

APPENDIX D: RUNWAY LENGTH ANALYSIS

Purpose

A runway length analysis was completed to FAA standards identified in [FAA AC 150/5325-4B, Runway Length Requirements for Airport Design](#) in this airport master plan study for the Dubois Municipal Airport (DUB). Due to the technical nature of this analysis, a separate appendix has been prepared to calculate recommended runway lengths for the design aircraft identified in the aviation forecasts.

Small Airplanes Up to 12,500 Pounds

FAA Design Curves

The FAA design approach identified in Chapter 2 of [FAA AC 150/5325-4B](#) for most small aircraft less than 12,500 pounds requires several steps to be performed to determine runway length:

1. **Identify Number of Passenger Seats:** Classify design aircraft as one of two categories; “Less than 10 Passenger Seats” and “10 Passenger Seats or Greater”
2. **Select Percentage of Fleet:** Airplanes classified as “Less than 10 Passenger Seats” are grouped into two percentage categories based on the airport’s location and the amount of existing or planned aviation activities. The categories include “95 Percent of Fleet” and “100 Percent of Fleet”.
3. **Consider Future Airport Expansion:** Consider runway length requirements during Instrument Meteorological Conditions (IMC) or expansions to accommodate airplanes more than 12,500 pounds.
4. **Determine Airport Data:** Evaluate the airport elevation, mean daily temperature in hottest month and runway condition to adjust runway length.
5. **Calculate Runway Length Based on Curves:** Utilize FAA runway length curves published in AC 150/5325-4B.

Table D-1 – 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	
Runway Gradient	0.89%	
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- Takeoff Conditions	Dry	Wet
Cessna 172 Skyhawk	3,889	4,472
Cessna T210	4,563	5,247
Cessna SR22	5,391	6,200
Cessna 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.

For small general aviation aircraft, the FAA runway length requirements of 100 percent of fleet would apply at DUB due to its elevation. The recommended runway length to accommodate the small general aviation aircraft fleet is **8,500 feet**. This is greater than the existing runway length for Runway 11/29 of 6,700 feet. See **Figure D-2: FAA Figure 2-1 Small Airplanes with fewer than 10 passenger seats** and **Figure D-3: FAA Figure 2-3 Small Airplanes with 10 or more passenger seats**. Actual runway length needs and feasibility of additional length will be explored in greater detail in *Chapter Two- Runways and Taxiways*.

Individual Aircraft

Runway length requirements vary depending on individual aircraft size, weight as well as weather, elevation and performance capabilities of the specific aircraft. Generally, smaller general aviation aircraft require less length because they operate with a lower weight and at slower approach speeds. These aircraft are able to stop more easily due to their light weight, as well as accelerate and reach lift at slower speeds, meaning they don't require as much distance to become airborne. Conversely, aircraft in higher AAC and ADG classifications have greater runway length requirements for takeoff and landing. This is in part due to their greater weight, contributing to slow acceleration, meaning additional length is needed to generate faster takeoff speeds to achieve lift. Additionally, longer available distances for stopping are required in order to provide the aircraft time to decelerate on landing. General operating requirements in regards to safety are also a consideration for larger aircraft, particularly in regards to the ability of an aircraft to safely continue or abandon a takeoff in the case of an engine failure, necessitating extra runway length beyond the amount required for a standard operation.

The Airport Cooperative Research Program (ACRP) released the Small Aircraft Runway Length Analysis Tool (SARLAT) in late 2022. This tool allows for the selection of specific general aviation aircraft to be applied to the airport's conditions to evaluate the runway length needed for said airport. It is also recommended to use airplane flight manuals in lieu of FAA Figure 2-1 or 2-2 (shown below). We applied the aircraft listed in **Table D-1** along with some other frequent aircraft seen at DUB, and the SARLAT calculated the takeoff and landing length needed in wet and dry conditions.

The results of the tool can be seen in **Figure D-1**. The piston aircraft (Cessna 172 Skyhawk, Cessna 182 Skylane to Cirrus SR22) have an Aircraft Approach Category (AAC) of A and an Aircraft Design Group (ADG) of ADG-I and maximum takeoff weight (MTOW) between 3,100 lbs. and 3,800 lbs. The turboprop aircraft (Beechcraft King Air C90, Piper 46 Malibu and Pilatus PC-12) have an AAC-A/B and ADG-II with MTOW ranging from 4,340 lbs. to 10,450 lbs. The Runway Design Code (RDC) for the Dubois Municipal Airport is A/B-II.

Figure D-1 SARLAT Runway Length Requirements

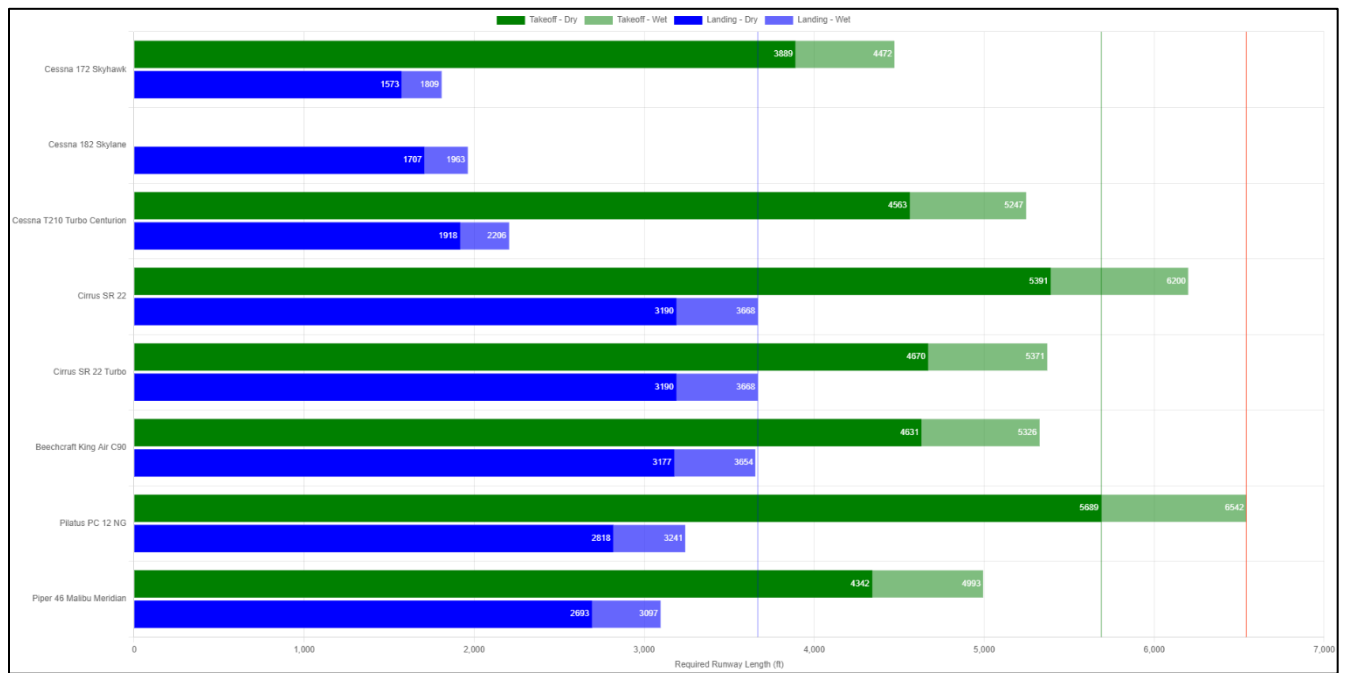
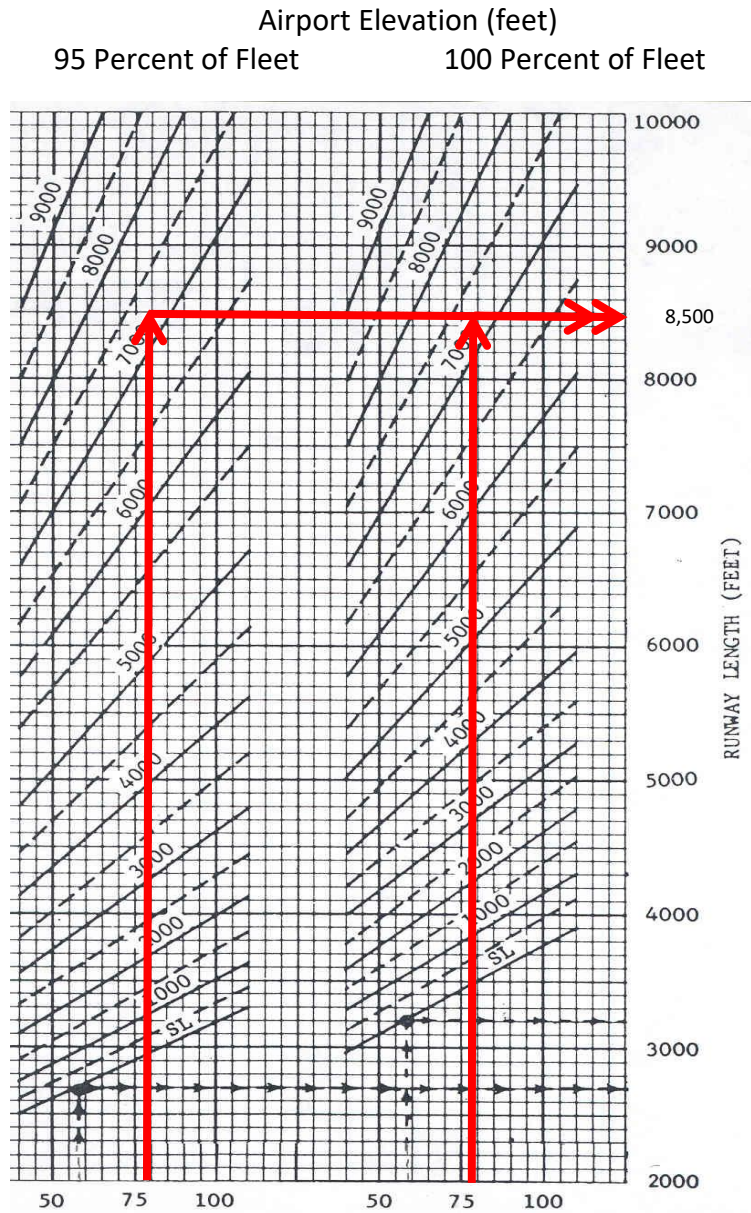


Figure D-2: FAA Figure 2-1 - Small Airplanes with Fewer than 10 Passenger Seats (Excludes Pilot and Co-pilot)

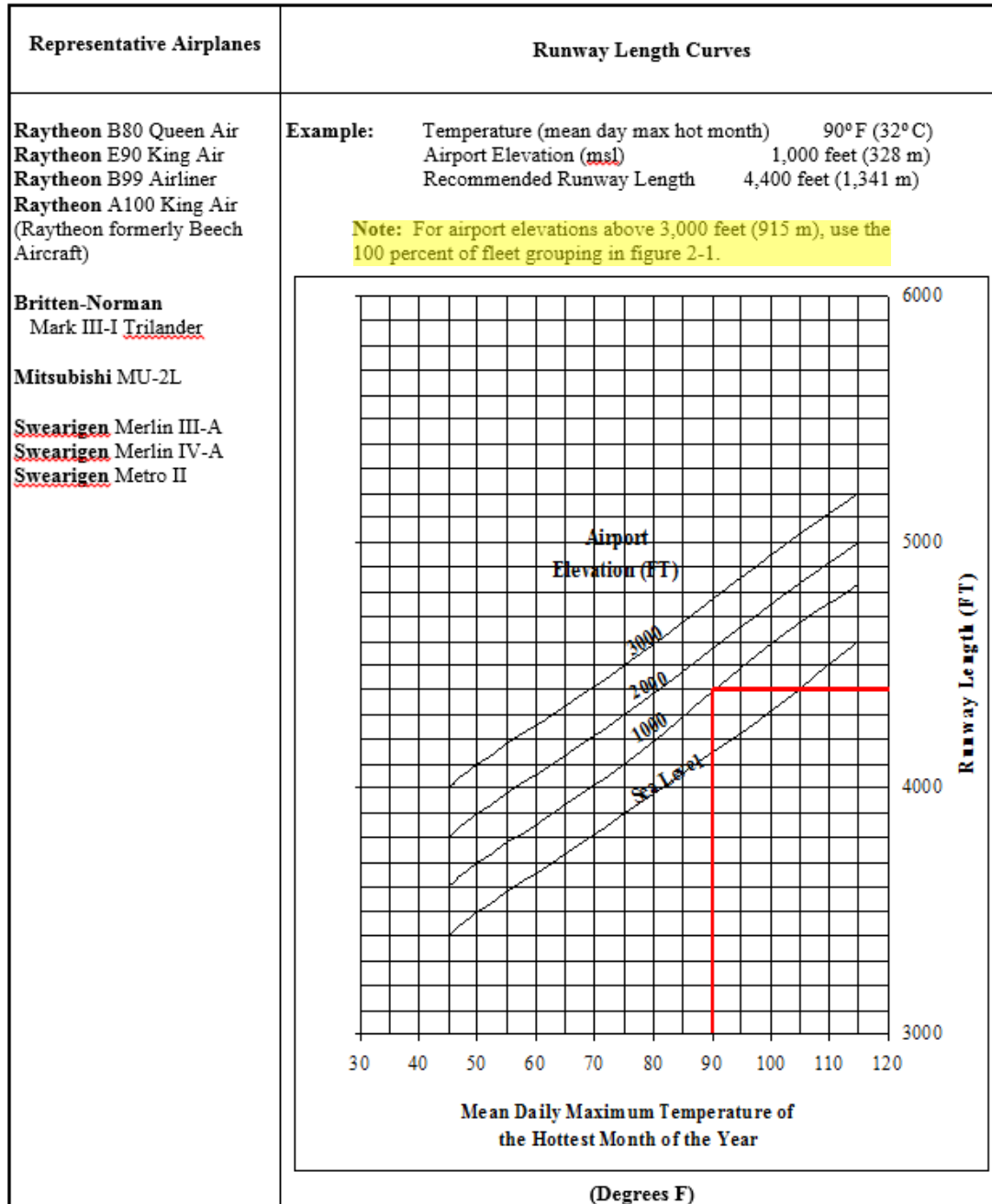
Dubois Municipal Airport
Temperature: 79.1°F / 26.1°C - Airport Elevation: 7,298' MSL



Runway Length at 95 Percent of Fleet: **8,500 feet**
Runway Length at 100 Percent of Fleet: **8,500 feet**

Figure D-3: FAA Figure 2-2 - Small Airplanes Having 10 or More Passenger Seats (Excludes Pilot and Co-pilot)

Dubois Municipal Airport
 Temperature: 79.1°F / 26.1°C - Airport Elevation: 7,298' MSL



See Note on Table