CHAPTER 2: RUNWAYS & TAXIWAYS

Introduction

This Chapter of the Airport Master Plan is focused on the Runway and Taxiway system at the airport which is commonly referred to as the airfield where aircraft takeoff, land and maneuver on the ground. Please note that **Chapter 3: Terminal Area and Support Facilities** will look at the apron, hangars and other facilities supporting the airport. These two chapters will address existing and future facility needs at Sidney-Richland Regional Airport (SDY).

As the chapter analyzes various components of the runway and taxiways at SDY, it will review current conditions and any deficiencies that do not meet FAA design standards. It will consider the future critical design aircraft and provide facility requirements to accommodate these aircraft through the planning period. The chapter will further present the alternatives that were considered to meet future needs and the preferred airfield alternative that was chosen. Included in this chapter will be the following elements:

- Critical Design Aircraft
- Meteorological Information
- Runway 11/29 and 01/19
- Taxiways
- Airside Alternatives
- Preferred Alternative

Critical Design Aircraft

The critical design aircraft types must be identified to determine the appropriate airport design standards to incorporate into airport planning. The existing and future critical design aircraft characteristics at the Sidney-Richland Regional Airport are summarized in the following sections.

The critical design aircraft types must be identified to determine the appropriate airport design standards to incorporate into airport planning. As discussed in the previous chapter, the current critical aircraft for the Sidney-Richland Regional Airport is the A/B-II category with a taxiway design group (TDG) of 2-A. This is based on the verified operations data derived from the FAA Traffic Flow Management System (TFMS). This information is bolstered by the enplanement data from the EAS commercial service operator, Cape Air, which operates out of SDY. Verified operations were outlined in **Table 1-17** of the previous chapter which detail the types and aircraft classifications of the various operators in and out of SDY, which overwhelmingly shows the majority of operators within the A/B-I and A/B-II category. Of specific interest to SDY, is the EAS airline operator, Cape Air, which operates a fleet of Tecnam P-2012, which fall within the B-I category. Other notable operators include Sidney Health Center, which operate Outreach efforts conducted as part of the Based on this data, it is recommended that the existing/future critical design aircraft remain an **ARC A/B-II, TDG 2-A**. The runway and taxiway pavements at the Sidney-Richland Regional Airport are adequate to accommodate the critical design aircraft throughout the planning period. **Table 2-1** summarizes the characteristics of the critical design aircraft for the airport.

Table 2-1 – Existing Airfield Design Aircraft Summary

Design Characteristics	Runway 1/19	Runway 11/29
Aircraft Make/Model	Beechcraft King Air B-200	Beechcraft King Air B-200
Airplane Approach Category	B	B
Airplane Design Group	II	II
Taxiway Design Group	2A	2A
Wingspan	57’ 11” (w/ winglets)	57’ 11” (w/ winglets)
Length	43’ 9”	43’ 9”
Height	15’ 0”	15’ 0”
Cockpit to Main Gear	8’ 4”	8’ 4”
Main Gear Width	18’ 7”	18’ 7”
Approach Speed (1.3 x Stall)	97 knots	97 knots
Maximum Takeoff Weight	12,500 pounds	12,500 pounds
Landing Gear Configuration	Dual Wheel	Dual Wheel

Source: Beechcraft, Cessna, Transport Canada, KLJ Analysis

Meteorological Factors

Meteorological conditions that affect the facility requirements of an airport include but are not limited to wind direction, wind speed, cloud ceiling, visibility, and temperature. Hourly metrological data was reviewed data from the ROX Automated Weather Observation System (AWOS) facility available from the National Climatic Data Center (NCDC). Periodic “special” weather observations within each hour were removed. This method provides considers the true average weather trends at an airport without skewing conditions toward IFR where multiple observations may be taken each hour due to changing conditions.

Wind coverage and weather conditions are evaluated based on the two different flight rules, Visual Flight Rules (VFR) and IFR. Visual Meteorological Conditions (VMC) are encountered when the visibility is 3 nautical miles or greater, and the cloud ceiling height is 1,000 feet or greater. Conditions less than these weather minimums are considered Instrument Meteorological Conditions (IMC) requiring all flights to be operated under IFR.

METEOROLOGICAL FACILITIES

Metrological facilities provide users with up-to-date weather information at the airport to aid in pilot decision making for safe flight operations.

Wind Indicator(s)

Wind direction indicators provide an immediate visual indication of the wind direction and velocity. A segmented circle provides a visual indication of the wind direction and velocity together with runway alignment and/or traffic pattern information.

The Sidney-Richland Airport has two wind indicators with segmented circles. One is located to the east of the Runway 01 end of the airfield, with the second one being located north of Runway 11/29 at the midfield point. Having multiple wind indicators positioned near each runway end provides pilots with a more accurate look at the wind conditions across the airfield, allowing them to make informed decisions that improve safety during takeoff and landing.

Airport Beacon

The airport beacon serves as the airport identification light so approaching pilots can identify the airport location from sunset to sunrise. The beacon consists of alternating white and green lights. The airport beacon's location at SDY is near the terminal area, north of both Runway 01/19 and 11/29. The beacon adequately serves the airport without interference or known obstructions to the runways' line of sight. The minimum light beam angle is 2 degrees.

Weather Reporting

There are two types of on-site weather reporting systems available to an airport. The Automated Surface Observing System (ASOS) program was a joint effort between the Federal Aviation Administration and the National Weather Service (NWS) to deploy a network of high-grade weather monitoring stations across the United States. ASOS serves as a primary climatological observing network in the United States and have equipment that provides weather observations every minute. A second-tier Automated Weather Observation System (AWOS) has varying sets of equipment packages to provide local weather observations. These systems operate 24/7 and ensure weather data is available which can be critical for landing, takeoff and en-route decision making. Generally, the data provided includes wind speed and direction, visibility, cloud ceiling, temperature and dew point and the altimeter setting. SDY has an AWOS-III which has been operational since 2015. In order to hear the weather broadcast, users may tune into the radio frequency of 119.275 or call the phone line at 406-482-7323. The location of the AWOS on the airfield can be seen in **Figure 2-1**.

Temperature

Average high temperature data for the hottest month was reviewed from climate data available from the National Climatic Data Center (NCDC) for SDY. Using locally available data, the average high temperature in the hottest month from 1991-2020 was 86.6 degrees Fahrenheit in the month of July. Temperature affects recommended runway lengths and aircraft performance, with higher temperatures contributing to lower air density, generally requiring increased lift and greater acceleration speeds from aircraft during takeoffs. Detailed weather information for the airport can be found in **Table 1-4** of the previous chapter.

METEOROLOGICAL DATA

Local weather conditions are a significant factor in the design and development of airport facilities since they affect aircraft performance. Temperature affects runway length, wind direction and speed affect runway orientation, and visibility and cloud ceiling conditions determine the need for runway navigational aids and lighting. Crosswind or tailwind conditions can be hazardous to aircraft operations if they exceed the operational capabilities of the airplane or flight crew. The smallest aircraft are typically the most affected operationally by crosswinds.

A runway's wind coverage is determined by an aircraft's ability to operate with a "direct" crosswind, which is defined as 90 degrees to the direction of travel. For planning purposes, FAA has defined the maximum direct crosswind for small aircraft as 12 miles per hour (10.5 knots). For increasingly larger aircraft, a 15-mile per hour (13 knot) direct crosswind is used up through 23-mile per hour (20 knots) for the largest aircraft. Aircraft can operate safely in progressively higher wind speeds as the crosswind angle decreases and the wind direction aligns more closely with the opposing the direction of flight. In addition, some aircraft are designed to safely operate with higher crosswind components. See **Table 2-2** for a representation of the crosswind component and the corresponding Aircraft Reference Code. Ideally, an aircraft will take off and land directly into the wind or with a light crosswind. The FAA

recommends that primary runways accommodate at least 95 percent of local wind conditions; when this level of coverage is not provided, the FAA recommends development of a secondary (crosswind) runway.

At SDY, prevailing winds under all weather conditions are from the northwest, aligning with the airports crosswind runway. Winds from the south are also prevalent and are generally aligned with the airport's primary runway configuration.

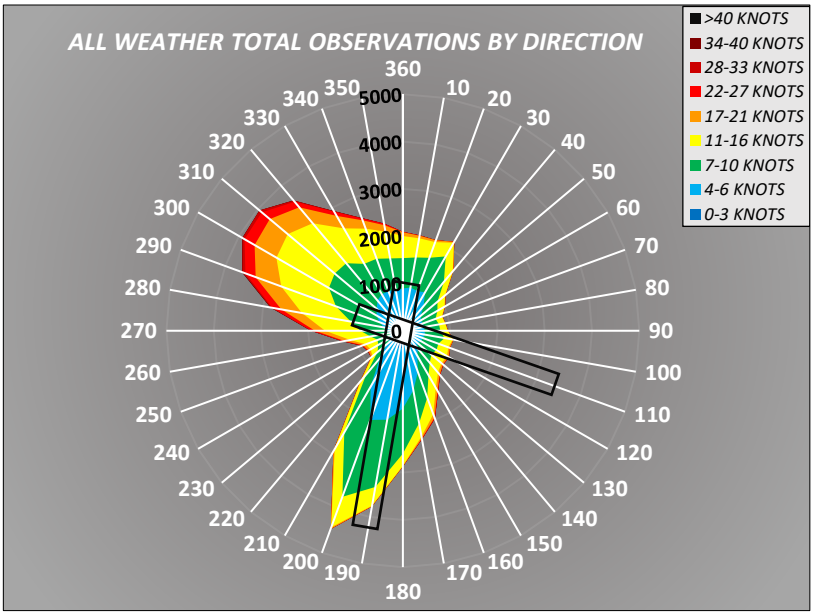


Table 2-2 – FAA Wind Coverage Standards

AAC-ADG	Maximum Crosswind Component
A-I & B-I	10.5 knots
A-II & B-II	13.0 knots

Source: FAA AC 150/5300-13B

Table 2-3 provides the calculated all-weather wind coverage for the airport.

Table 2-3 – All-Weather Wind Coverage

Runway	Crosswind Component (Wind Speed)			
	10.5 knots	13.0 knots	16.0 knots	20.0 knots
Runway 01/19	83.27%	90.28%	94.78%	-
Runway 11/29	92.87%	97.52%	99.32%	-
Combined*	**98.51%**	**99.59%**	**99.93%**	**-**

Source: SDY AWOS (2015-2024, Hourly) From National Climatic Data Center (85,824 Total Observations)
**Combined assumes up to maximum design aircraft crosswind component for each runway*

Pilots can fly with visual reference to the ground and other aircraft during most weather conditions. This is known as Visual Meteorological Conditions (VMC). Pilots are required to reference flight instruments and be on a FAA Instrument Flight Riles (IFR) flight plan when the cloud ceiling is less than 1,000 feet above the ground or the flight visibility is less than 3 statute miles. These conditions are known as Instrument Meteorological Conditions (IMC) and require a pilot to be instrument rated.

Wind coverage during VMC is evaluated to determine the ideal alignment for runways used during visual operations, such as VFR flight training. As is shown in **Table 2-4**, the wind coverage for Runway 01/19 alone is below 95 percent for all crosswind components, but when combined with Runway 11/29, greater than 95 percent coverage is achieved under these conditions.

Table 2-4 – VMC Wind Coverage

Runway	Crosswind Component (Wind Speed)			
	10.5 knots	13.0 knots	16.0 knots	20.0 knots
Runway 01/19	83.07%	90.22%	94.83%	-
Runway 11/29	93.16%	97.65%	99.34%	-
Combined*	**98.56%**	**99.60%**	**99.39%**	**-**

Source: SDY AWOS (2015-2024, Hourly) From National Climatic Data Center (81,795 Total Observations)
**Combined assumes up to maximum design aircraft crosswind component for each runway*

Wind coverage during IMC is evaluated to determine the ideal alignment for instrument approach to an airport's runway. As shown in **Table 2-5,** the existing wind coverage at SDY is less than 95 percent at all crosswind components for the primary runway under IFR conditions. Additionally, the crosswind runway coverage at 10.0 and 13.0 knots is less than the recommended coverage. In all of these instances, it is only through combined coverage of both Runway 01/19 and 11/29 that the threshold for wind coverage is achieved.

Table 2-5 – IMC Wind Coverage

Runway	Crosswind Component (Wind Speed)		
	10.5 knots	13.0 knots	16.0 knots
Runway 01/19	87.34%	91.64%	93.77%
Runway 11/29	86.99%	94.99%	98.76%
Combined	97.42%	99.33%	99.85%

Source: SDY AWOS (2015-2024, Hourly) From National Climatic Data Center (4,029 Total Observations)

Based on true hourly weather data summarized in **Table 2-6**, the airport experiences VMC weather conditions 95.31 percent of the time. When considering the current instrument approach to Runway 01/19, the airport experiences weather conditions below this criterion 1.1 days per year, or 0.31 percent of the time, where the airport is not usable. Overall, under the existing approaches, SDY is usable 99.69 percent of the time, resulting in approximately 364 total days of availability.

Table 2-6 – Meteorological Analysis

Weather Condition	Percentage	Days per Year	Hours per Year
VMC	95.31%	347.9	8,349
Usable IMC	4.38%	16.0	384
Usability	99.69%	363.9	8,732
Below Weather Minimums*	0.31%	1.1	28
Total	***100.0%***	**365.0**	**8,760**

Source: SDY AWOS (2015-2024, Hourly) From National Climatic Data Center

Instrument Approach Conditions

Instrument approach procedures to a runway end are used by landing aircraft to navigate to the airport during instrument conditions when the cloud ceiling is less than 1,000 feet and/or visibility is less than 3 miles. Establishing approaches with the lowest possible weather minimums allow the airport to maximize its operational utility. Each approach type requires differing infrastructure and navigational aids. Types of approach procedures include non-precision approach (NPA), approach with vertical guidance (APV) and precision instrument approach (PA). See **Appendix B – Commercial Service Airports**

101 for details on the requirements of different levels of instrument approach procedures. **Table 2-7** is a list of the major approach categories and associated capabilities.

Table 2-7 – Instrument Approach Procedure Visibility Minimums

Typical Categories of Approaches					
Approach	**Category**	**Vertical Guidance**	**Lowest Ceiling**	**Lowest Visibility**	**Ground Based Aids**
Visual			1,000’	3 miles	-
RNAV LNAV	NPA	No	250’	¾ mile	MIRL, VGSI*
RNAV LNAV/VNAV	APV	Yes	250’	¾ mile	MIRL, VGSI*
RNAV LPV**	APV	Yes	250’	¾ mile	MIRL, VGSI*
VOR	NPA	No	250’	¾ mile	VOR, MIRL, VGSI*
ILS CAT I	PA	Yes	200’	½ mile	GS, LOC, MIRL, MALSR
ILS CAT II	PA	Yes	100’	¼ mile	GS, LOC, HIRL, ALSF-1 or ALSF-2, TDZ/CL
ILS CAT III a	PA	Yes	0’	RVR 700’	GS, LOC, RVR, HIRL, ALSF, TDZ/CL
ILS CAT III b	PA	Yes	0’	RVR 600’	GS, LOC, RVR, HIRL, ALSF, TDZ/CL
ILS CAT III c	PA	Yes	0’	0’	GS, LOC, RVR, HIRL, ALSF, TDZ/CL

*Source: KLJ Analysis; * Recommended; ** Often the best RNAV minimums but requires aircraft equipped with WAAS receiver*

Instrument approach weather minimums are a result of the approach type, airport infrastructure, and any prevailing airspace obstructions. This section discusses the existing instrument approaches and any possible procedure upgrades/options that can be explored for SDY. Coordination with FAA Flight Procedures Office is recommended to review the feasibility of implementing any new approach procedure. Two IAPs (see **Table 2-8**) are available for Runways 01 and 19 with satellite-based NAVAIDS.

Table 2-8 – Instrument Approach Procedures

Approach Procedure	Approach Type	Lowest Cloud Ceiling Minimum (HAT)		Lowest Visibility Minimum (n.m.)
RNAV (GPS) RWY 01	Non-Precision Approach with Vertical Guidance	LPV	253 feet	7/8 mile
		LNAV/VNAV	434 feet	
		LNAV MDA	475 feet	
		Circling	CAT A- 595 feet CAT B- 675 feet CAT C- 715 feet CAT D- 855 feet	
RNAV (GPS) RWY 19	Non-Precision Approach with Vertical Guidance	LPV	253 feet	1-mile
		LNAV/VNAV:	562 feet	
		LNAV MDA:	519 feet	
		Circling:	CAT A- 555 feet CAT B- 635feet CAT C- 715 feet CAT D- 855 feet	

Source: AirNav
Note: HAT = Height Above Touchdown, n.m. = nautical miles (reported), VG = Vertical Guidance, NVG = Non-Vertical Guidance, ILS = Instrument Landing System, LPV = Localizer Performance with Vertical Guidance, LNAV = Lateral Navigation, VNAV = Vertical Navigation, VOR = Very High Frequency Omni-Directional Range, DME = Distance Measuring Equipment

Runway 11 and 29 support circling approaches. Input from airport operators indicated that lower approaches to Runway 01/19 and a dedicated approach to Runway 11/29 would be desirable in the future. **Table 2-9** outlines the utility of the airport under alternative instrument approach procedures.

Table 2-9 – Future Instrument Approach Analysis

Approach	Usability	Usable Days Per Year	Usable Hours Per year
Runway 1/19 Approach Analysis			
Current	99.12%	361.8	8,683
¾ mile, 250' ceiling	99.25%	362.3	8,695
½ mile, 200' ceiling	99.69%	363.9	8,732
Runway 11/29 Approach Analysis			
Current	95.31%	347.9	8,349
1-mile, 400' ceiling	98.87%	360.9	8,661
Combined Runway Approach Analysis			
RW 1/19: Current RW 11/29 Future: 1-mile, 400' ceiling	50.06% 49.94%	357.7	8,574

Figure 2-1 – Airfield Facilities Map



Runways

Runways

SDY has two runways. Runway 01/19 is the airport's primary runway and currently serves all of SDY's commercial service traffic with an RNAV instrument approach to both ends, as was outlined **Table 2-8**. Runway 11/29 operates as the crosswind runway, available only for flights under visual flight rule (VFR) conditions. Both Runway 01/19 and 11/29 are maintained by the airport to FAR Part 139 standards and are described in greater detail below.

Runway 01/19: Runway 01/19 is the airports primary runway, measuring 5,705 feet long and 100 feet wide. This runway is currently designed to accommodate instrument approaches. The runway has a pavement strength capacity of 46,000 lbs. single-wheel gear (SWG) and 62,000 lbs. double wheel gear (DWG), making it available to accommodate large aircraft. In 2025 the runway underwent rehabilitation. This runway is equipped with Medium Intensity Runway Lighting (MIRL), Runway End Identifier Lighters (REIL) as well as Precision Approach Path Indicators (PAPI) at both ends and has non-precision instrument pavement markings.

Runway 11/29: This crosswind runway is 4,024 feet long and 100 feet wide and was constructed in the early 1950's. This runway is visual and not currently designed to accommodate instrument approaches. With a pavement strength capacity of 54,000 lbs. single-wheel gear (SWG) and 70,000 lbs. double wheel gear (DWG). The runway's pavement is in good condition, and a rehabilitation took place in 2021. This runway is also equipped with MIRL's, REILS and PAPIS at both ends.

Table 2-10 – Runway Facility Summary

Component	Runway 01/19	Runway 11/29
Runway Length (feet)	5,705	4,024
Runway Width (feet)	100	100
Runway Surface Material	Asphalt	Asphalt
Runway Surface Treatment	Grooved	Grooved
Pavement Strength	46,000 lbs SWG 62,000 lbs DWG	54,000 lbs SWG 70,000 lbs DWG
Runway Design Code	B-II-4000	B-II-VIS
Runway Safety Area (Width)	150'	150'
Object Free Area (Width)	500'	500'
Object Free Zone	400'	400'
Runway Protection Zone	500' x 700' x 1,000'	500' x 700' x 1,000'

Source: FAA Advisory Circular150/5300-13B, Airport Design

RUNWAY DESIGN CODES

The Runway Design Code (RDC) is a coding system which conveys the design standards for the specific runway based on design aircraft and instrument approach minimums. The RDC represents the most demanding aircraft which utilizes the runway the most often and is based on approach speed, aircraft wingspan and tail height as well as the visibility minimums of the runway. The Runway Design Code determines the runway width and overall design standards applied to the airfield geometry. Further information about Runway Design Codes can be found in **Appendix B: Commercial Service Airports 101**.

Runway 01/19: The existing RDC is A/B-II-4000 for both runway ends.

Runway 11/29: The existing RDC is A/B-II VIS for both runway ends.

Based on the operations analysis from Chapter One, it is not anticipated that either runway will need to accommodate larger or heavier aircraft that would necessitate an upgrade to the Runway Design Code throughout the planning period. It is possible that sometime in the future, the visibility minimums for either runway may be lowered, resulting in a change to that component, but this would not impact the overall aircraft type of the RDC.

RUNWAY REFERENCE CODES

Runway Reference Codes (RRCs) indicate current operational capabilities where no special operations procedures are necessary, and without consideration of the actual runway length. The existing operational capabilities of the runway are identified based on a taxiway separation distance. At SDY, the designated runway to parallel taxiway separation distance is 240 feet for runways of the B-II design code, however the actual distance exceeds standards, measuring at 400 feet for the Runway 01/19 to parallel taxiway and 300 feet for the Runway 11/29 to parallel taxiway. **The runway and taxiway infrastructure does not limit existing, future, or ultimate RDC classifications at SDY.**

DESIGN STANDARDS

Basic Safety Standards

One primary purpose of this master plan is to review and achieve compliance with all FAA safety and design standards. The design standards vary based on the RDC and RRC as established by the design aircraft. Some of the safety standards include:

- Runway Safety Area (RSA)
- Runway Object Free Area (ROFA)
- Runway Obstacle Free Zone (ROFZ)

Other basic design standards include runway width, runway surface gradient, runway shoulder width, blast pad, and required separation distances to markings, objects, and other infrastructure for safety. Critical areas associated with navigational aids as well as airspace requirements are described further in this chapter.

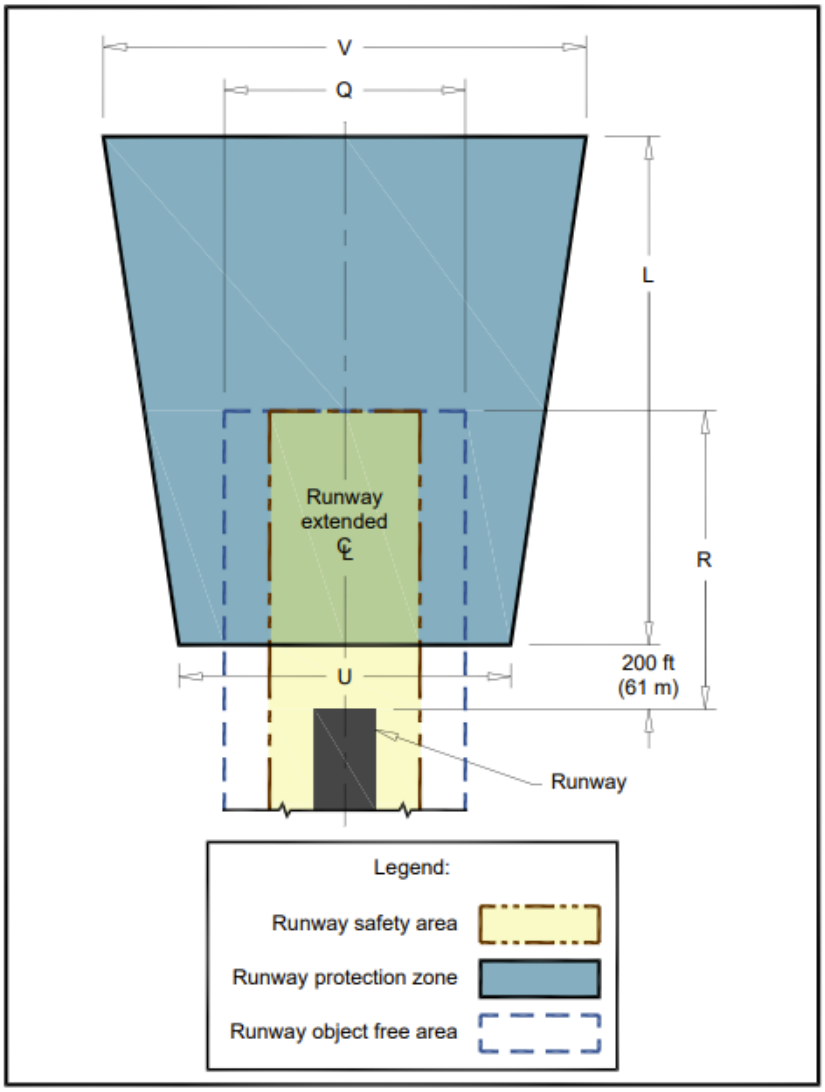
The existing RSA, ROFA and ROFZ standards for all runways meet existing airport design standards. The basic safety standards dimensional requirements for all runways at SDY are summarized in Table 2-10Improvements will need to be made to meet future standards. The basic safety standards dimensional requirements for all runways are summarized in **Table 2-11** below. **Figure 2-2** visually depicts these runway protection areas as they relate to the orientation of the runway.

Table 2-11– Runway Design Standards

	Runway 01/19	Runway 11/29
Runway Safety Area		
Width	150feet	150 feet
Length beyond departure end	300 feet	300 feet
Length prior to threshold	300 feet	300 feet
Runway Object Free Area		
Width	500 feet	500 feet
Length beyond runway end	300 feet	300 feet
Length prior to threshold	300 feet	300 feet
Runway Obstacle Free Zone		
Length Beyond Runway End	200 feet	200 feet
Width	400 Feet	400 Feet

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

Figure 2-2– Runway Protection Areas



Source: FAA Advisory Circular 150-5300-13B, Airport Design, Figure 3-26

Runway Protection Zone

The Runway Protection Zone (RPZ) is a trapezoidal land use area at ground level prior to the landing threshold or beyond the runway end. The RPZ's function is to enhance the protection of people and property on the ground. The RPZ size varies based on the runway's RDC. The RPZ is further broken down to Approach RPZ and Departure RPZ.

Airport owners should, at a minimum, maintain the RPZ clear of all facilities supporting incompatible activities, such as residential structures. It is desirable to clear all above-ground objects from the RPZ. Protection of the RPZ is achieved through airport control over RPZs including fee title ownership or clear zone easement.

At SDY, there appears to be several incompatible objects within the runway RPZ's. This includes an existing road on the 19 end (5th St SW) as well as groupings of several trees. Additionally, much of the land which encompasses the RPZ on the 19 end is owned by the Sidney Country Club and golf course. Conversely, the 01 end has an existing roadway within the RPZ (County Road 124) and a private residence just beyond the current critical area boundary. On the 11 end, there are two existing roadways within the RPZ (5th St SW and County Road 124), The County Road is considered an interior airport service road and neither this roadway nor the 5th street road serve a large volume of traffic. Within the RPZ on the 29 end is an irrigation canal as well as a ditch service road and agricultural fence. While generally, RPZ's are expected to remain free and clear of public roads, railroads, parking areas, etc. and airport sponsors are expected to work towards relocation, removal or mitigation of such obstacles in order to minimize the risk to people on the ground in the case of an aircraft incursion, that is not always feasible due to land ownership, cost restrictions, etc.

At GRN, the existing roadways likely do not pose a significant risk and it is not recommended to conduct further analysis for relocation or removal, however it is recommended that appropriate signage and possible access gates be put in place to mark roads as either airport maintenance roadways or on non-airport roads warn of aircraft in the vicinity. Land use surrounding the airport is widely open space, agricultural use and does not encourage the congregation of people and as such is generally acceptable, with the exception of the residence on the Runway 01 end.

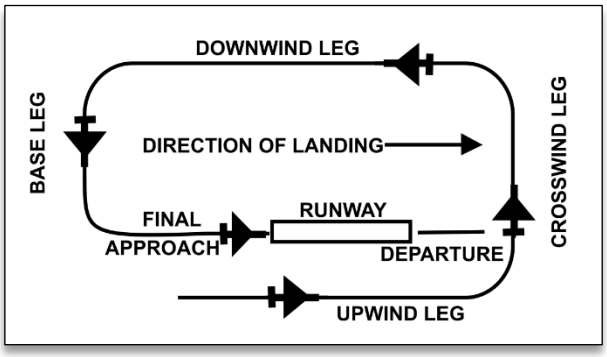
It is recommended that SDY should consider acquiring land to control all existing, future, and ultimate RPZs in fee simple or land use easement.

APPROACH/DEPARTURE PROCEDURES

Aircraft operate under either Visual Flight Rules (VFR) or Instrument Flight Rules (IFR) depending on weather conditions and/or operational standards.

Visual Approach/Departure Procedures

Under VFR, pilots are advised to utilize a standard rectangular traffic pattern around the runway to approach or depart an airport. Standard traffic pattern legs include upwind, crosswind, downwind, base, and final. Departures are typically straight-out from a departing runway, a 90-degree crosswind, or 180 degree downwind. Arrivals typically enter a traffic pattern 45



Standard VFR Airport Traffic Pattern (Source: FAA)

degrees to a downwind leg for landing. All traffic at SDY follows a standards left traffic pattern.

IFR/Obstacle Departure Procedures

Special procedures are published at airports to provide aircraft with adequate obstacle clearance. Examples include increased aircraft climb rates or recommended turns. The information below describes the current departure procedures for SDY.

SIDNEY, MT
SIDNEY-RICHLAND RGNL (SDY)
TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES
AMDT 6 17AUG17 (17229) (FAA)
TAKEOFF MINIMUMS:
Rwy 29, 300-2¼ or std. w/min. climb of 330' per NM to 2300.
DEPARTURE PROCEDURE:
Rwy 11, climb heading 108° to 2700 before turning right.
Rwy 29, climb heading 288° to 2800 before turning left.
TAKEOFF OBSTACLE NOTES:
Rwy 1, Rwy light, NAVAID beginning 9' from DER, 39' right of centerline, up to 1983' MSL.
Tree 86' from DER, 358' left of centerline, 2004' MSL.
Tree 145' from DER, 376' right of centerline, 2039' MSL.
Tree 171' from DER, 538' left of centerline, 2019' MSL.
Trees beginning 188' from DER, 90' right of centerline, up to 2040' MSL.
Tree 193' from DER, 470' left of centerline, 2026' MSL.
Tree, vehicle on road beginning 304' from DER, 99' left of centerline, up to 2037' MSL.
Tree 640' from DER, 585' left of centerline, 2038' MSL.
Tree, ground beginning 763' from DER, 123' left of centerline, up to 2049' MSL.
Trees beginning 1094' from DER, 137' right of centerline, up to 2041' MSL.
Trees beginning 1218' from DER, 269' right of centerline, up to 2044' MSL.
CON'T

SIDNEY, MT (CON'T)
SIDNEY-RICHLAND RGNL (SDY) (CON'T)
Rwy 1 (CON'T), trees beginning 1313' from DER, 270' right of centerline, up to 2052' MSL.
Trees beginning 1341' from DER, 1' right of centerline, up to 2053' MSL.
Trees beginning 1410' from DER, 10' left of centerline, up to 2051' MSL.
Trees beginning 1708' from DER, 11' left of centerline, up to 2080' MSL.
Rwy 11, terrain+vegetation, vehicle on road, tree beginning 50' from DER, 38' right of centerline, up to 40' AGL/1996' M
Tree 86' from DER, 310' left of centerline, 1977' MSL.
Terrain+vegetation, vehicle on road beginning 94' from DER, 19' left of centerline, up to 40' AGL/1996' MSL.
Tree terrain+vegetation beginning 809' from DER, 123' right of centerline, up to 2020' MSL.
Trees beginning 2102' from DER, 161' right of centerline, up to 2035' MSL.
Rwy 19, NAVAID 18' from DER, 125' right of centerline, 2' AGL/1984' MSL.
Vehicle on road 19' from DER, 336' right of centerline, 1997' MSL.
Rwy 29, NAVAID beginning 7' from DER, 41' left of centerline, up to 1983' MSL.
Fence, NAVAID beginning 26' from DER, 124' right of centerline, up to 7' AGL/1984' MSL.
Trees beginning 55' from DER, 195' right of centerline, up to 1997' MSL.
Tree, fence, bush beginning 146' from DER, 178' right of centerline, up to 2012' MSL.
Ground beginning 155' from DER, 400' left of centerline, up to 1989' MSL.
Tree, vehicle on road beginning 193' from DER, 9' right of centerline, up to 2023' MSL.
Trees beginning 400' from DER, 28' left of centerline, up to 1998' MSL.
Tree, vehicle on road beginning 516' from DER, 6' left of centerline, up to 2000' MSL.
Trees beginning 590' from DER, 8' right of centerline, up to 2026' MSL.
Tree 611' from DER, 91' left of centerline, 2001' MSL.
Trees beginning 651' from DER, 36' left of centerline, up to 2006' MSL.
Trees beginning 677' from DER, 2' right of centerline, up to 2039' MSL.
Trees beginning 891' from DER, 60' left of centerline, up to 2007' MSL.
Ground, tree beginning 942' from DER, 0' of centerline, up to 2052' MSL.
Tree 953' from DER, 76' left of centerline, 2008' MSL.
Tree 999' from DER, 120' left of centerline, 2010' MSL.
Trees beginning 1076' from DER, 122' left of centerline, up to 2012' MSL.
Pole, tree beginning 1166' from DER, 12' left of centerline, up to 30' AGL/2021' MSL.
Ground, tree beginning 1184' from DER, 4' right of centerline, up to 2054' MSL.
Ground 1389' from DER, 847' right of centerline, 2067' MSL.
Ground 1396' from DER, 814' left of centerline, 2023' MSL.
Oil pump 1438' from DER, 211' left of centerline, 36' AGL/2027' MSL.
Pole, tree beginning 1517' from DER, 710' right of centerline, up to 34' AGL/2104' MSL.
Ground beginning 1540' from DER, 603' left of centerline, up to 2051' MSL.
Pole, tree beginning 1786' from DER, 720' left of centerline, up to 19' AGL/2104' MSL.
Tree, ground, pole, catenary, fence beginning 1865' from DER, 39' right of centerline, up to 2120' MSL.
Ground beginning 1919' from DER, 858' left of centerline, up to 2107' MSL.
Ground, tree beginning 2536' from DER, 18' left of centerline, up to 2108' MSL.
Transmission tower, ground, tree beginning 3107' from DER, 1037' left of centerline, up to 43' AGL/2132' MSL.
Pole, ground, tree beginning 4435' from DER, 494' right of centerline, up to 30' AGL/2133' MSL.
Catenary, ground beginning 5121' from DER, 1729' right of centerline, up to 33' AGL/2159' MSL.
Pole, ground beginning 5227' from DER, 1469' right of centerline, up to 55' AGL/2180' MSL.
Pole, transmission tower, ground, vehicle on road, fence beginning 5280' from DER, 1205' right of centerline, up to 60' AGL/2186' MSL.
Ground beginning 5280' from DER, 1255' left of centerline, up to 2135' MSL.
Ground beginning 5544' from DER, 1382' left of centerline, up to 2142' MSL.
Ground beginning 1.1 NM from DER, 2019' left of centerline, up to 2158' MSL.
Tree 1.1 NM from DER, 1644' left of centerline, 2163' MSL.
Ground, tree beginning 1.1 NM from DER, 1976' left of centerline, up to 2162' MSL.
Tree 1.2 NM from DER, 1747' left of centerline, 2166' MSL.
Ground 1.2 NM from DER, 2280' left of centerline, 2171' MSL.
Ground 1.3 NM from DER, 2458' left of centerline, 2184' MSL.
Ground beginning 1.3 NM from DER, 2355' left of centerline, up to 2197' MSL.
Ground, fence beginning 1.4 NM from DER, 2126' left of centerline, up to 2204' MSL.
Ground beginning 1.4 NM from DER, 2625' left of centerline, up to 2206' MSL.
Ground 1.5 NM from DER, 2775' left of centerline, 2212' MSL.
Ground 1.5 NM from DER, 2909' left of centerline, 2216' MSL.
Fence 1.8 NM from DER, 3160' left of centerline, 3' AGL/2263' MSL.
Ground 1.8 NM from DER, 3123' left of centerline, 2261' MSL.

RUNWAY APPROACH/DEPARTURE SURFACES

FAA identifies sloping approach surfaces that must be cleared at an absolute minimum for safety for landing aircraft. These surfaces are identified in paragraph 3.6 of FAA AC 150/5300-13B.

The departure surface applies to runways with instrument departures available. It begins at the end of the takeoff distance available and extends upward and outward at a 40:1 slope. No new penetrations are allowed unless an FAA study has been completed and a determination of no hazard has been issued.

The applicable approach/departure surface standards at SDY are identified in **Table 2-12.**

Table 2-12 – Approach/Departure Surface Requirements

Runway End(s)	Par. 3.6 Surface	Description	Slope
Existing			
01,19 and 11,29	4	Approach end of runways that support IFR circling procedures and procedures providing only lateral guidance	20:1
Future			
01	5	Approach end of runways providing ILS, MMLS, PAR and localizer type directional aid with glidepath, LPV, LNAV/VNAV, RNP or GLS	20:1
19	5	Approach end of runways providing ILS, MMLS, PAR and localizer type directional aid with glidepath, LPV, LNAV/VNAV, RNP or GLS	20:1
11	4	Approach end of runways that support IFR circling procedures and procedures providing only lateral guidance	20:1
29	5	Approach end of runways that support IFR circling procedures and procedures providing only lateral guidance	20:1

Source: FAA AC 150/5300-13B, KLJ Analysis

RUNWAY DESIGNATION

Runway designation is determined by the magnetic bearing (azimuth) of the runway centerline which is relative to the location of the magnetic north pole. The runway designator number is the whole number nearest the one-tenth of the magnetic azimuth along the runway centerline.

The published magnetic declination for SDY, which can be found in the Airport Data Information Portal (ADIP), is 9° east from 2010. As part of this Master Plan study, the 2025 magnetic variation was calculated, and is 7° 49’ east, changing 0° 5’ west per year as the location of the magnetic north pole moves over time. This results in runway re-designation from 01/19 to 01/20. FAA will make a determination if runways are to be re-designated. Any change to runway designation will be made at the discretion of FAA as it requires the update of national aeronautical publications, procedures and signage. In the early 2000’s, what is now referenced as Runway 11/29 was redesignated from runway 10/28.

RUNWAY LENGTH & WIDTH

Runway width is driven by the RDC and approach visibility minimums for each runway as identified in FAA AC 150/5300-13B. Runway Length requirements are determined based on a variety of factors, including the elevation of the runway, the temperature of the airport during the hottest month and the type of aircraft intending to takeoff/land on the runway.

Runway 01/19 is the longest runway at SDY with a length of 5,705 feet and width of 100 feet. Runway 11/29 has a length of 4,024 feet and width of 100 feet. The width of each runway is satisfactory for each of the respective the RDC's and no changes are anticipated through the planning period.

As of the date this Master Plan study was initiated, FAA AC 150/5325-4B, *Runway Length Requirements for Airport Design* was the current guidance for determining runway lengths at airports. A revision to this guidance, FAA AC 150/5325-4C, *Runway Length Recommendations for Airport Design (DRAFT)* was proposed in 2013. A detailed analysis using these two methods including FAA runway length charts and aircraft performance data is in **Appendix D: Runway Length Evaluation**.

Runway Lenth Analysis-Small Airplanes Up to 12,500 Pounds

The FAA design approach to determine recommended runway length in small aircraft is identified in Chapter 2 of FAA AC 150/5325-4B. The method requires several steps to be performed including identifying percentage of fleet and using airport data to calculate runway length based on curves. Calculations for SDY are identified in **Table 2-13**.

Table 2-13 – FAA AC 150/5345-4B Runway Length Requirements (≤ 12,500 lbs.)

Airport and Runway Data	
Airport Elevation	1,985 feet
Mean Daily Maximum Temperature of Hottest Month	87.8°F
Maximum Difference in Runway Centerline Elevation	0.35
Existing Runway Length	
01/19	5,705 feet
11/29	4,024 feet
Aircraft Classification	**Recommended Runway Length**
Small Airplanes 12,500 Pounds or less	
10 or more passenger seats	4,550 feet
Less than 10 passenger seats at 100 percent of fleet	4,390 feet
Less than 10 passenger seats at 95 percent of fleet	3,690 feet

Source: FAA AC 150/5325-4B, KLJ Analysis
Note: Runway length requirements estimated based on charts for airport planning purposes only.

Runway Length Analysis-Large Airplanes Up to 60,000 Pounds

The FAA design approach to determine recommended runway length in large aircraft greater than 12,500 pounds up to 60,000 pounds is identified in Chapter 3 of FAA AC 150/5325-4B. The method requires several steps to be performed including identifying percentage of fleet, useful load factor and using airport data to calculate runway length based on curves. The recommended runway length calculations at SDY for large aircraft up to 60,000 pounds are summarized in **Table 2-14**.

Table 2-14– FAA AC 150/5345-4B Runway Length Requirements (>12,500 but ≤ 60,000 lbs.)

Airport and Runway Data	
Airport Elevation	1,985 feet
Mean Daily Maximum Temperature of Hottest Month	87.8°F
Maximum Difference in Runway Centerline Elevation	0.35 feet
Existing Runway Length	
01/19	5,705 feet
11/29	4,024 feet
Aircraft Classification	**Recommended Runway Length**
Large Airplanes more than 12,500 Pounds but less than 60,000 Pounds	
100 percent of fleet at 90 percent useful load	8,490 feet
100 percent of fleet at 60 percent useful load	6,000 feet
75 percent of fleet at 90 percent useful load	6,700 feet
75 percent of fleet at 60 percent useful load	5,000 feet

Source: FAA AC 150/5325-4B, KLJ Analysis
Note: Runway length requirements estimated based on charts for airport planning purposes only.

Primary Runway 01/19

In addition to the runway length analysis guidance provided by the FAA, the more detailed Small Aircraft Runway Length Analysis Tool (SARLAT) was used to determine the necessary landing and takeoff lengths for specific aircraft under the operating conditions of the Sidney-Richland Regional Airport. The results of that detailed analysis can be found in **Appendix D: Runway Length Analysis**. The critical design aircraft, the Beechcraft King Air 200 was used to determine the necessary runway length for primary Runway 01/19, in addition to a variety of other primary users including operators of the more demanding Beechcraft King Air 350 and the the Pilatus PC 12, the primary aircraft utilized for medical opeations. The majority of the large aircraft analyzed are able to operate well within the current runway length of 5,705 feet, with the exception of the Beech King Air 350 which requires 5,727 feet of available runway length for takeoff in dry conditions and 6,586 feet for wet or slippery conditions. It is recommended that space be protected for an extension to either the Runway 01 or 19 end in the future.

Crosswind Runway 11/29

FAA recommends secondary “crosswind” runways have a length capable of accommodating the lower crosswind capable aircraft expected to use this runway. The length of a runway must be justified to accommodate the aircraft that requires its use. At SDY, Runway 11/29 is 4,024 feet long and necessary to provide the FAA recommended 95 percent wind coverage for ARC A/B-I and A/B-II aircraft types under a 10.5-knot and 13-knot crosswind component. Based on the aircraft fleet mix, a mix of both small general aviation aircraft, such as the Cessna 172 Skyhawk and Cessna 180 were analyzed in addition to more demanding aircraft which regularly utilize the crosswind runway, including the Pilatus PC-12, Cessna 340 and the Beechcraft Barron 55. The results of that detailed analysis can be found in **Appendix D: Runway Length Analysis**. For the most part, the small aircraft fleet may be accommodated within the existing 4,024 feet of available runway length, with the exception of the Baron 55 which requires 3,933 feet of takeoff length available in dry conditions and 4,523 feet for wet conditions. Generally, the crosswind runway is considered to have adequate length to accommodate the majority of both the small and large aircraft fleet and it is recommended that the existing length be maintained.

Other Considerations

According to FAA AC 150/5300-13B, the FAA recommended minimum runway length of 3,200 feet exists for runways accommodating circling and non-precision instrument approaches with visibility minimums as low as ¾ mile. The recommended minimum runway length for runways accommodating precision instrument approaches with visibility minimums less than ¾ mile is 4,200 feet for runways accommodating precision instrument approaches. It is important to note that Runway 11/29 meets both of the above described criteria and as such, remains a vital part of the runway system at the airport.

PAVEMENT STRENGTH

Airfield pavements should be adequately maintained, rehabilitated and reconstructed to meet the operational needs of the airport. The published pavement strength is based on the construction materials, thickness, aircraft weight, gear configuration and operational frequency for the pavement to perform over its useful life.

The FAA standard for measuring the reporting pavement strength on runways with pavement strengths greater than 12,500 pounds is defined in FAA AC 150/5335-5D, *Standard Method of Reporting Airport Pavement Strength - PCR.* The Aircraft Classification Rating – Pavement Classification Rating (ACR-PCR) method is defined within this guidance. The PCR values measures the cumulative damage resulting from an aircraft fleet mix. In general, the PCR value should equal or exceed the ACR value assigned for the design aircraft. Larger aircraft could occasionally exceed the pavement strength but not on a regular basis. PCR is based on a variety of calculated factors including aircraft geometry and pavement design, the overall strength of the subgrade beneath the pavement as well as the maximum tire pressure the pavement itself can support. The PCR is communicated through a five-part series of numeric and letter codes.

- The first part of the code is a numeric value which communicates the Pavement Classification Number (PCN) or load-carrying capacity of the pavement.
- The second part is a letter (R or F) which indicates if the pavement is rigid (concrete) or flexible (asphalt).
- The third part is a letter (A to D) which indicates strength of the subgrade underneath the pavement. A grade of A indicates high strength soils like stabilized clay, while a grade of D indicates low strength, such as uncompacted soil.
- The fourth part is either a letter or a number which expresses the maximum tire pressure which the pavement can support. The letters that can be used are:
    - W (unlimited) - no tire pressure limit.
    - X (high) - maximum tire pressure of 1.75 MPa (heavy jets)
    - Y (medium) - maximum tire pressure of 1.25 MPa (business jets)
    - Z (low) - maximum tire pressure of 0.5 MPa (Light aircraft)
- The fifth part of the coding system is a letter (T or U) which describes the method by which the PCN value was obtained, either by technical evaluation (T) or by usage (U) via a physical test.

The PCR values for both runways at SDY are shown as:

Runway 01/19: 180/F/D/Y/T

Runway 11/29: 211/F/D/Y/T

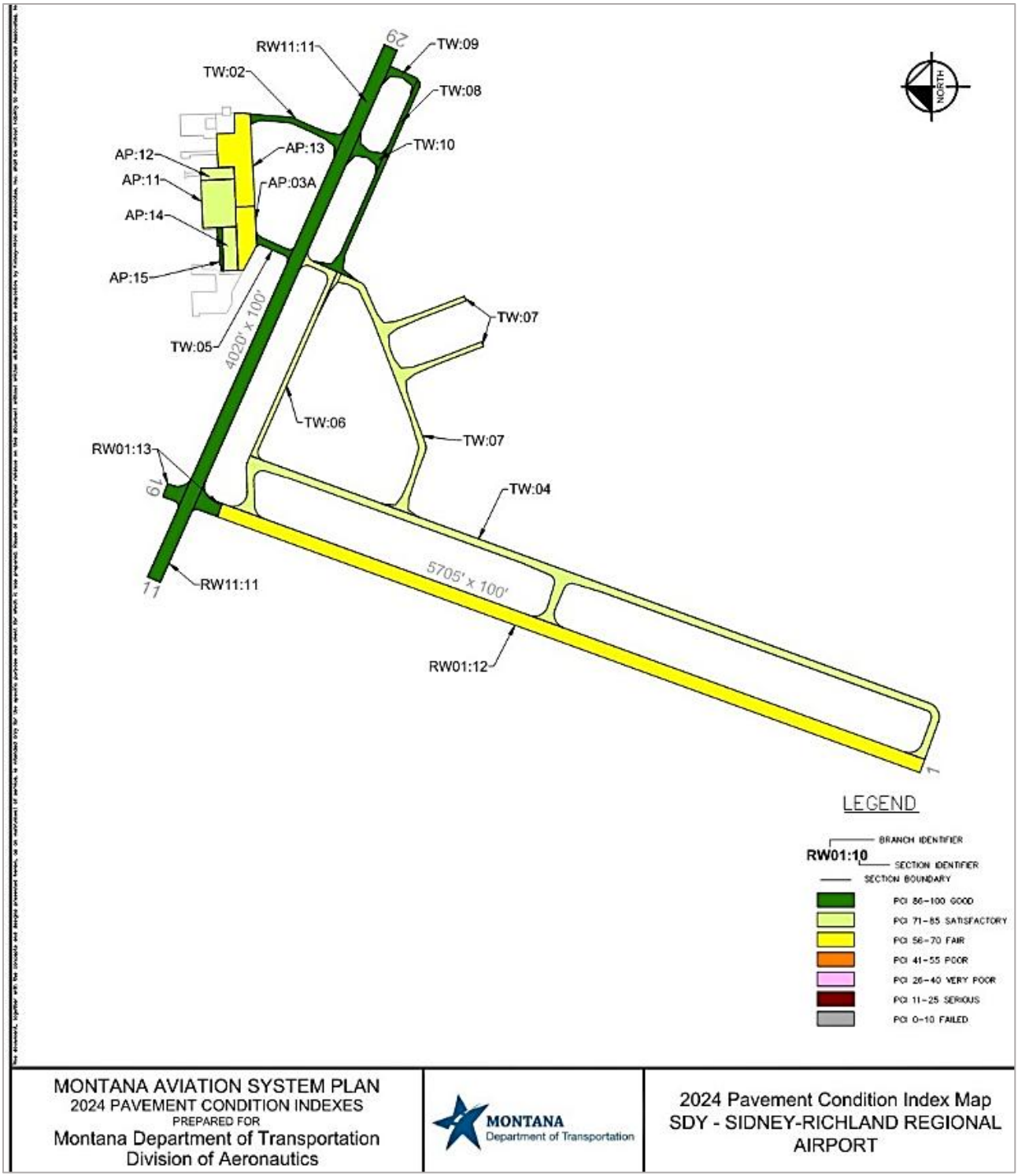
PAVEMENT SURFACE

Both Runway 01/19 and Runway 11/29 pavement consists of a grooved asphalt pavement surface. Runway grooving improves aircraft stopping performance when runway contaminants are present (water, ice, snow, slush, etc.). Runway grooving or friction treatment is recommended by the FAA for primary and secondary runways at commercial service airports. FAA AC 150/5320-12C considers this to be high priority safety work. The runway surfaces at the airport are adequate for the planning period.

PAVEMENT CONDITION

Condition of pavement can be determined based on a metric referred to as the Pavement Condition Index (PCI). PCI is communicated through a numerical scale between 0 and 100, with high numbers indicating better conditions. In 2024, the Montana Department of Transportation conducted a survey of pavement at Sidney-Richland Regional Airport. Those findings were summarized in a PCI report. At the time of the study, Runway 01/19 had a reported PCI of 68, which is fair. Following this study, Runway 01/19 underwent a pavement maintenance project for rehabilitation and is now considered to be in excellent condition. It is recommended to continue to perform routine pavement maintenance as necessary to maintain the integrity of the runway. Runway 11/29 had a reported PCI of 97, which is classified as good condition. **Figure 2-3** below shows the PCI report map as well as the corresponding data table outlining the condition of each pavement section and date of last major work.

Figure 2-3 - 2024 Pavement Condition Index



Source: Montana Department of Transportation

Figure 2-3 - 2024 Pavement Condition Index (Continued)

CURRENT 2024 PAVEMENT CONDITION INDEX

Branch ID	Section ID	Branch Name	Surface Type	Section Area (SF)	Approx. Age at Inspection	Last Major Work Date	Last Inspection Date	Pavement Condition Index	PCI Category
RW11	11	Runway 11--29	AAC	412,200	1.9	1/1/2023	9/23/2024	97	Good
RW01	12	Runway 01-19	AAC	529,179	21.3	8/1/2003	9/23/2024	68	Fair
RW01	13	Runway 01-19	AAC	36,336	1.9	1/1/2023	9/23/2024	97	Good
TW	04	Taxiway	AAC	364,350	12.1	9/30/2012	9/23/2024	73	Satisfactory
TW	02	Taxiway	AC	34,753	4	11/1/2020	9/23/2024	93	Good
TW	05	Taxiway	AAC	14,369	1.9	1/1/2023	9/23/2024	97	Good
TW	06	Taxiway	AC	61,857	12.3	8/1/2012	9/23/2024	80	Satisfactory
TW	07	Taxiway	AC	151,622	8.2	9/10/2016	9/23/2024	83	Satisfactory
TW	08	Taxiway	AC	60,339	2.9	1/1/2022	9/23/2024	95	Good
TW	09	Taxiway	AC	13,917	2.9	1/1/2022	9/23/2024	92	Good
TW	10	Taxiway	AC	20,602	2.9	1/1/2022	9/23/2024	90	Good
AP	03A	Apron	AAC	53,696	17.3	8/1/2007	9/23/2024	60	Fair
AP	11	Apron	PCC	80,156	20.3	8/1/2004	9/23/2024	83	Satisfactory
AP	12	Apron	AC	20,179	20.3	8/1/2004	9/23/2024	71	Satisfactory
AP	13	Apron	AAC	112,591	18.3	8/1/2006	9/23/2024	63	Fair
AP	14	Apron	PCC	30,849	18.3	8/1/2006	9/23/2024	81	Satisfactory
AP	15	Apron	PCC	9,375	18.3	8/1/2006	9/23/2024	87	Good

AIRFIELD PAVEMENT WORK HISTORY

1. ADAP-05, 1980, RESURFACE RUNWAY 10/28; APRON OVERLAY AND EXPANSION.
2. AIP-001-1984, REHABILITATE RUNWAY 1/19, APRON, AND TAXIWAYS; EXPAND APRON (AP:02,AP:03); CONSTRUCT HELIPAD (AP:05).
3. AIP-005-1992, CONSTRUCT PARALLEL TAXIWAY.
4. AIP-007-1997, OVERLAY TAXIWAY (TW:02); RECONSTRUCT TAXIWAY (TW:05).
5. AIP-011-2003, OVERLAY AND GROOVE RUNWAYS; CRACK SEAL, FOG SEAL, AND REMARK TAXIWAY (TW:04).
6. AIP-012-2004, CONSTRUCT APRONS (AP:11,AP:12).
7. AIP-013-2005, CONSTRUCT APRON (AP:14).
8. AIP-014-2006, RECONSTRUCT APRONS (AP:13, AP:15); CONSTRUCT HELIPAD (AP:05A, EXEMPT); REMOVE HELIPAD (AP:05).
9. AIP-015-2007, RECONSTRUCT APRON (AP:03A).
10. AIP-017-2010, CRACK SEAL, FOG SEAL, AND REMARK RUNWAYS AND TAXIWAYS.
11. AIP-019-2012, OVERLAY TAXIWAY D (TW:04); CONSTRUCT TAXIWAY C (TW:06).
12. AIP-020-2014, CRACK SEAL, SEAL COAT, AND REMARK PAVEMENTS.
13. AIP-022-2015, CONSTRUCT TAXIWAYS (TW:07). [PAVEMENT SECTION COMPLETED 2016]
14. AIP-024-2019, CRACK SEAL, SURFACE SEAL, REMARK ALL PAVEMENTS.
15. AIP-026-2020, RECONSTRUCT TAXIWAY E (TW:02), NEW TAXIWAY B EXTENSION (TW:08), AND TAXIWAY B CONNECTOR CONSTRUCTION (TW:09, TW:10).
16. AIP-035-2022, RECONSTRUCT TAXIWAY (TW:05), REHABILITATE RUNWAY (RW11:11, RW01:13).

Source: Montana Department of Transportation

VISUAL NAVIGATION AIDS

Visual aids are installed to provide airport usability during periods of darkness and/or low visibility. Pavement markings and lighting systems available at the airport are summarized in the following sections.

Runway Lighting

Runway edge lights are placed off the edge of the runway surface to help pilots define the edges and end of the runway during night and low visibility conditions. At SDY, both Runway 01/19 and 11/29 are equipped with Medium Intensity Runway Lighting (MIRL) systems. **A high intensity runway lighting (HIRL) replacement on Runway 01/19 may be recommended in the future.**

Pilot-Controlled Lighting

Airfield lighting systems allow for pilots to control the complexity and intensity of runway edge, approach threshold lights in addition to the activation of taxiway edge lights and guidance signage. At SDY, the MIRLs for both Runway 01/19 and 11/29 as well as the PAPIs and REILs for Runway can be activated by pilots using the common traffic advisory frequency (CTAF) of 122.800.

Visual Approach Slope Lighting

Visual approach slope lighting provide vertical descent guidance to pilots for a specific runway end. These approach aids enable the pilot to acquire and maintain the correct glide path for landing. Precision Approach Path Indicator Lights (PAPI) are the current FAA standard equipment installed for this purpose, however other types of equipment exist, including visual approach slope indicator lights (VASI).

Both PAPI and VASI function similarly. They both have red and white lights that are used by the pilot to indicate whether they are too high, too low, or on the appropriate glidepath. Precision approach path indicators project light along a standard glide path to a runway end, with red and white colored lights indicating the aircraft's vertical position (above, below, or on glide path) relative to the defined glide path. Visual approach slope indicators project a beam of light having a white segment in the upper part of the beam and red segment in the lower part of the beam.

SDY has a two box PAPI system installed on all runway ends, set to a 3.00-degree angle. It is recommended that the airport continue to maintain the PAPI system in good condition.

Runway End Identifier Lights (REIL)

REILs consist of high-intensity flashing white strobe lights located on the approach ends of runways to assist the pilot in early identification of the runway threshold. SDY has REIL's at all runway ends. These REILs should be maintained through the long-term. At Sidney-Richland Regional Airport, all four runway ends are equipped with REILs.

Approach Lighting System

An approach lighting system provides extended runway centerline alignment information near the runway's end for pilots to transition from instrument flight to visual flight for landing in low visibility conditions. There are several types of systems with varying configurations.



Typical Approach Lighting System (FAA)

Common types of ALS to consider at SDY include:

- **Omnidirectional Approach Lighting System (ODALS):** This basic ALS consists of seven omnidirectional sequenced strobe lights along runway approach centerline. The system is 1,500 feet in total length providing visual guidance to non-precision runways. SDY does not have an existing approach with an ODALS lighting system.

- **Medium-intensity Approach Lighting System with Sequencing Flashing Lights (MALSF):** This intermediate ALS consists of seven rows of lights, three flashing lights and a row of steady burning green lights prior to runway threshold. The system is 1,400 feet in total length providing visual guidance to non-precision runways.

- **Medium-intensity Approach Lighting System with Runway Alignment Indicator Lights (MALSR):** This full ALS consists of seven rows of lights, five flashing lights and a row of steady burning green lights prior to runway threshold. The system is 2,400 feet in total length. This is required for a Category I precision instrument approach.

Airfield Guidance Signs

Guidance signs provide location, direction, and guidance information to pilots on the ground to enhance awareness. Signs are placed around the airfield to identify runway and taxiway intersections, runway hold positions and other guidance. Mandatory signs are red and identify an intersection with a runway or critical safety zone. Other types of signs include location, direction, destination, and distance remaining signs.

SDY has mandatory, location, and directional signage on the airfield. All types of signage are lighted and marked in accordance with FAA AC 150/5340-18F, Standards for Airport Sign Systems. The airport should continue to maintain airfield guidance signs and make updates as necessary through out the planning period.

PAVEMENT MARKINGS

Pavement markings help airport users visually identify important features on the airfield. FAA has defined numerous different pavement markings to promote safety and situational awareness as defined by FAA AC 150/5340-1, *Standards for Airport Markings*.

The minimum required runway markings for a standard runway are as follows:

- Visual (landing designator, centerline)
- Non-Precision (landing designator, centerline, threshold)
- Precision (landing designator, centerline, threshold, aiming point, touchdown zone, edge)

Taxiways

TAXIWAYS

Taxiways provide for the safe and efficient movement of aircraft between the runway and other operational areas of the airport. The taxiway system should provide critical links to airside infrastructure, increase capacity and reduce the risk of an incursion with traffic on the runway. The taxiway system should meet the standards design requirements identified in FAA AC 150/5300-13B. Taxiways are classified by a Taxiway Design Group (TDG) ranging from TDG 1 to TDG 7. The Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance of the design aircraft are combined in order to determine the necessary TDG for an airport. The TDG Incorporates elements related to actual aircraft movement of specific taxiing aircraft in an effort to appropriately plan for adequate space for taxiing aircraft and allow for a margin amount of space on either side of the aircraft as it taxis. At SDY, the TDG classification is 2-A. Locations and identifiers of each taxiway at SDY are depicted in **Figure 2-1** and includes a series of parallel taxiways serving Runway 01/19 and 11/29, midfield connectors, hangar taxilanes as well as access points to the apron.

SYSTEM DESIGN

FAA has placed a renewed emphasis on taxiway design in their updated airport design standards. Fundamental elements help develop and efficient system to meet demands, reduce pilot confusion and enhance safety. Considerations include:

- Design taxiways to meet FAA design standards for existing and future users considering expandability of airport facilities.
- Design taxiway intersections so the cockpit is over the centerline with a sufficient taxiway edge safety margin.
- Simplify taxiway intersections to reduce pilot confusion using the three-node concept, where a pilot has no more than three choices at an intersection.
- Eliminate “hot spots” identified by the FAA Runway Safety Action Team where enhanced pilot awareness is encouraged.
- Minimize the number of runway crossings and avoid direct access from the apron to the runway.
- Eliminate aligned taxiways whose centerline coincides with a runway centerline.
- Other considerations include avoiding wide expanses of pavement and avoiding “high energy intersections” near the middle third of a runway.

At SDY, taxiway Delta (D) provides straight through “direct access” from the apron to the runway environment. This configuration is considered a hazard to safe operations, as it decreases situational awareness and increases the likelihood of an incursion between taxiing aircraft and those operating on the runway. **Ultimately, direct access taxiways should be reconfigured to require a turn from the apron onto the active runway.**

DESIGN STANDARDS

FAA identifies the design requirements for taxiways. The design standards vary based on individual aircraft geometric and landing gear characteristics. The Taxiway Design Group (TDG) and Airplane Design Group (ADG) identified for the design aircraft using a particular taxiway. Some of the safety standards include:

- Taxiway Width
- Taxiway/Taxilane Safety Area (TSA)
- Taxiway Edge Safety Margin (TESM)
- Taxiway/Taxilane Object Free Area (TOFA)

Other design standards include taxiway shoulder width to prevent jet blast soil erosion or debris ingestion for jet engines, and required separation distances to other taxiways/taxilanes. More information can be found in **Appendix B: Commercial Service Airports 101**.

PAVEMENT CONDITION

Taxiway D was rehabilitated in 1997 and Taxiway E was reconstructed in 1997. Taxiway B was constructed in 2013 and in the same year, Taxiway A was rehabilitated. In 2014, all taxiway pavement underwent routine crack seal maintenance. Taxiway C was constructed in 2015. In 2019 several of the taxiways at SDY underwent pavement maintenance and again in 2024. **Table 2-15** below details the specific pavement sections which underwent rehabilitation during the most recent. It is recommended that regular maintenance of the taxiway pavements be continued throughout the planning period.

Table 2-15– Taxiway Maintenance History

Taxiway Pavement Section	Last Major Construction	Existing Age (At time of Maintenance in 20204)	2024 PCI Value
TW 01	2020	4	93
TW 04	2012	12	73
TW 06	2012	12	80
TW 07	2016	8	83
TW 08	2020	4	95
TW 09	2020	4	92
TW 10	2020	4	90

Source: Montana Department of Transportation, KLJ Analysis

TAXIWAY LIGHTING

Taxiway edge lighting delineates the taxiway and apron edges. The taxiway system at SDY is equipped with Medium Intensity Taxiway Lighting (MITL). It is recommended the airport continue to maintain the MITL system on the airfield.

PAVEMENT MARKINGS

Taxiway and taxilane markings are important for directional guidance for taxiing aircraft and ground vehicles. Taxiway markings include centerline striping to provide proper clearance from pavement edges and fixed objects. Additionally, markings can include enhanced centerlines, movement/non-movement markings, runway hold-lines, and painted holding position signs (markings on pavement) on all runway hold lines and applicable taxiways/taxilanes.

SDY's taxiway/taxilane markings are maintained during routine pavement maintenance and are in good condition.

Airside Data Summary

The following tables provide summary data of the facility requirements and recommendations associated with each of the runways at SDY through the planning period(s) identified in this study

Table 2-16 – Runway 01/19 Design Standard Matrix

Design Standard	Actual Condition	Facility Requirement or Recommendation	
		Existing	Future
Runway Identification	01/19	01/19	02/20
Runway Classification	Greater than Utility	Greater than Utility	Greater than Utility
Aircraft Classification	Large Aircraft	Large Aircraft	Large Aircraft
Runway Design Code (RDC)	B-II -4000	B-II-4000	B-II-4000
Approach Reference Code (APRC)	D-V-2400: D-IV-1200	B-II-4000; B-I-2400	B-II-4000; B-I-2400
Departure Reference Code (DPRC)	D-IV; D-V	B-II	B-II
Pavement Strength (Wheel Loading)	62,000 (DW)	62,000 (DW)	62,000 (DW)
Pavement Surface Type	Asphalt	Asphalt	Asphalt
Line of Sight Requirements Met	Yes	Yes	Yes
Runway Length	5,705’	5,705’	TBD
Runway Width	75’	100’	100’
Displaced Threshold	0’	0’	0’
Runway Safety Area (RSA) Width	150’	150’	300’
RSA Length Past Departure End	300’	300’	600’
RSA Length Prior to Threshold	300’	300’	600’
Runway Lighting Type	MIRL	MIRL	HIRL
Approach RPZ Start from Runway	Roads in RPZ (1 & 19) Golf Course in RPZ (19)	200’	200’
Approach RPZ Length		1,700’	1,700’
Approach RPZ Inner Width		1,000’	1,000’
Approach RPZ Outer Width		1,510’	1,510’
Runway Marking Type	Non-Precision	Non-Precision	Non-Precision
14 CFR Part 77 Approach Category	34:1	34:1	34:1
Approach Type	NPI	NPI	NPI
Visibility Minimums	7/8 mile	7/8 mile	¾ mile
Runway Departure Surface	Yes	Yes	Yes
ROFA Width	500’	500’	800’
ROFA Length Past Departure End	300’	300’	600’
ROFA Length Prior to Threshold	300’	300’	600’
ROFZ Length Past Runway	200’	200’	200’
ROFZ Width	400’	400’	400’
13B Paragraph 3.6 Approach Surface	4	4	5
Start from Runway End	200’	200’	200’
Length	10,000’	10,000’	10,000’
Inner Width	400’	400’	400’
Outer Width	3,400’	3,400’	3,400’
Slope	20:1	20:1	34:1
Visual and Instrument NAVAIDs	GPS, REIL, PAPI	GPS, REIL, PAPI	GPS, REIL, PAPI
Runway and Taxiway Separation	400’	240	240’
Runway and Parking Separation	250’	250’	250’
Runway and Hold Line Separation	200’	200’	200’

Note: RED indicates a known deficiency to existing minimum design standards GREEN indicates a design standard is exceeded
Source: FAA AC 150/5300-13B, KLJ Analysis

Table 2-17 – Runway 11/29 Design Standard Matrix

Design Standard	Actual Condition	Facility Requirement or Recommendation	
		Existing	Future
Runway Identification	11/29	11/29	11/29
Runway Classification	Greater than Utility	Greater than Utility	Greater than Utility
Aircraft Classification	Large Aircraft	Large Aircraft	Large Aircraft
Runway Design Code (RDC)	B-II-VIS	B-II-VIS	B-II-5000
Approach Reference Code (APRC)	D-III-4000; B-III-2400	B-II-4000; B-I-2400	B-II-4000; B-I-2400
Departure Reference Code (DPRC)	B-III; D-II	B-II	B-II
Pavement Strength (Wheel Loading)	70,000 (DW)	70,000 (DW)	70,000 (DW)
Pavement Surface Type	Asphalt	Asphalt	Asphalt
Line of Sight Requirements Met	Yes	Yes	Yes
Runway Length	4,024’	4,024’	4,024’
Runway Width	100’	75’	100’
Runway Safety Area (RSA) Width	120’	120’	120’
RSA Length Past Departure End	240’	240’	240’
RSA Length Prior to Threshold	240’	240’	240’
Runway Lighting Type	MIRL	MIRL	MIRL
Approach RPZ Start from Runway	Roads in RPZ (11 & 29)	200’	200’
Approach RPZ Length		1,000’	1,000’
Approach RPZ Inner Width		500’	500’
Approach RPZ Outer Width		700’	700’
Runway Marking Type	Visual	NPI	NPI
14 CFR Part 77 Approach Category	20:1	20:1	34:1
Approach Type	Visual	Visual	NPI
Visibility Minimums	VIS	VIS	1 Mile
Runway Departure Surface	Yes	Yes	Yes
ROFA Width	400’	400’	400’
ROFA Length Past Departure End	240’	240’	240’
ROFA Length Prior to Threshold	240’	240’	240’
ROFZ Length Past Runway	200’	200’	200’
ROFZ Width	400’	400’	400’
13B Paragraph 3.6 Approach Surface	4	4	4
Start from Runway End	200’	200’	200’
Length	10,000’	10,000’	10,000’
Inner Width	400’	400’	400’
Outer Width	3.400’	3,400’	3,400’
Slope	20:1	20:1	20:1
Visual and Instrument NAVAIDs	REIL, PAPI	REIL, PAPI	REIL, PAPI
Runway and Taxiway Separation	300’	240’	240’
Runway and Parking Separation	250’	250’	250’
Runway and Hold Line Separation	200’	200’	200’

Note: RED indicates a known deficiency to existing minimum design standards, GREEN indicates a design standard is exceeded
Source: FAA AC 150/5300-13B, KLJ Analysis

Airfield Summary

This chapter identifies safety, capacity and development needs for the Sidney-Richland Regional Airport based on forecasted activity levels. This information aids in formulating development alternatives to adequately address recommended improvements. The following summarizes the facility recommendations:

Airside Facilities

- Construct taxiway on Runway 19 end to connect with partial parallel taxiway in order to create a full-length parallel taxiway for Runway 01/19 in order to protect for future instrument approach minimums
- Establish future Runway 19 threshold and runway to taxilane centerline separation to mitigate obstacles and remove the intersection with Runway 11/29
- Take steps to mitigate obstructions and penetrations on the Runway 19 end in order to lower the instrument approach minimums of the runway.
- Establish new instrument approach to Runway 29 end in order to enhance utility of the airfield.
- Acquire land in fee simple for existing and future Runway Protection Zones.