation (WSDOT) Aviation Pavement Evaluation Program inspection was conducted at Sanderson Field in September 2024 (**Figure 3-3**). A summary of airfield pavement conditions observed in the inspection is provided below.

The WSDOT Aviation Pavement Evaluation Program reports that the overall (area weighted) condition of the runway, taxiway, and apron pavements at the Airport are consistent with project history and recent site visit observations:

- Runway: 100 (Good)
- Taxiway A, A1: 64-68 (Fair)
- Taxiway B: 72 (Satisfactory)
- Taxiway A3, A4, A5: 61-65 (Fair)/100 (Good)
- Main Apron: 60 (Fair)
- Fuel Apron: 56 (Fair)
- Hangar Taxilanes: 36-100 (Very Poor - Good)

Figure 3-3: 2024 Pavement Condition



Source: Washington State Department of Transportation Aviation 2024-2025 Pavement Management Program Update

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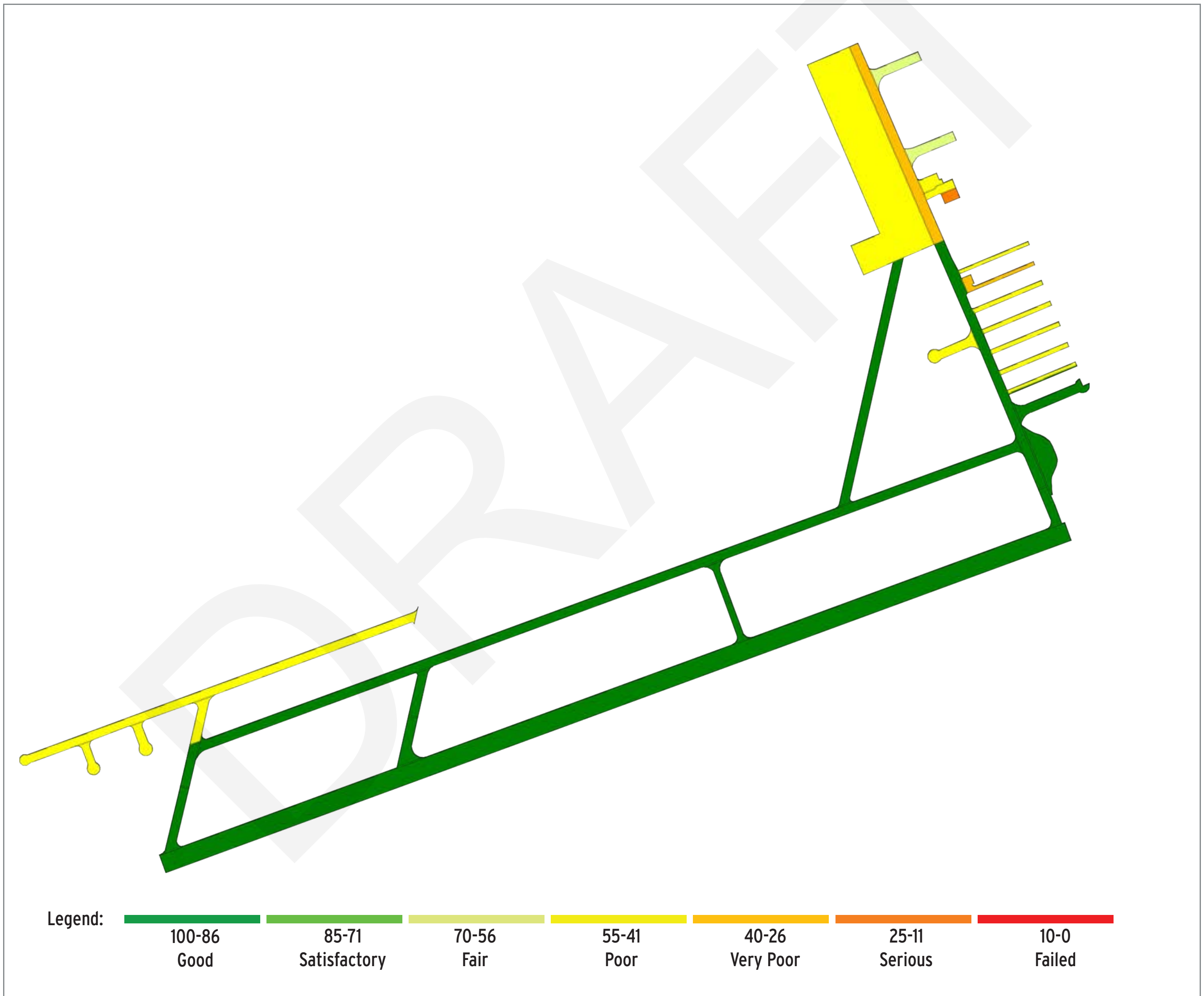
Projected pavement conditions were estimated for 2035 based on the 2024 survey, and anticipated wear. The 2035 projection (**Figure 3-4**) depicts moderate degradation of pavement conditions consistent with regular use over the modeled 11-year period. The modeled 2035 PCI scores for Taxiway A, B, and the connector taxiways reflect the pavement rehabilitation project initiated in 2025. A summary of projected 2035 pavement conditions are summarized below.

- Runway: 87 (Good)
- Taxiway A, A1: 93 (Good)
- Taxiway B: 93 (Good)
- Taxiway A3, A4, A5: 93 (Good)
- Main Apron: 54 (Poor)
- Fuel Apron: 46 (Poor)
- Hangar Taxilanes: 26-93 (Very Poor - Good)

Figure 3-4: 2035 Predicted Pavement Condition



Source: Washington State Department of Transportation Aviation 2024-2025 Pavement Management Program Update

It is expected that apron and taxilane pavements will require rehabilitation or reconstruction during the current 20-year planning period. A prioritized list of pavement rehabilitation or reconstruction projects will be provided in the updated capital improvement program. It is recommended that ongoing maintenance, including vegetation removal, crack filling, sealcoats, and joint repairs be conducted on a regular basis and consistent with WSDOT to maximize the longevity of airfield pavements through the planning period.

Airfield Facilities

Runway Orientation and Crosswind Coverage

The preferred orientation of runways is a function of wind velocity, combined with the ability of aircraft to operate under given conditions. While large aircraft can operate with limited levels of crosswinds during takeoff and landing, smaller aircraft are more susceptible to crosswinds. The ability of an aircraft to effectively manage crosswinds relies on variables such as pilot skill, aircraft type, and crosswind speeds.

The FAA recommends primary runways be aligned with the prevailing wind patterns to minimize crosswind conditions. To ensure safety, the FAA specifies primary wind coverage should be capable of accommodating at least 95% of wind conditions within the prescribed crosswind comment. This means that the runway should be oriented to minimize crosswind conditions defined as "blowing at a perpendicular angle to the runway" at least 95% of the time.

Aircraft size and type play a key role in the severity of crosswind operations. To maintain safe conditions the runway orientation should prevent crosswinds for the typical aircraft using the runway. Aircraft are grouped based on aircraft approach category (AAC), airplane design group (ADG). **Table 3-8** summarizes the allowable crosswind component based on the AAC and ADG.

Table 3-8: Allowable Crosswind Component By Runway Design Code

AAC/ADG	Allowable Crosswind Component
A-I and B-I	10.5 knots
A-II and B-II	13 knots
A-III, B-III C-I through D-III D-I through D-III	16 knots
A-IV and B-IV C-IV through C-VI D-IV through D-VI E-I through E-VI	20 knots

Source: FAA AC 150/5300-13B Change 1, Table B-1

The FAA requires 10 years of wind data to accurately represent wind coverage. Wind data for Sanderson Field are recorded by an Automated Surface Observation System (ASOS) located on the Airport. A total of 143,726 wind observations from 2014-2023 were downloaded and evaluated using the FAA Windrose Generator available through the FAA Airport Data and Information Portal (ADIP). A review of data shows that the Runway 5/23 orientation meets the FAA threshold of 95% wind coverage for large and small aircraft, under both visual and instrument operations. **Table 3-9** summarizes the wind coverage for RWY 5/23, and **Figure 3-5** depicts the wind coverage graphically in a wind rose.

Table 3-9: Wind Coverage

Crosswind	Runway 5/23		
	All Weather	IFR	VFR
10.5 Knots	99.15%	99.59%	98.95%
13 Knots	99.67%	99.85%	99.59%
16 Knots	99.94%	99.97%	99.92%

Source: FAA Airport Data and Information Portal

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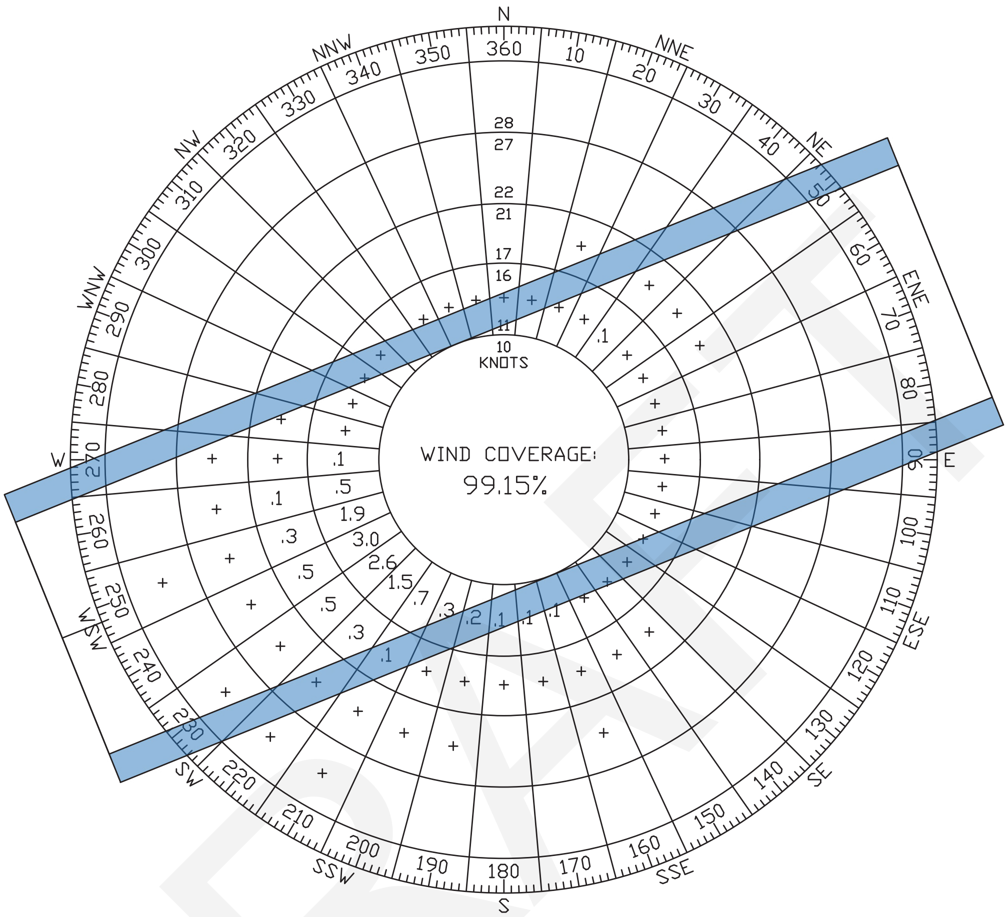
Figure 3-5: All Weather Wind Rose (SHN)



Source: FAA Airport Data and Information Portal

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Runway Visibility

Atmospheric conditions affecting runway visibility play a critical role in an aircraft's ability to access the runway under Instrument Meteorological Conditions (IMC). To assess visibility conditions for Runway 5/23, a comprehensive analysis was conducted using five years of hourly data from the onsite Automated Surface Observing System (ASOS). These data were examined to quantify the frequency of observations that meet standard visibility minimums for published IFR approach procedures. The results of the evaluation are summarized in **Table 3-10**.

Table 3-10: ASOS Visibility Observations

Visibility	Observations	Percent
3 miles and Up	41,585	82.84%
1 to 3 Miles Vis.	5,302	10.56%
3/4 to 1 Mile Vis.	1,133	2.26%
1/2 to 3/4 Mile Vis.	992	1.98%
Less than 1/2 Mile	1,188	2.37%
Total Observations	50,200	100.00%

Source: FAA Airport Data and Information Portal

RUNWAY LENGTH

Runway length requirements are based primarily on airport elevation, mean maximum temperature of the hottest month, runway gradient, and the aircraft expected to use the runway. For general aviation airports, the FAA recommends using a "family of design aircraft" approach for defining runway length requirements. *FAA AC 150/5325-4B, Runway Length Requirements for Airport Design*, provides the length analysis guidance for different segments of large and small aircraft fleets.

- Airport elevation: **273 feet above mean sea level (MSL)**
- Mean Maximum Temperature (the average daily high temperature for the hottest month of the year): **78°F**

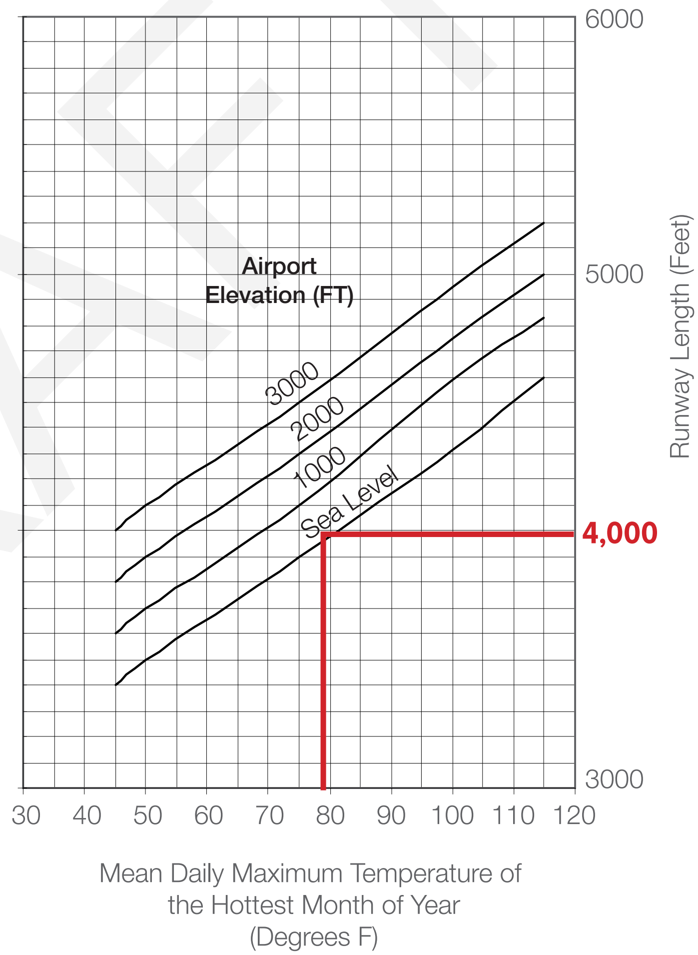
Runway Length Assessment

An updated assessment of runway length was completed using current methods described in *FAA AC 150/5325-4B, Runway Length Requirements for Airport Design*. This methodology is consistent with FAA planning criteria that correlates the needs of the existing and future critical aircraft to approval of the Airport Layout Plan drawing and project eligibility for FAA funding. The specific design criteria applied to a runway do not preclude use by larger aircraft. However, airport management approval is typically required for use by heavier aircraft based on the operational limits of the airfield, particularly pavement strength.

Using FAA planning methodologies, the evaluation of runway length requirements begins with the operational requirements of the critical aircraft, or family of aircraft, expected to use each runway. Several airfield-specific conditions that affect aircraft performance are then verified including airport elevation, runway gradient, and the assumed operating temperature (average daily maximum temperature of the hottest month of the year). These inputs are applied to runway length curves presented in AC 150/5325-4B for the applicable segment of the GA aircraft fleet.

Figure 3-6: Runway Length Curves - Existing

Small Airplanes Having 10 or More Passenger Seats
(Excludes Pilot and Co-pilot)



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

The existing and future critical aircraft (King Air 300) is a multi-engine turboprop with a MTOW of 14,000 pounds. AC 150/5325 Chapter 3 presents runway length curves specifically for "large" aircraft with MTOW of more than 12,500 pounds up to and including 60,000 pounds. However, the AC states that the large airplane runway length curves are based on a grouping of only the turbojet-powered fleet (business jets). As such, the FAA runway length planning guidance for large airplanes does not include large turbine propellor aircraft (turboprops), including the King Air 300.

In some instances, where a runway has a large turboprop critical aircraft paired with significant jet activity (but short of 500 annual operations), it may be appropriate to use the large aircraft runway length curves presented in Chapter 3 of the AC. However, the modest jet activity at Sanderson Field in recent years does not support the application of the large a curves.

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Since the King Air 300 is not a jet and performs in a manner more closely aligned with the small piston and turboprop driven aircraft represented in the runway length curves for "small airplanes having 10 or more passenger seats" presented in Figure 2-2 of the AC, it is appropriate to apply those curves to arrive at a representative runway length. The applicable runway length curves and derived runway length for Runway 5/23 are depicted in **Figure 3-6**.

Using the FAA methodology summarized above a runway length of 4,000 feet can be justified to accommodate the critical aircraft (Beechcraft King Air 300) and similar aircraft.

For comparison, the takeoff requirements for the current critical aircraft as presented in the Operating Handbook[1] are presented in **Figure 3-7**. The aircraft manufacturer data indicates that the accelerate-stop distance required for a fully loaded Beechcraft King Air 300 operating at sea level at 78° Fahrenheit (25.6° Celsius) is approximately 5,100 feet. This length is consistent with the existing length of Runway 5/23 (5,005 feet).

Figure 3-7: BE30 Takeoff Data - Sea Level - Anti-Ice Off - No Flaps/App Flaps

T.O. WT. LBS	ITEM	FLAPS		ITEMS	OUTSIDE AIR TEMPERATURE CENTIGRADE													
		0%	40%		-20° C (-4° F)		-10° C (-14° F)		0° C (32° F)		10° C (50° F)		20° C (68° F)		30° C (86° F)		40° C (104° F)	
14,000	V_1	112	101	ACCEL STOP	4,150	3,250	4,400	3,300	4,500	3,410	4,760	3,600	4,910	3,750	5,300	4,000	5,600	4,240
	V_2	120	107	ACCEL GO	3,780	3,050	3,800	3,050	3,800	3,200	4,200	3,360	4,580	3,840	5,200	4,380	5,950	5,200
	V_{YSE}	122																
13,500	V_1	110	100	ACCEL STOP	3,950	3,145	4,195	3,200	4,255	3,315	4,480	3,500	4,655	3,650	5,040	3,885	5,290	4,120
	V_2	118	105	ACCEL GO	3,565	2,740	3,575	2,740	3,575	2,725	3,895	3,005	4,200	3,445	4,775	3,875	5,425	4,600
	V_{YSE}	121																
13,000	V_1	108	100	ACCEL STOP	3,750	3,040	3,990	3,100	4,010	3,220	4,200	3,400	4,400	3,550	4,760	3,770	4,980	4,000
	V_2	116	103	ACCEL GO	3,350	2,430	3,350	2,430	3,350	2,550	3,590	2,650	3,820	3,050	4,350	3,370	4,900	4,000
	V_{YSE}	120																
12,500	V_1	107	100	ACCEL STOP	3,625	2,970	3,885	3,055	3,900	3,160	4,095	3,320	4,280	3,475	4,580	3,685	4,790	3,910
	V_2	115	102	ACCEL GO	3,125	2,215	3,125	2,215	3,125	2,300	3,355	2,425	3,585	2,800	4,050	3,070	4,555	3,575
	V_{YSE}	119																
12,000	V_1	105	100	ACCEL STOP	3,500	2,900	3,780	3,010	3,790	3,100	3,990	3,240	4,160	3,400	4,380	3,600	4,600	3,820
	V_2	113	101	ACCEL GO	2,900	2,000	2,900	2,000	2,900	2,050	3,120	2,200	3,350	2,550	3,750	2,770	4,210	3,150
	V_{YSE}	118																
11,500	V_1	105	100	ACCEL STOP	3,400	2,850	3,675	2,955	3,690	3,050	3,870	3,195	4,035	3,350	4,245	3,535	4,503	3,765
	V_2	113	101	ACCEL GO	2,665	1,875	2,700	1,875	2,700	1,930	2,935	2,050	3,150	2,360	3,510	2,575	3,980	2,925
	V_{YSE}	117																
11,000	V_1	105	100	ACCEL STOP	3,300	2,800	3,570	2,900	3,590	3,000	3,750	3,150	3,910	3,300	4,110	3,470	4,405	3,710
	V_2	113	101	ACCEL GO	2,430	1,750	2,500	1,750	2,500	1,810	2,750	1,900	2,950	2,170	3,270	2,380	3,750	2,700
	V_{YSE}	115																
10,500	V_1	105	100	ACCEL STOP	3,250	2,755	3,485	2,850	3,540	2,955	3,685	3,100	3,855	3,250	4,055	3,425	4,307	3,655
	V_2	113	101	ACCEL GO	2,315	1,675	2,355	1,675	2,360	1,740	2,570	1,825	2,775	2,040	3,125	2,250	3,550	2,600
	V_{YSE}	114																
10,000	V_1	105	100	ACCEL STOP	3,200	2,710	3,400	2,800	3,490	2,910	3,620	3,050	3,800	3,200	4,000	3,380	4,210	3,600
	V_2	113	101	ACCEL GO	2,200	1,600	2,210	1,600	2,220	1,670	2,390	1,750	2,600	1,910	2,980	2,120	3,350	2,500
	V_{YSE}	113																
MIN T.O. PWR					96		96		96		96		94.4		86.5		77.4	
Source: King Air 300 Operating Handbook, CAE SimuFlite. 2003																		

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1 King Air 300 Operating Handbook, CAE SimuFlite. 2003

The 2013 Airport Layout Plan depicts an extension of the runway by 295 feet to 5,300 feet as well as a long-term reserve extension of 1,480 feet to 6,485 feet. The updated runway length analysis justifies a length shorter than the existing runway length. It is recommended that the Airport maintain the existing runway length and maintain the runway reserve depicted on the 2013 ALP. As the reserve is located on existing Airport property, it is appropriate to continue to protect this area for future development to accommodated potential changes in the fleet mix beyond the 20-year planning period.

Airport Design Standards

Runway 5/23 generally conforms to dimensional standards based on RDC, B-II-4000. The runways and taxiways currently exceeds several design standards that correspond to the current/future critical aircraft designations.

FAA AC 150/5300-13B Change 1 defines both dimensional and obstruction clearance standards for major airfield design standards for runways, taxiways and aircraft aprons. **Table 3-4**, provided earlier, summarizes current and future dimensional standards for Runway 5/23 at Sanderson Field. Design standards are described in the following text boxes and sections.

FAA DESIGN STANDARDS

Runway Width/Shoulders

Existing Standards: B-II-4000 runway width is 75 feet, with 10-foot shoulders, based on existing approach visibility minimums.

Future Standard: Future runway width and shoulder standards are dependent on future instrument approach procedure capabilities which will be evaluated in the development alternatives analysis.

Existing Conditions: Runway 5/23 width is 100 feet with 10- foot shoulders, which exceeds standards for a B-II-4000 runway and is capable of meeting B-II-2400 standards.

Runway Blast Pad

Existing Standards: B-II-4000 standard is 95 feet wide and 150 feet long (turf or stabilized soils, when required for ADG I, II, and II runways).

Future Standard: Future blast pad standards are dependent on future instrument approach procedure capabilities which will be evaluated in the development alternatives analysis.

Existing Conditions: The runway is not equipped with blast pads at either end.

Runway Protection Zone (RPZ)

Land use in the RPZs should be directly controlled by the airport through ownership or easement. RPZs should be clear of incompatible land uses such as roads, buildings, and critical infrastructure. RPZs begin 200 feet beyond each runway end and often coincide with the geometry of the inner approach surface for the runway. The current and planned approach visibility levels for each runway are referenced below.

Current Standard: Approach RPZ dimensions for B-II-4000 runways are 1,000 x 1,510 x 1,700 feet (inner width, outer width, length); the corresponding Departure RPZ is 500 x 700 x 1,000 feet.

Future Standard: Future RPZ standards are dependent on future runway configuration and instrument approach procedure capabilities. These variables and any associated changes to RPZ standards will be evaluated in the development alternatives analysis.

Existing Conditions: Runway 5 RPZ is clear of incompatible land uses and meets current standards. Runway 23 RPZ is transected by U.S. Highway 101.

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FAA DESIGN STANDARDS

Runway Safety Area (RSA)
Existing Standard: B-II-4000 standard is 150 feet wide (centered on runway) and 300 feet beyond runway ends. Gradient, surface compaction, and obstacle clearing standards apply.

Future Standard: The future RSA standards are in part dependent on the future instrument approach procedures, which will be evaluated and selected as part of the development alternatives process. The future RSA standards will be defined at that time.

Existing Conditions: The existing RSA appears to meet RDC B-II-4000 standards.

Runway Object Free Area (ROFA)
Existing Standard: B-II-4000 standard is 500 feet wide (centered on runway) and 300 feet beyond runway ends. Gradient and obstacle clearing standards apply.

Future Standard: The future ROFA standards are in part dependent on the future instrument approach procedures, which will be evaluated and selected as part of the development alternatives process. The future ROFA standards will be defined at that time.

Existing Conditions: The existing ROFA appears to meet RDC B-II-4000 standards.

Runway Heading

A review of magnetic variation (MAGVAR) data and anticipated annual rate of change accessed through the National Geodetic Survey's Magnetic Declination Calculator[2] indicates that Runway 5/23 will require a change to 6/24 near the end of the current 20-year planning based on the current annual rate of change.

Runway Protection Zones (RPZ)

By FAA definition "The RPZ is a protection zone that serves to enhance the protection of people and property on the ground." The RPZ shape and location often corresponds to the inner portion of the runway approach surface, although RPZs do not have vertical (slope) component. RPZ dimensions vary by runway design code (RDC).

The most recent update of the FAA Airport Design advisory circular *(AC 150/5300-13B Change 1, Appendix I)* identifies several common conditions and facilities that are considered compatible with RPZs. An updated Airport Land Use Compatibility Planning AC (150/5190-4B), issued by FAA in 2022, provides this guidance for RPZs.

The FAA recommends airport control of RPZ through property ownership or acquisition of an avigation easement that limits specific conditions and defines vertical clearances for the corresponding approach surfaces. In general, proposed runway changes that reduce the presence of incompatible land uses in an RPZ are considered to provide incremental safety benefits.

No changes to the RPZ size based on the current and future RDC are anticipated during the current 20-year planning period. Any future change in runway length, configuration, or approach visibility minimums may require changes in RPZ locations.

Although the FAA discourages roads in RPZs, they recognize that potential impacts vary, and in many cases the cost of realigning major roadways outside of RPZs, or reconfiguring runways to eliminate the RPZ conflict, may not be feasible. However, even in cases where roads pre-exist, or will continue to exist in an RPZ, maintaining a clear approach to the runway end is a high priority safety item for FAA. Since RPZs coincide with the inner portion of the Part 77 runway approach surface, vehicles traveling on these roads should not penetrate the runway approach, or if an obstruction does exist, it may be mitigated through a variety of actions.

2 https://www.ngdc.noaa.gov/geomag/calculators/magcalc.shtml#declination

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Runway Object Free Area (ROFA)

The ROFA is a flat surface that sits at the same elevation as the runway. The ROFA should be clear of terrain and above ground objects except for those required for air navigation or aircraft ground maneuvering purposes.

Runway 5/23 meets/exceeds the current B-II-4000 dimensional, surface compaction, and obstacle clearance standards for the ROFA.

Runway Safety Area (RSA)

The RSA is a flat surface that sits at the same elevation as the runway and is intended to be clear of terrain and above ground objects. FAA standards define dimensional, gradient, surface condition, and obstruction clearance requirements. The RSA is intended to enhance the safety of aircraft that overshoot, overrun, or veer off the runway without causing significant structural damage, as well as to provide access for Aircraft Rescue and Firefighting (ARFF) equipment for emergency response.

Runway 5/23 meets/exceeds the current B-II-4000 dimensional, surface compaction, and obstacle clearance standards for the RSA.

FAA DESIGN STANDARDS

Runway Object Free Zone (OFZ)
Existing Standard: B-II-4000 standard is 400 feet wide (centered on runway) and 200 feet beyond runway ends. The OFZ is to be kept clear of aircraft and other object penetrations during runway operations. Frangible NAVAIDs are permitted in the OFZ if required by their function.

Future Standard: Future OFZ dimensional standards are dependent on future runway configuration and instrument approach procedure capabilities. These variables and any associated changes to OFZ standards will be evaluated in the development alternatives analysis.

Additional OFZ surface standards (Precision OFZ, inner-approach OFZ, and inner-transitional OFZ) would need to be met if future approach visibility minimums are lower than ¾-mile.

Existing Conditions: The existing runway meets OFZ standards based on the existing RDC (B-II-4000).

Obstacle Free Zone (OFZ)

The FAA defines the OFZ that surrounds a runway as "a design and an operational surface kept clear during aircraft operations. This clearing standard does not allow aircraft and other object penetrations, except for locating frangible NAVAIDs in the OFZ because of their function. The FAA will not consider modification of the OFZ surface."

The OFZ may include up to four components depending on approach and lighting capabilities (abbreviated FAA definitions provided below):

- **Runway Obstacle Free Zone (ROFZ).** The ROFZ is a defined volume of airspace centered on the runway centerline, at runway elevation for any particular location. The ROFZ extends 200 feet beyond each end of the runway. ROFA dimensions are determined by aircraft size (small and large) and in some cases, approach visibility minimums.
- **Inner-approach OFZ.** This OFZ is a defined volume of airspace centered on the approach area that only applies to runway ends with an approach lighting system (ALS). The surface begins 200 feet from the runway threshold (at the end of the ROFA) at the same elevation and extends 200 feet beyond the last light unit in the ALS. Its width is the same as the ROFZ and rises at a slope of 50 (horizontal) to 1 (vertical) from its beginning.
- **Inner-transitional OFZ.** This OFZ only applies to runway ends with lower than ¾-mile approach visibility minimums. This OFZ is a defined volume of airspace along the sides of the ROFZ and Inner- approach OFZ.
- **Precision OFZ.** This OFZ applies to any runway end with a vertically guided approach and landing minimums less than 250 feet, or visibility minimums less than ¾-mile (or RVR below 4,000 feet). The protected area begins at the threshold and continues along the extended runway centerline for a distance of 200 feet beyond the runway end. The surface is in effect when an aircraft is on final approach within 2 miles of the runway threshold.

The Runway OFZ (large aircraft standard - 400 feet) applies to the existing Runway 5/23. The inner-approach OFZ, inner-transitional OFZ, and precision OFZ do not apply to the existing runway as the approach visibility minimums

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are not less than ¾-mile. If through the development alternatives process an approach with visibility minimums less than ¾-mile is selected as part of the preferred alternative, inner-approach, inner-transitional, and precision OFZ standards will apply as depicted for Runway 23 on the 2013 ALP.

Runway 5/23 meets/exceeds the dimensional and obstacle clearance standards for all OFZ components, for the current RDC.

FAA DESIGN STANDARDS

Runway – Parallel Taxiway/Taxilane Separation

Existing Standard: The standard runway to parallel taxiway separation for a B-II-4000 runway is 240 feet from centerline to centerline.

Future Standard: Future runway to parallel taxiway separation standards are dependent on future instrument approach procedure capabilities which will be evaluated in the development alternatives analysis.

Existing Conditions: A separation is 500 feet, which exceeds standards for all B-II runways.

Taxiway Safety Area (TSA)

Existing/Future Standard: ADG II dimension is 79 feet wide (extends 39.5 feet either side of the taxiway centerline). Additional gradient standards apply.

Existing Conditions: The TSAs for all existing taxiways appear to meet ADG II dimensional, grading and obstruction clearing standards.

Taxiway Object Free Area (TOFA)

Taxiways

Existing/Future Standard: ADG II dimension is 124 feet wide (extends 62 feet either side of the taxiway centerline). Additional gradient standards apply.

Existing Conditions: The TOFAs for Taxiway A, A3, A4, A5 and B meet ADG II dimensional, grading and obstruction clearing standards. Two fire hydrants are located in the Taxiway A1 TOFA near the T-hangar area.

Taxilane Object Free Area (TLOFA)

Existing/Future Standard:

- The ADG II standard is 110 feet wide, or 55 feet each side of taxilane centerline (applies to taxilanes and aprons used by large aircraft)
- The ADG I standard is 79 feet wide, or 39.5 feet each side of taxilane centerline (applies to small aircraft aprons and taxilanes)

Existing Conditions: Several existing aircraft hangar taxilanes in the T-hangar area do not meet the applicable TLOFA dimensional and obstruction clearance criteria. See recommendations later in this section for compliance with taxilane clearance.

Two items related to Taxiway A are identified in **Figure 3-8** as non-standard based on current FAA taxiway design guidance:

- **Exit taxiways A4 and A5 do not meet the 90-degree guidelines set forth by the FAA for connections to Runway 5/23.** Current FAA guidance recommends that taxiway connectors be designed to provide a 90-degree intersection (and aircraft alignment at the hold position) relative to the runway centerline, to increase visibility for pilots and reduce runway incursions.

- **Taxiway A1 provides direct access from the main apron to Runway 23:** The FAA recommends that entrance taxiways do not provide direct access from an apron to a runway, to increase situational awareness for pilots and reduce runway incursions.

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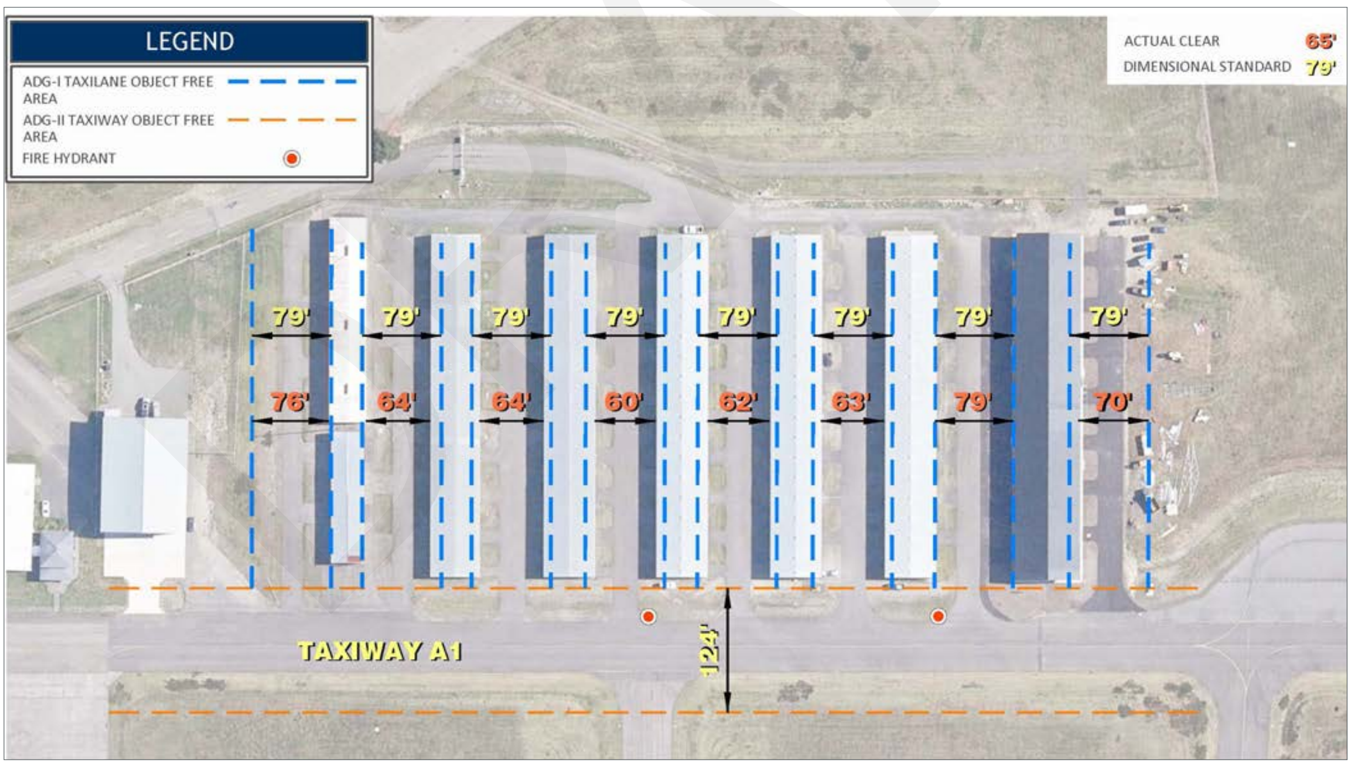
Figure 3-8: Non standard conditions

Source: Century West Engineering

TAXILANES

Taxilanes provide access to aircraft hangars, parking areas, and the fuel facility. By FAA standard, taxilane object free areas (TLOFA) are defined and should be free of items that could create a hazard for taxiing aircraft including parked aircraft, hangars, fences, other built items, and natural terrain. As illustrated in **Figure 3-9**, many taxilanes in the T-hangar area do not meet ADG-I standards for clear TLOFA (79 feet).

Figure 3-9: Existing and Standard Taxilane OFA Clearances



Source: Century West Engineering

AC 150/5300-13B (Appendix J, Table J-10) provides guidance for calculating taxilane object free areas based on ADG. The calculations presented in the table represent the maximum wingspan within each ADG. For example, ADG I includes aircraft with wingspans up to 49 feet. The TOLFA formula is:

½ Aircraft Wingspan (A) + Lateral Deviation (B) + Safety Buffer (C) = ½ TLOFA (D). Doubling the ½ TLOFA dimension provides the full TLOFA (E).

> **ADG I TLOFA:** (A) 24.5' + (B) 5' + (C) 10' = (D) 39.5'. (D) 39.5' x 2 = (E) 79' (TLOFA)

The formula establishes the centerline to object separation distance based on the wingspan of the most demanding aircraft anticipated to use the taxilane. Applying the FAA formula to T-hangar taxilanes that exclusively serve smaller hangar units (for example 42-foot wide doors) provides a practical TLOFA clearance measure with the same lateral deviation and safety buffer components.

> **ADG I (42-foot Wingspan) TLOFA:** For a maximum 42-foot door width (actual aircraft wingspans would be less to provide adequate wingtip clearance): (A) 21' + (B) 5' + (C)10' = (D) 36'. (D) 36' x 2 = (E) 72' (TLOFA)

While this method of determining TLOFA widths identifies less restrictive TLOFAs for these specific hangar areas, in several cases the available space between the hangars is less than the calculated TLOFA. Future hangars constructed in new hangar areas, or reconstructed in existing hangar areas should be configured to provide adequate lateral clearances to meet TLOFA requirements.

AIRFIELD INSTRUMENTATION, SIGNAGE, LIGHTING, AND MARKINGS

Most of the existing airfield lighting systems have been installed/replaced since the last airport layout plan was completed in 2013. The service life of the systems varies. However, for planning purposes, it is assumed that all existing airfield lighting systems will reach the end of their service life during the current planning period and require replacement. FAA airfield lighting guidance supports use of common technology between systems. The current LED standard used at Sanderson Field will be applied to all new and replacement airfield lighting systems.

Runway & Taxiway Lighting

The Runway 5/23 lighting systems are consistent with the requirements of a non-precision instrument runway (NPIR). The existing lighting systems are in good condition.

Existing Lighting Systems – Runway 5/23 & Parallel Taxiway

- MIRL – Medium Intensity Runway Edge Lighting
- Precision Approach Path Indicators (PAPI) – 4-light units Runway 23
- Runway End Identification Lights (REIL) – Runway 23
- Taxiway edge reflectors
- Airport Rotating Beacon - Located on the top of the water tower north of the Runway 5 end.
- Airfield Signs – Mandatory Instruction, Location, Direction, Destination, Information, Distance Remaining

All airfield lighting systems should be maintained and updated as necessary. The airport rotating beacon will likely reach the end of useful life within the planning period. Replacement of existing lighting systems with updated LED lighting is recommended at the end of useful life.

Weather Reporting

The Airport has an automated surface observing system (ASOS) that provides 24-hour weather information. The ASOS is located west of Taxiway A1. Future system needs related to maintaining/replacing FAA-owned weather systems are determined by FAA. Replacement of the ASOS should be anticipated during the current planning period based on typical useful life.

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Airfield Markings

The airfield markings are consistent with FAA standards for color (white/yellow), configuration, and approach type. The condition of the markings varies. Generally, the runway markings are in good condition; the taxiway markings are in fair condition; and the apron markings are in poor condition. Regular maintenance including repainting is required and is typically coordinated with pavement maintenance projects.

Runway Markings

The existing non-precision instrument runway (NPIR) markings on Runway 23 and Runway 5 are consistent with FAA requirements.

Taxiways Markings

The markings on Taxiways A, A1-A5, and B include centerline stripes and aircraft hold lines, consistent with FAA requirements. The taxiway markings are consistent with FAA standards for color (yellow) and configuration and are in fair condition. Regular repainting is required and is typically coordinated with pavement maintenance projects.

Apron/Taxilane Markings

Markings on the apron include taxilane centerlines and aircraft parking position markings. Generally, the apron markings are in poor condition as they are significantly faded and/or worn.

It is recommended that all runway, taxiway, and apron markings be maintained in accordance with the WSDOT Pavement Maintenance Program. A runway MAGVAR change is anticipated toward the end of the planning period. Runway number markings will be updated to 6/24 at that time.

Airfield Signs

The signage for Runway 5/23 and Taxiway A consists of illuminated LED signage. The mandatory, location, destination, direction, and information signs are the Airport provide all necessary information. The existing signs should be maintained and replaced as necessary. Signage should also be reconfigured to account for any future changes to airfield geometry, and to address an anticipated MAGVAR runway name change to Runway 6/24 at the end of the planning period.

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Landside Facility Requirements

Landside facilities include aircraft parking apron(s), hangars, terminal, fixed base operator (FBO) facilities, and related items. The landside facility requirements were analyzed relative to hangar demand, apron and aircraft parking requirements, runway access, and conformance with FAA design standards. Future facility demand is estimated based on the updated aviation activity forecasts presented in the aviation activity forecast.

AIRCRAFT PARKING APRON

Aircraft parking apron facility requirements were analyzed relative to existing FAA apron and aircraft parking requirements analysis provided in *FAA AC 150/5300-13B Change 1, Airport Design*. The parking requirements by aircraft type are summarized in **Table 3-12** and described in the following sections. To quantify the based and transient aircraft parking needs, a projection (based on FAA National Aerospace Forecast Total GA Fleet growth rates) of based aircraft and peak day projections were used to determine the parking necessary to satisfy existing and future demand.

Based and Transient Aircraft Parking

The evaluation of apron and taxilane configurations in the Airport Development Alternatives (Chapter 4) will reflect the aircraft using each facility, consistent with FAA design guidance: *"Provide planning and design to accommodate varying aircraft types and sizes anticipated to use the airport." (AC 150/5300- 13B, Change 1 Appendix E. E.1.3, General Aviation Facilities).* It is assumed that based aircraft are stored in hangars and that apron parking primarily accommodates transient aircraft.

The main apron consists of two parallel (north-south) aircraft tiedown rows with a total of 34 aircraft parking spaces. The west row is currently configured to accommodate 20 aircraft, including 9 designated tail-in small aircraft tiedowns. The east row has 19 nested tiedowns for small aircraft and 1 tiedown at the north end dedicated for large aircraft. There are also 5 pull-through parking spaces at the south end of the apron available to accommodate transient business aircraft or helicopters.

Space requirements for large transient business aircraft were estimated based on typical parking configurations used for ADG II aircraft. Based on the maximum ADG II wingspan of 79 feet, drive-through parking positions are configured to provide adequate wingtip clearances and nose/tail clearances from adjacent taxilane OFAs.

Transient aircraft parking demand is determined based on transient operational peaks. Transient operations are estimated to be 70% of total operations. Activity peaking is evaluated to identify potential capacity-related issues that may need to be addressed through facility improvements or operational changes. The Peak Month represents the month of the year with the greatest number of aircraft operations (takeoffs and landings). The peak month for most general aviation airports in North America occurs during the summer when weather conditions and daylight are optimal. For planning purposes, peak month operations at Sanderson Field are estimated to be 15% of annual operations during the planning period.

Peak Day operations are defined by the average day in the peak month (Design Day) and the busy day in the typical week during peak month (Busy Day). The Design Day is calculated by dividing peak month operations by 31. For planning purposes, the Busy Day is estimated to be 25% higher than the average day in the peak month (Design Day x 1.25), based on common activities generating surges in flight activity.

The peak activity period in the Design Day is the Design Hour. For planning purposes, the Design Hour operations are estimated to account for 20% of Design Day operations (Design Day x 0.20).

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The operational peaks for each forecast year are summarized in **Table 3-11**.

Table 3-11: Operational Peaks

Transient Operational Peaks					
	2024	2029	2034	2039	2044
Total Transient Operations	19,218	19,999	20,812	21,658	22,538
Peak Month	2,883	3,000	3,122	3,249	3,381
Design Day	93	97	101	105	109
Busy Day	116	121	126	131	136
Design Hour	19	19	20	21	22

Note: Values may not total due to rounding.

Based on available data, the operations fleet mix is estimated to be:

- Single-Engine Pistons: 60%
- Multi-Engine Pistons: 5%
- Turboprops: 25%
- Jets: 5%
- Helicopters: 5%

Some shifts in activity are anticipated in the current planning period, consistent with national trends and local conditions.

Parking needs for transient aircraft were calculated to be 25% of Busy Day operations. This multiplier assumes that 50% of the operations at that time are departures and 50% of the remaining operations will require apron parking at one time. Using this formula, parking demand was calculated for each aircraft type. Future demand is assumed to increase in line with national trends as reflected in the 2024-2044 National Aerospace Forecasts General Aviation Hours Flown projections (0.8% annually). Aircraft parking demand is summarized in **Table 3-12**.

Table 3-12: Projected Aircraft Parking Demand

Aircraft Parking Demand					
	2024	2029	2034	2039	2044
SEP	17	18	18	19	20
MEP	1	1	2	2	2
TP	7	7	7	8	8
Jet	1	2	2	2	2
Helicopter	1	2	2	2	2
Total	27	30	31	33	34

Source: Century West

Business Aircraft Parking

The main apron has 6 parking spaces (5 on the south and one on the north) sized for transient business aircraft and/or helicopters. The apron can accommodate these aircraft while maintaining clearance from adjacent taxilane OFAs. However, the lateral clearances between the 5 parking stands on the south end of the apron do not meet ADG separation standards. In cases where additional capacity is needed, large aircraft may also utilize multiple

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adjacent small-aircraft nested parking positions. Establishing dedicated business aircraft parking meeting ADG II standards is recommended.

Helicopter Parking

Sanderson Field accommodates locally based helicopters and occasional transient helicopters in the five pull-through parking locations at the south end of the main apron. These parking spaces are able to accommodate both transient helicopters and fixed-wing business aircraft. It could be advantageous to establish at least one dedicated helicopter parking position separated from fixed-wing aircraft parking to avoid operational conflicts between the two groups.

AIRCRAFT HANGARS

The Airport currently has 15 existing hangars that provide aircraft storage and support commercial tenant activities. The existing buildings accommodate aircraft storage and tenant operations space (approximately 188,000 square feet, 120+ aircraft):

- Seven (7) – Conventional hangars
- Eight (8) – Multi-unit T-hangars (104 individual bays)

Tenant requirements will vary and the requirements for larger hangars capable of business aircraft or expanded commercial operations should be reflected in site planning. It is recommended that a 100% development reserve be incorporated into future landside planning.

The Airport currently has adequate existing built hangars to accommodate the existing fleet. However, construction of hangars will be driven by market demand and preferences of developers. Hangar development reserve areas capable of accommodating multiple aircraft types and sizes should be identified to provide varied options to developers and allow for unforeseen increased demand.

Support Facilities Requirements

Support facilities such as aircraft fueling, security/perimeter fencing, surface access and vehicle parking, and utilities may require upgrades during the planning period. Existing facilities should be maintained, replaced, and/or upgraded as necessary.

SURFACE ACCESS AND VEHICLE PARKING

The primary access to Sanderson Fields east landside area is provided from U.S. Highway 101 in connection with entrance roads leading to vehicle parking (W Sanderson Way, and W Enterprise Rd). The two existing access points appear to be adequate to accommodate aviation-related vehicle traffic at the airport. Currently, both entrances to the east side of the Airport have a center turn lane in addition to the north and south travel lanes on Highway 101. Additional access points may be constructed at West Airview Way if future demand warrants it.

The east landside area has several areas used for vehicle parking located adjacent to the road system and within individual lease areas. Some of the vehicle parking is paved, other areas are gravel surfaced. A paved vehicle parking area is located near the southwest T-hangar area and access road. The heaviest concentrations of vehicle parking appear to be located in the vicinity of commercial facilities. Current vehicle parking areas appear to be adequate to accommodate the current demand at the Airport. Additional vehicle parking should be included in future development to accommodate new demand.

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FUEL FACILITIES

The existing aviation fuel storage on the Airport includes two 12,000-gallon above-ground tanks (1 - 100LL AVGAS, 1 - Jet A) owned and operated by Skydive Kapowsin. Kapowsin also owns and operates two 650-gallon Jet A fuel trucks. The fixed tank fuel dispensing system includes a 24-hour credit card payment system for self-fueling. Based on current and forecast activity, the existing tank capacity for both the stationary 100LL and Jet A fuel, as well as the Jet A fuel trucks appear to be adequate.

UTILITIES

The existing airport utilities as discussed in the Existing Conditions chapter appear to be adequate to support future development in the east landside development area of the Airport. It is recommended the existing utilities be maintained and extended, as required to accommodate new development during the planning period.

AIRPORT FIREFIGHTING

The Airport has no on-site Airport Rescue and Fire Fighting (ARFF) facilities or assets and none are required based on current FAA regulations. The airport has three fire hydrants located adjacent to Taxiway A1. These hydrants are located in the object free areas and should be relocated to positions where they do not impact FAA design surfaces.

PERIMETER FENCING/GATES

The Airport is full fenced with a 6-foot chain link around the perimeter of the airfield and additional sections of fencing located within the landside development areas. There are automated gates located adjacent to the southeast T-hangars and the northernmost hangars on the main apron. Vehicle and pedestrian swing gates are located adjacent to hangars and other development areas of the airfield.

The Airports fencing and gates are free of any ROFA and RSA. However, some perimeter fencing is damaged and aging around the old fairgrounds and is in need of repair.

LAND USE

On-Airport Land Use

The entirety of Sanderson Field is located in the City of Shelton's UGA, however portions of the Part 77 Airspace surfaces fall outside of the Shelton city limits and are under the jurisdiction of Mason County. The existing zoning accommodates all airport related development and provides adequate protection from potential incompatible land uses.

Off-Airport Land Use

As noted in Chapter 2, large portions of the Part 77 surfaces established for the Airport extend into unincorporated Mason County and over the City of Shelton. The current City and County airport overlay zoning should be updated for consistency with the airport master plan and the updated ALP and Part 77 airspace plan. See Chapter 2 for information on existing land use and zoning. A review of off-airport land use provided in the Existing Conditions Chapter did not identify any known land use compatibility issues. A review of existing avigation easements will be conducted to identify any existing or potential gaps in coverage/ protection, in conjunction with the updates to the Airport Layout Plan and Exhibit "A" Property Plan drawing.

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Summary

The significant investment in Sanderson Field runway-taxiway system and other airfield facilities, combined with significant tenant facility investment made since the last master plan will allow the Airport to focus on other facility needs early in the current 20-year planning period. A summary of facility needs is provided in **Table 3-13**.

Modest growth and no change in critical aircraft are anticipated for the Airport. This results in moderate airside and landside facility demands beyond existing capabilities. The existing airfield facilities can accommodate existing and reasonable future demand with targeted facility improvements. For the most part, the need for new or expanded facilities, such as aircraft hangars, will be market driven. The non-conforming items noted within this chapter can be addressed systematically during the current planning period to improve overall safety for all users.

Preliminary airport development alternatives will be presented in Chapter 4 to evaluate different options capable of meeting forecast demand, in addition to identifying any development constraints that exist. The review of the preliminary alternatives will allow the Port of Shelton to define and refine the preferred alternative for the master plan and develop a viable implementation strategy.

Table 3-13: Facility Requirements Summary

Facility	Facility Requirements
Runway	• Maintain existing length and width • Construct blast pads on each runway end • Anticipate MagVar change to 6/24 • Evaluate approach procedure capabilities in Development Alternatives Analysis • Ongoing pavement maintenance • Maintain existing runway extension reserve
Taxiways	• Maintain existing taxiway widths • Correct acute angle connector taxiways (A4 and A5) • Mitigate direct runway access at Taxiway A1 • Maintain pavements according to WSDOT pavement maintenance program
Taxilanes	• Ensure TLOFAs are clear of object penetrations and appropriate wingtip lateral clearances are met • Maintain pavements according to WSDOT pavement maintenance program
Navigational Aids and Lighting	• Maintain existing NAVAIDs and update as needed to coincide with changes to runway geometry and/or instrument approach procedures
Weather	• Maintain existing ASOS through end of useful life; replace when necessary
Hangars	• Maintain existing hangar capacity to accommodate current based fleet. Existing hangars approaching end of useful life should be replaced • Identify hangar development and reserves areas to accommodate future market-driven hangar construction • Future hangars should be spaced to allow for TOFA/TLOFA lateral clearances
Apron	• Maintain existing apron pavements according to WSDOT pavement maintenance program • Maintain existing aircraft parking capacity to accommodate existing fleet • Future parking configurations should accommodate a total of 34 transient aircraft including 2 helicopters, 2 jets, and up to 8 turboprops of various sizes • Add two dedicated helicopter parking positions to accommodate anticipated demand • Ensure TOFA/TLOFAs are clear of object penetrations and appropriate wingtip lateral clearances are met
Aircraft Fueling	• Maintain existing fuel system • Periodically review flowage fees to ensure the Airport captures available revenue • Consider electric aircraft charging facilities
Surface Access/ Parking	• Maintain existing parking capacity • Add additional capacity as needed for future development projects
Security	• Maintain existing security fence and gates • Extend security fencing and gates to future development areas
Utilities	• Upgrade and/or extend utilities as needed to serve future development

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