

CHAPTER 2: RUNWAYS & TAXIWAYS

Introduction

This Chapter of the Airport Master Plan is focused on the Runway and Taxiway system at the Dubois Municipal Airport (DUB). This area is commonly referred to as the airfield, and includes 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 DUB.

As the chapter analyzes various components of the runway and taxiways at DUB, 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 a summary of facility requirements which are necessary 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 Analysis
- Taxiway System
- Evaluation Process
- 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. As discussed in the previous chapter, the existing critical design aircraft at DUB is the **A/B-I (small) with TDG 1-A** and the future critical design aircraft is the **A/B-II (small) with TDG-2A**. Because of the amount of turbojet activity into the region there is a need, where practicable, to consider preserving space for a **C-II aircraft with TDG-2A**. Each of these critical design aircraft characteristics are summarized in **Table 2-1**.

Table 2-1 – Critical Design Aircraft Summary

Design Characteristics	Existing	Future	Ultimate
Aircraft Example	Piper PA-46	King Air 200	Citation X
Airplane Approach Category	A/B	A/B	C
Airplane Design Group	I	II	II
Taxiway Design Group	1A	2A	2A
Wingspan	<49'	≥49' and <79'	≥49' and <79'
Tail Height	<20'	≥20' and < 29'	≥30' and <44'
Cockpit to Main Gear	≤20'	≥20' and < 40'	≤40'
Main Gear Width	15'	20'	≥15' and < 20'
Approach Speed (Knots)	<91	≥91 and <121	≥121 and <141

Source: 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 DUB 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, either Visual Flight Rules (VFR) or Instrument Flight Rules (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 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 both the winds 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.

Figure 2-1– DUB Windcone and Segmented Circle



At DUB, the primary windcone and segmented circle is located north of Runway 11/29. There are two supplemental windsocks with one located north of the runway and east of the terminal area and another located south of runway near the midpoint. See **Figure 2-1** for an image of the primary windsock and segmented circle at the airport.

Source: KLJ

Airport Beacon

The airport beacon serves as the airport identification light so approaching pilots can identify the airport location from sunset to sunrise. The airport beacon at DUB is located south of Runway 11/29 near the midpoint and adequately serves the airport with no known obstructions to its line of sight. The minimum light beam angle is two degrees.

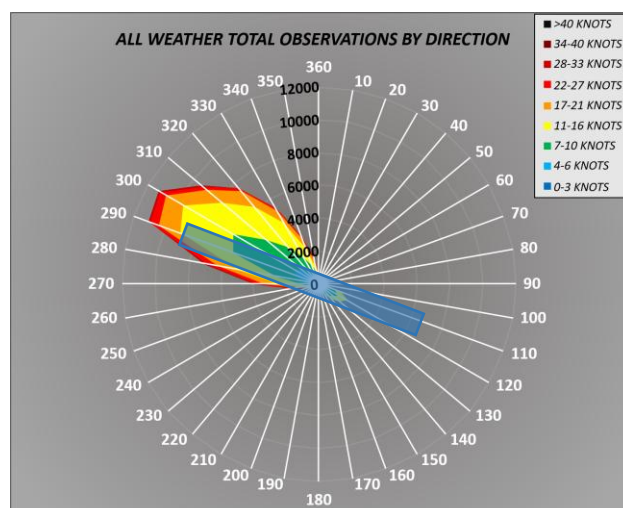
Weather Reporting

There are two types of weather reporting systems on 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. DUB has an AWOS-3PT which provides real time weather for aircraft utilizing the airport.

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. Over the last 30 years (1991-2020) the average maximum temperature at DUB in the hottest month has been 79.4 degrees Fahrenheit (July).

Prevailing winds are from the northwest and are generally aligned with the airport's runway configuration. 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 at 10.5 knots. For increasingly larger aircraft, a 13 knot direct crosswind is used up through 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 direction of flight. In addition, some aircraft are designed to safely operate with higher crosswind components. 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. For 10.5 knot wind conditions in All Weather and VMC conditions, Runway 11/29 is just below the 95% objective under 10.5 knots but exceeds the recommended coverage for 13.0 and 16.0 knots. One means to accommodate being less than the objective is to widen the runway to the next higher runway category (see FAA Advisory Circular 150/5300-13B, par. B.2.3.2). In this case for DUB, Runway 11/29 is 75-feet wide which is wider than the required 60-foot width for A/B-I aircraft. Therefore, the runway design does meet wind coverage needs.

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
A-III, B- III, C-I to D-III & D-I to D-III	16.0 knots

Source: FAA AC 150/5300-13B

For all-weather conditions, the A/B-II design aircraft crosswind component (13 knots) is accommodated with Runway 11/29 according to the available data. However, for A/B-I design aircraft, the 10.5 knot crosswind component is just below the 95% objective. **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
Runway 11/29	94.60%	97.97%	99.36%

Source: KDUB AWOS (2015-2024, Hourly) From National Climatic Data Center, 80,459 Total Observations

Pilots fly VMC under VFR when there is visual reference to the ground and other aircraft with a requirement of 3 miles visibility and a 1,000 cloud ceiling. Wind coverage during VMC is evaluated to determine the ideal alignment for runways used during visual operations, such as VFR flight training. The coverage is shown in **Table 2-4**.

Table 2-4 – VMC Wind Coverage

Runway	Crosswind Component (Wind Speed)		
	10.5 knots	13.0 knots	16.0 knots
Runway 11/29	94.49%	97.93%	99.34%

Source: KDUB AWOS (2015-2024, Hourly) From National Climatic Data Center, 77,507 Total Observations

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**, Runway 11/29 meets the recommended crosswind coverage during IMC conditions. Runway 29 currently has an RNAV approach but there is not a current approach to Runway 11.

Table 2-5 – IMC Wind Coverage

Runway	Crosswind Component (Wind Speed)		
	10.5 knots	13.0 knots	16.0 knots
Runway 11/29	97.63%	99.02%	99.66%

Source: KDUB AWOS (2015-2024, Hourly) From National Climatic Data Center, 2,952 Total Observations

IMC does not occur often at DUB with only 2,952 hourly observations in a 10-year period (approximately 3.6% of the time). While in most weather conditions, Runway 29 is favored, in IMC, Runway 11 is heavily favored. See **Table 2-6** for a detailed breakdown regarding operations for both runway ends during inclement weather.

Table 2-6 – Favored Approach in Weather Conditions

Runway	Favored Approach End (10.5 Knots)		
	All-Weather	VMC	IMC
Runway 11 Only	19.18%	17.07%	74.63%
Runway 29 Only	81.90%	83.54%	38.89%

Source: KDUB AWOS (2015-2024, Hourly) From National Climatic Data Center, 2,952 Total Observations

Based on true hourly weather data summarized in **Table 2-7**, the airport experiences IMC weather conditions 3.66%. With the existing approach for Runway 29 this adds an additional 0.31% of usability, or 1.1 days per year, when considering the current Runway 29 instrument approach weather minimums of 2.5-mile flight visibility and 800-foot cloud ceiling. The airport has weather conditions below this criterion 3.35%, or 12.2 days per year, where the airport is not usable. Potential improvements with a 300-foot ceiling and 1-mile visibility to each runway were analyzed and the results are shown in **Table 2-7**.

Table 2-7 – Meteorological Analysis

Existing Weather Condition	Percentage	Days per Year	Hours per Year
VMC	96.33%	351.6	8,439
Usable IMC	0.31%	1.1	28
Usability	96.65%	352.8	8,466
Below Weather Minimums*	3.35%	12.2	294
Total	100.0%	365.0	8,760
Weather Conditions with Improvements to Runway 29 Approach			
300' ceiling and 1 mile visibility	0.92%	3.1	73
Weather Conditions with Improvements to Runway 11 Approach			
300' ceiling and 1 mile visibility Potential	1.69%	5.6	136
Below Weather Minimums with Improvements	0.74%	3.5	85
Total	100.0%	365.0	8,760

Source: KLJ Analysis

*Current IFR minimums are 800-foot cloud ceiling and 2.5 mile flight visibility for Runway 29 approach

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 – General Aviation Airports –**

101 for details on the requirements of different levels of instrument approach procedures. **Table 2-8** is a list of the major approach categories and associated capabilities.

Table 2-8 – 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: KJJ Analysis; * Recommended; ** Often the best RNAV minimums but requires aircraft equipped with WAAS receiver

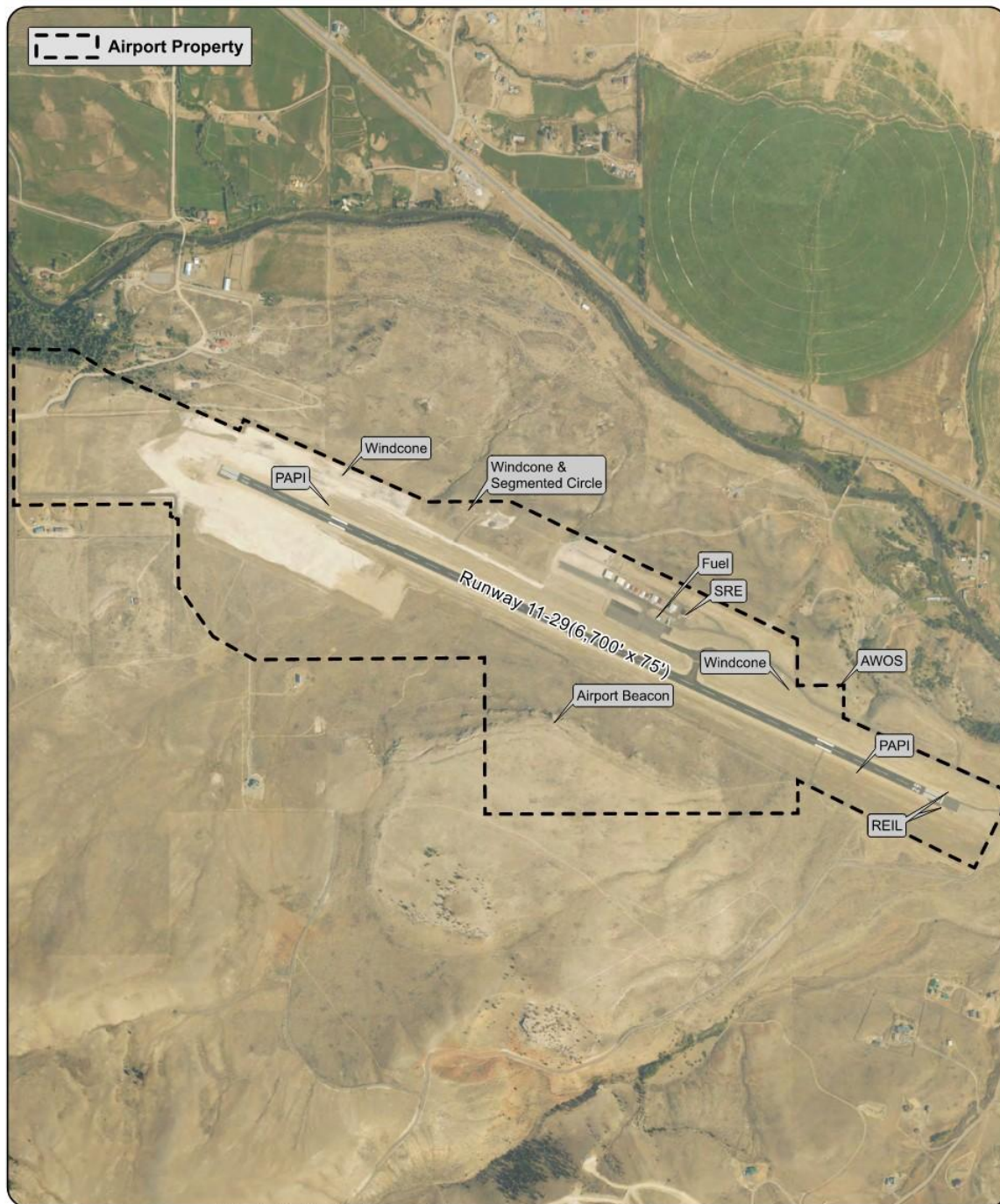
At Dubois Municipal Airport, -an RNAV Instrument Approach Procedure (IAP) (see **Table 2-9**) is available for Runway 29 with existing NAVAIDS. Instrument approach weather minimums are a result of the approach type, airport infrastructure, and any prevailing airspace obstructions.

Table 2-9 – Instrument Approach Procedures

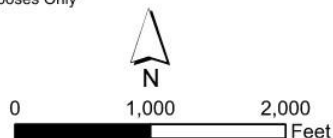
Approach Procedure	Approach Type	Lowest Cloud Ceiling Minimum (HAT)	Lowest Visibility Minimum (n.m.)
RNAV (GPS) RWY 29	Non-Precision Approach with Vertical Guidance	LPV: 800 feet	2 ½ mile
		LNAV MDA: 1,500 feet	1 ¼ mile
		LNAV/VNAV - None	-
		Circling: 1,500 feet	1 ¼ mile

Source: AirNav; Note: HAT = Height Above Touchdown, n.m. = nautical miles (reported), LPV = Localizer Performance with Vertical Guidance, LNAV = Lateral Navigation, VNAV = Vertical Navigation

Figure 2-2 – Airfield Facilities Map



*Intended for Planning Purposes Only



Dubois Municipal Airport
Airfield Map

Source: KLJ Analysis

Runways

Runways

Runway 11/29 is the airport's only runway and currently serves all traffic at the airport. This runway is 6,700 feet long and 75 feet wide and paved with asphalt. The runway has a weight bearing capacity of 24,000 pounds single-wheel. The runway is equipped with Medium Intensity Runway Lighting (MIRL) and has non-precision runway markings. The runway was rehabilitated in 2012 and reconstructed in 2015. This project included extending the runway by 600 feet and realigning it from 10/28 to 11/29.

Table 2-10 – Runway Facility Summary (Existing based on B-II-5000)

Component	Runway 11-29
Runway Length (feet)	6,700
Runway Width (feet)	75
Runway Surface Material	Asphalt
Pavement Strength	24,000 pounds (SW)
Runway Design Code	B-II
Runway Safety Area	7,300' X 150'
Object Free Area	7,300' X 500'
Object Free Zone	7,100' X 400'
Runway Protection Zone	1,000' X 500' X 700'

Source: AirNav

RUNWAY DESIGN

The Runway Design Code (RDC) provides the design standards for a specific runway based on design aircraft and instrument approach minimums. Further information about Runway Design Codes can be found in **Appendix B: General Aviation Airports 101**. The existing RDC is B-II-5000 for Runway 29 and B-II-VIS for Runway 11.

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 derived based on a taxiway separation distance. Runway 11/29 does not have a parallel taxiway and therefore does not have an approach or departure reference code.

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 the runway meets existing airport design standards for the existing and future critical design aircraft. If there is an intention to preserve space for an ultimate C-II critical design aircraft there will be improvements needed which will be summarized later in **Table 2-13**.

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.

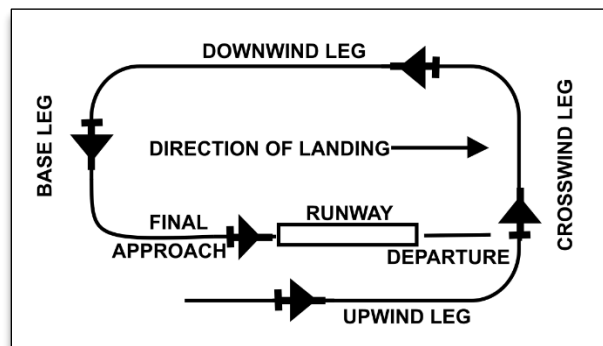
The land uses in the existing RPZs are acceptable now. Further review is required if new land uses, runway end locations or a change in the size of the RPZ is proposed and a land use requiring FAA coordination is in the RPZ.

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 degrees to a downwind leg for landing. Traffic for Runway 11 follows a left-hand traffic pattern while traffic for Runway 29 follows a right-hand traffic pattern.



Standard VFR Airport Traffic Pattern (Source: FAA)

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. For DUB, due to the surrounding terrain, there are no instrument departures available for Runway 29 and there are routing restrictions through the ROWEY RNAV Departure. The instrument departure guidance **Figure 2-3** and guidance from the ROWEY RNAV **Figure 2-4** are as follows:

Figure 2-3 – Instrument Departures at DUB

DUBOIS, WY
DUBOIS MUNI (DUB)
TAKEOFF MINIMUMS AND (OBSTACLE) DEPARTURE PROCEDURES
ORIG 20FEB25 (25051) (FAA)
TAKEOFF MINIMUMS:
Rwy 29, NA-Environmental.
DEPARTURE PROCEDURE:
Rwy 11, use ROWEY (RNAV) DEPARTURE.

Figure 2-4 – ROWEY RNAV Guidance

TAKEOFF MINIMUMS

Rwy 11: 300-1 $\frac{3}{8}$ with minimum climb of 270'/NM to 8200 or
standard with minimum climb of 310'/NM to 8200.

TAKEOFF OBSTACLE NOTES

Rwy 11: Vehicles on road 11' from DER, 338' left of centerline, 7244' MSL.
Vehicles on road 40' from DER, 146' left of centerline, 7249' MSL.
Fence, terrain beginning 67' from DER, 320' right of centerline up to 14' AGL/7262' MSL.
Vehicles on road beginning 383' from DER, 509' right of centerline, up to 7264' MSL.
Trees beginning 5134' from DER, 1827' right of centerline, up to 120' AGL/7463' 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. Currently, only Runway 29 has a published instrument approach, however at DUB circling minimums are allowed via visual maneuver to land on either end of the runway, including Runway 11. The applicable approach/departure surface standards are identified in **Table 2-11**. Under the current approach surface, there are obstacles within five-feet on both the Runway 11 and 29 end, as well as penetrations to the Runway 11 end. The departure surface for both runway ends is clear of penetrations.

Table 2-11 – Approach/Departure Surface Requirements

Runway End(s)	Par. 3.6 Surface	Description	Slope
Existing			
11	4	Approach end of runways that support IFR circling procedures and procedures only providing lateral guidance, VOR, NDB, LNAV, LP, TACAN, VORTAC, ASR and LOC	20:1
29	5	Approach end of runways providing ILS, MMLS, PAR, and localizer type directional aid with glidepath, LPV, LNAV/VNAV, RMP or GLS	20:1
11	7	Departure runway ends for all instrument operations	40:1
Future - TBD			

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

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. Based on the existing and future design standards, no changes are recommended to the existing runway widths. However, if the critical design aircraft changed to C-II in the ultimate configuration, the runway width will need to increase from the existing 75 feet to 100 feet.

Runway 11/29 is the only runway at DUB and has a length of 6,700 feet. This runway was extended from 6,100 feet to its current length in 2015 when the runway was re-constructed.

As of the date this Master Plan study was initiated, [FAA AC 150/5325-4B, Runway Length Requirements for Airport Design](#) is the current guidance for determining runway lengths at airports. The FAA has also began to use a tool developed by the Airport Cooperative Research Program (ACRP) called the Small Aircraft Runway Length Analysis Tool (SARLAT). Each of these were used to calculate the runway length needs and the results are summarized in **Table 2-12**. A detailed analysis using these two methods, as well as FAA runway length charts and aircraft performance data, is in **Appendix D: Runway Length Evaluation**. For DUB, it is recommended that the current length of 6,700 feet be maintained through the planning period, as the existing length adequately meets the needs of the aircraft flying to and from this high-altitude airport.

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

Airport and Runway Data		
Longest Runway Length (11/29)	6,700 feet	
Airport Elevation	7,298 feet	
Mean Daily Maximum Temperature of Hottest Month	79.1°F	
Aircraft Classification	Recommended Runway Length	
Small Airplanes 12,500 Pounds or less		
Less than 10 passenger seats at 100 percent of fleet	8,500 feet	
Less than 10 passenger seats at 95 percent of fleet	8,500 feet	
Small Aircraft Analysis Tool	Dry	Wet
Cessna 172 Skyhawk	3,889	4,472
Cessna T210	4,563	5,247
Cirrus SR22	5,391	6,200
Cirrus SR22 Turbo	4,670	5,371
Beechcraft King Air C90	4,631	5,326
Pilatus PC12	5,689	6,542
Piper 46 Malibu	4,342	4,993

Source: [FAA AC 150/5325-4B](#), KLJ Analysis

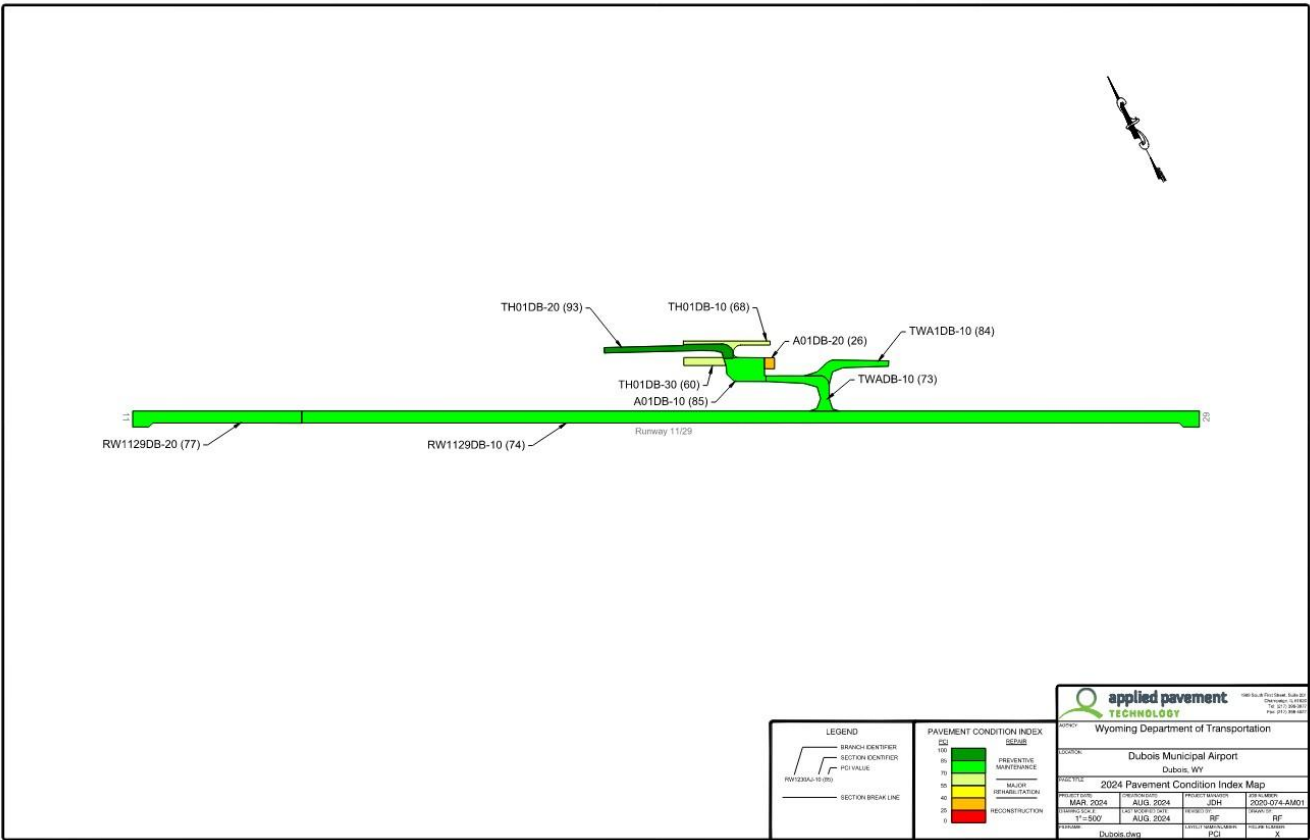
Note: Runway length requirements estimated based on charts for airport planning purposes only.

RUNWAY PAVEMENT STRENGTH AND CONDITION

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 current pavement strength is 24,000 lbs (Single Wheel) and will be adequate for the planning period.

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 Wyoming Department of Transportation (WYDOT) Aeronautics conducted a survey of pavement at Dubois Municipal Airport. Those findings were summarized in a PCI report, see **Figure 2-5**. At the time of the study, Runway 11/29 had a reported PCI of 74, with the Runway 11 end reporting slightly higher at a PCI of 77. A rating between 71 and 85 is deemed satisfactory. A visual inspection of the runway in August 2025 indicates that the pavement is in good condition. It is recommended to maintain the runway pavement over the planning period through regular maintenance activities including crack seal, seal coats and rehabilitation when necessary. **Figure 2-6** below shows the existing condition of the runway pavement and markings at both the 11 and 29 threshold.

Figure 2-5 – Dubois Municipal Airport PCI Report



Source: WYDOT Aeronautics

Figure 2-6 – Condition of Runway 11/29



Source: KLJ, August 2025

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.

Runway 11/29 is equipped with Medium Intensity Runway Lighting (MIRL) systems. The lighting was installed in 2015 with the runway construction and should be maintained through the planning period.

Pilot-Controlled Lighting

Airfield lighting systems allow for pilots to control the complexity and intensity of lights. DUB has pilot-controlled lighting that activates the runway lights, PAPIs and REIL through the use of the CTAF frequency, 122.9.

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.

Runways 11 and 29 each have 2-box PAPIs providing a 3.00 degree glide path. These should be maintained through the planning period.

Figure 2-7 – DUB PAPI's



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. The Runway 29 end at DUB has REILs installed. In early 2026, the REIL system failed and underwent an emergency replacement, funded by WYDOT. These REILs should be maintained through the long-term. **It is recommended a REIL be installed for Runway 11 if a RNAV approach is added.** REILs are currently unidirectional, but omnidirectional could be acceptable as well. Unidirectional could be considered if circling approaches are common.

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. DUB 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](#).

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)

Runway 11/29 is marked with non-precision instrument markings which includes a landing designator, centerline, threshold markings and aiming point. The pavement markings are in good condition.

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. Locations and identifiers are depicted in **Figure 2-2**.

SYSTEM DESIGN

FAA has placed a renewed emphasis on taxiway design in their updated airport design standards. Fundamental elements help develop an 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.

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- 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.

At DUB there is a single taxiway connecting from the apron area to the runway near the midpoint. The taxiway is 50 feet wide and meets TDG 3 standards. There is a portion of the taxiway that is parallel to the runway measuring 35 feet wide and meets TDG 2-B standards. Taxilanes serving the apron and aircraft hangars will be discussed in greater detail in Chapter Three.

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: General Aviation Airports 101**.

TAXIWAY PAVEMENT CONDITION

The taxiway was constructed in 2015 at the same time as the runway and is generally in the same condition. The pavement should be maintained through the planning period.

Taxiway Lighting

Taxiway edge lighting delineates the taxiway and apron edges. The taxiways at DUB have Medium Intensity Taxiway Lighting (MITL) and reflectors. It is recommended the airport continue to maintain the MITL and reflectors through the planning period.

Pavement Markings

Taxiway and taxilane markings are important for directional guidance for taxiing aircraft and ground vehicles. Existing markings meet the design standards and include the required hold positions.

Holding Position

Holding position markings are a visual reference to prevent aircraft and vehicles from entering critical areas such as an active runway environment. The hold position is at 200 feet which is appropriate for the existing design aircraft, A/B-I classification, however with the recommendation of an RDC of A/B-II, a 240-foot separation would be required.

Airside Data Summary

The following table provides summary data of the facility requirements and recommendations associated with Runway 11/29 at DUB through the planning period identified in this study.

Table 2-13 – Runway 11/29 Design Standard Matrix

Design Standard	Actual Condition	Facility Requirement or Recommendation		
		Existing	Future	Ultimate
Runway Identification	11 / 29	11 / 29	11 / 29	11 / 29
Runway Classification	Utility	Utility	Utility	Other-Than-Utility
Design Aircraft Classification	Small	Small	Small	Large
Runway Design Code (RDC)	A/B-II-5000	A/B-I-5000	A/B-II-5000	C-II-5000
Approach Reference Code (APRC)	-	-	B-II-4000	B-III-4000 D-II-4000
Departure Reference Code (DPRC)	-	-	B-II	B-III; D-II
Pavement Strength (Wheel Loading)	24,000 lb (SW)	24,000 lb (SW)	24,000 lb (SW)	24,000 lb (SW)
Pavement Surface Type	Asphalt	Paved	Paved	Paved
Line of Sight Requirements Met	Yes	Yes	Yes	Yes
Runway Length	6,700'	6,700'	6,700'	6,700'
Runway Width	75'	75'	75'	100'
Runway Safety Area (RSA) Width	150'	150'	150'	500'
RSA Length Past Departure End	240'	240'	300'	1,000'
RSA Length Prior to Threshold	240'	240'	300'	600'
Runway Lighting Type	MIRL	MIRL	MIRL	MIRL
Approach RPZ Start from Runway	Incompatible Uses 11-None 29-Road	200'	200'	200'
Approach RPZ Length		1,000'	1,000'	1,700'
Approach RPZ Inner Width		250'	250'	500'
Approach RPZ Outer Width		500'	500'	1,010'
Runway Marking Type	Non-Precision	Non-Precision	Non-Precision	Non-Precision
14 CFR Part 77 Approach Category	Vis / NPI	Vis / NPI	NPI	NPI
Approach Slope	20:1	20:1	20:1	20:1
Runway Departure Surface	Yes	Yes	Yes	Yes
ROFA Width	800'	800'	800'	800'
ROFA Length Past Departure End	1,000'	1,000'	1,000'	1,000'
ROFA Length Prior to Threshold	1,000'	1,000'	1,000'	1,000'
ROFZ Length Past Runway	200'	200'	200'	200'
ROFZ Width	400'	400'	400'	400'
13B Para. 3.6 Approach Surface	2 / 5	2 / 5	5	5
Start from Runway End	0' / 200'	0' / 200'	200'	200'
Length	5,000' / 10,000'	5,000' / 10,000'	10,000'	10,000'
Inner Width	250' / 400'	250' / 400'	400'	400'
Outer Width	700' / 3,400'	700' / 3,400'	3,400'	3,400'
Slope	20:1	20:1	20:1	20:1
Runway and Taxiway Separation	245'	150'	240'	300'
Runway and Parking Separation	305'	212'	302'	362'
Runway and Hold Line Separation	200'	125'	125'	240'

Note: **RED** indicates a known deficiency to existing minimum design standards

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