

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 Mobridge Municipal Airport. 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 (≤ 12,500 lbs.).

Airport and Runway Data		
Longest Runway Length (Runway 12-30)	4,410 feet	
Airport Elevation	1,716.2 ft	
Mean Daily Maximum Temperature of Hottest Month	87.4°F	
Aircraft Classification	Recommended Runway Length	
Small Airplanes 12,500 Pounds or less		
10 or more passenger seats	4,410 feet	
Less than 10 passenger seats at 100 percent of fleet	4,280 feet	
Less than 10 passenger seats at 95 percent of fleet	3,700 feet	
Small Aircraft Runway Length Analysis Tool	Dry	Wet
Cessna 150	2,017 feet	2,320 feet
Cessna 172 Skyhawk	2,074 feet	2,385 feet
Cessna 177 Cardinal	2,018 feet	2,321 feet
Cessna 182 Skylane	1,947 feet	2,239 feet

Cessna 340	4,544 feet	5,226 feet
Cessna 402B	4,098 feet	4,713 feet
Cessna T206 Turbo Stationair	2,360 feet	2,714 feet
Cirrus SR 22	2,798 feet	3,218 feet
Cirrus SR 22 Turbo	2,951 feet	3,394 feet
Mooney M20J	3,678 feet	4,230 feet
Piper 28B Dakota	1,997 feet	2,297 feet
Beechcraft King Air B200GT	3,916 feet	4,503 feet
Beechcraft King Air C90	3,233 feet	3,718 feet
Cessna 208 Caravan	2,659 feet	3,058 feet
Pilatus PC-12	3,648 feet	4,195 feet
Piper PA-46 Malibu Meridian	3,076 feet	3,537 feet
Beechcraft 1900D	3,850 feet	-
Cessna 560 XL	4,927 feet	5,666 feet
Phenom 300	4,547 feet	5,229 feet

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

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

For other small general aviation aircraft, the FAA runway length requirements of 10 or more passenger seats would apply at MBG due to its number of current and forecasted operations and critical aircraft. The recommended runway length is 4,410 feet which is the current length for Runway 12-30.

Individual Aircraft

The Airport Cooperative Research Program (ACRP) released the Small Aircraft Runway Length Analysis Tool (SARLAT) in late 2022. This tool allows multiple general aviation aircraft to be applied to the airport environment 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 Mobridge, and the SARLAT calculated the takeoff and landing length needed in wet and dry conditions.

The results the tool provides can be seen in **Figure D-3**. The piston aircraft (Cessna 182 Skylane to Cessna T210 Turbo Centurion) have an AAC of A and an ADG-I and maximum takeoff weight (MTOW) between 3,100 lbs. and 3,800 lbs. The turboprop aircraft (Beechcraft King Air 350ER and Cessna 208 Caravan) has an AAC-A/B and ADG-II with MTOW of 9,062 lbs. to 15,000 lbs.

SARLAT does not have all general aviation listed in the program and it was important to evaluate the Beechcraft 1900D's landing and takeoff distance since it is a frequent aircraft seen at the airport. It was determined that 3,850 feet were needed for takeoff which is well within the current length of Runway 12-30. This information can be seen in **Figure D-4**.

Turf Crosswind Runway

At times, certain airplanes with lower crosswind capabilities are unable to utilize the primary runway. The design objective for the length of crosswind runways at general aviation airports is to provide a length equal to 100 percent of the recommended runway length determine for the lower crosswind capable airplanes using the primary runway.

The current turf crosswind runway at Mobridge is 2,399 feet long and is sufficient for use of smaller AAC-A/B and ADG-I aircraft with MTOW of less than 12,500 lbs.

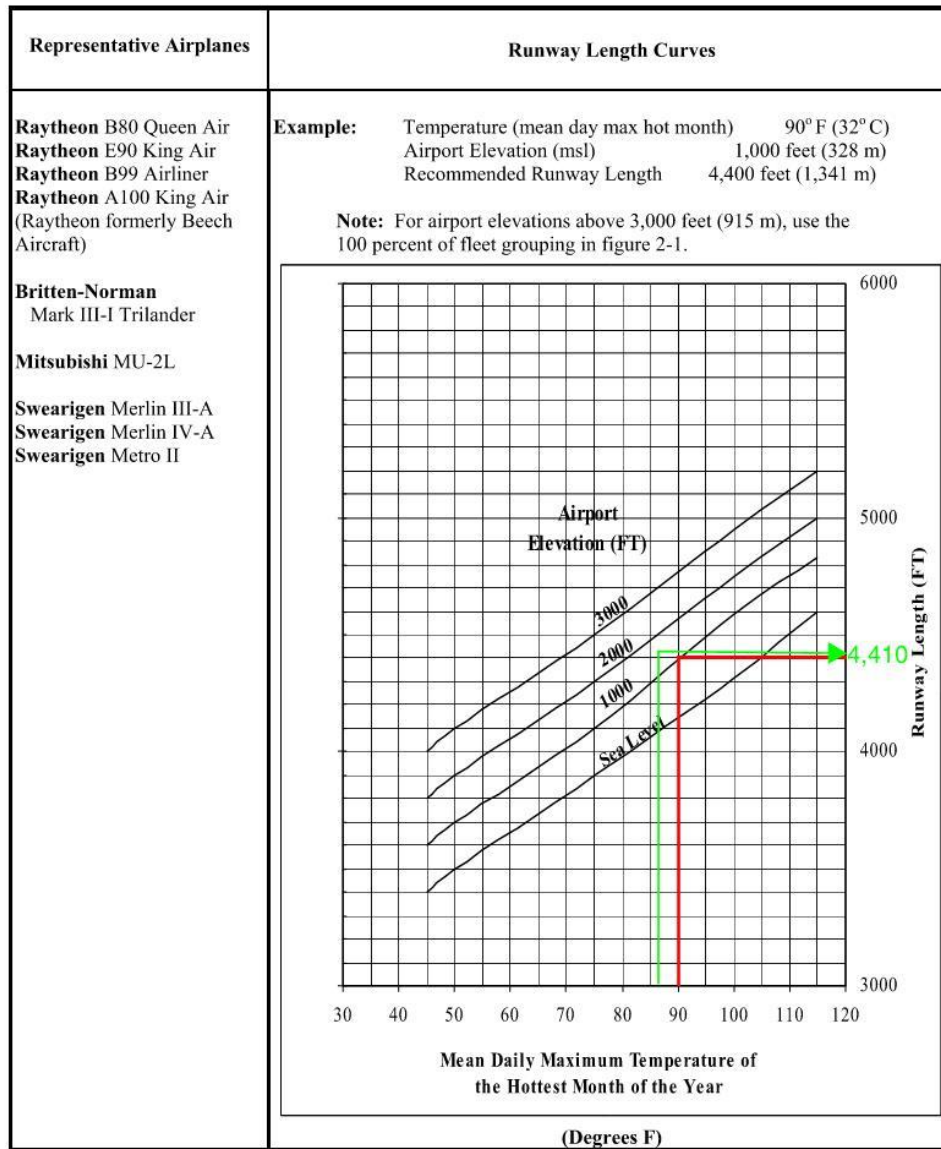
Figure D-1 – 10 or More Passenger Seats

AC 150/5325-4B

7/1/2005

Figure 2-2. Small Airplanes Having 10 or More Passenger Seats
(Excludes Pilot and Co-pilot)

**Mobridge
Municipal Airport
Temp. 87.4 F
Elevation 1716 ft.**



Runway Length 4,410 ft.

Figure D-2 – Less Than 10 Passenger Seats

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

**Mobridge
Municipal Airport**
Temp. 87.4 F
Elevation 1716 ft.

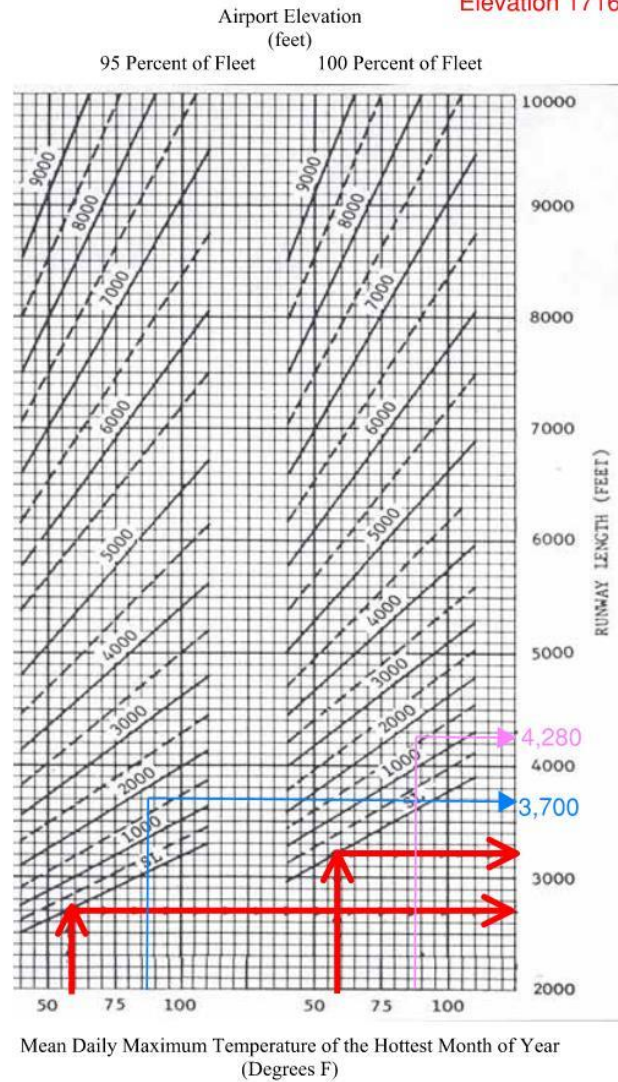
Example:

Temperature (mean day max hot month): 59° F (15° C)
Airport Elevation: Mean Sea Level

Note: Dashed lines shown in the table are mid values of adjacent solid lines.

Recommended Runway Length:

For 95% = 2,700 feet (823 m)
For 100% = 3,200 feet (975 m)



95% Fleet 3,700 ft.
100% Fleet 4,280 ft.

Figure D-3 – SARLAT Runway Analysis

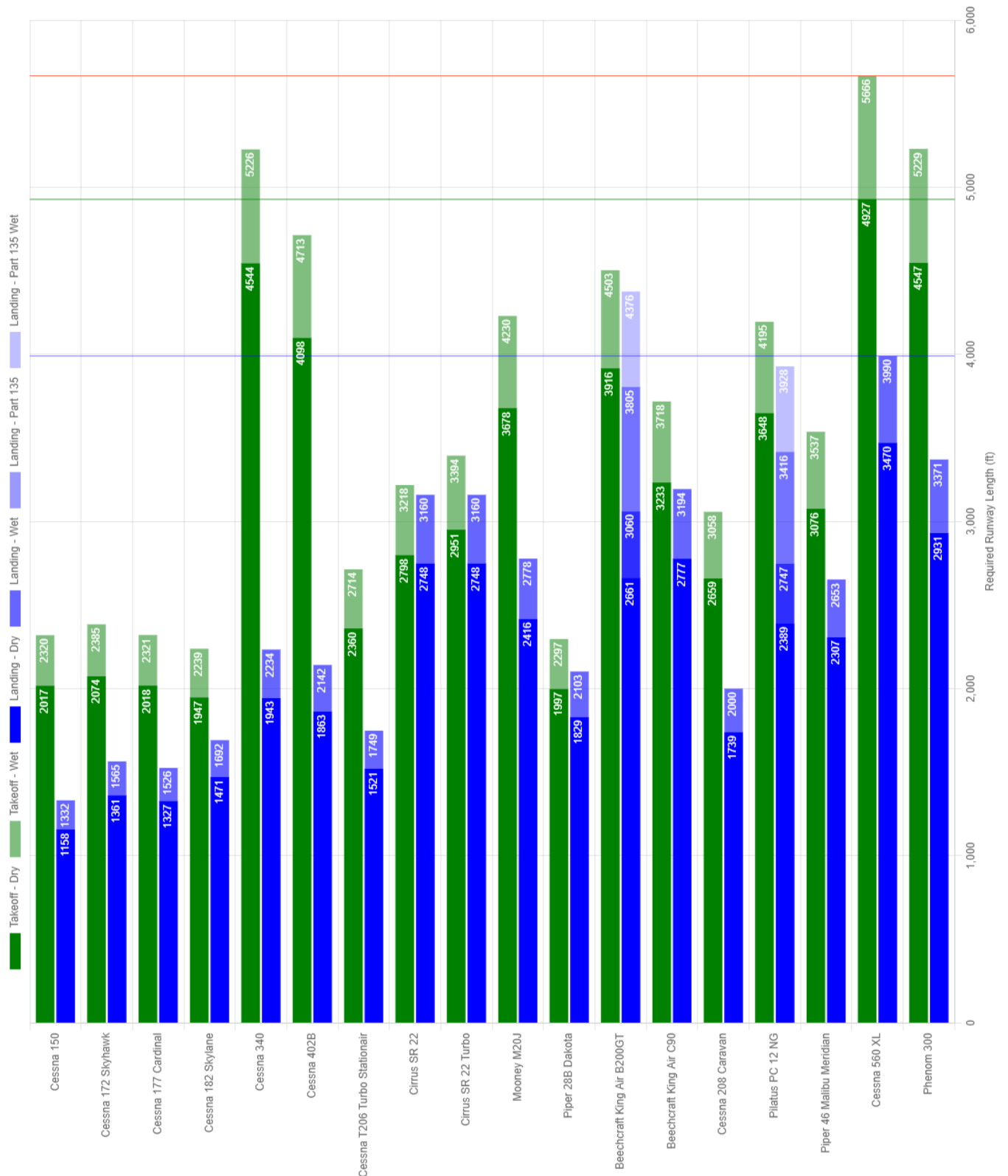


Figure D-4 – Beechcraft 1900D Runway Length Requirements

