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 Mercer County Regional Airport (HZE). 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 15-33)	4,999 feet	
Airport Elevation	1,814 ft	
Mean Daily Maximum Temperature of Hottest Month	84°F	
Aircraft Classification	**Recommended Turf 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 172	2,070 feet	2,381 feet
Cessna 182	1,945 feet	2,237 feet
Cessna 402B	4,069 feet	4,679 feet
Cessna T206	2,349 feet	2,701 feet
Cirrus SR 22 Turbo	2,938 feet	3,379 feet
Mooney M20J	3,654 feet	4,202 feet

Air Tractor 502	3,330 feet	3,830 feet
Air Tractor 802	**5,300 feet**	**6,095 feet**
Beechcraft King Air 200	3,905 feet	4,491 feet
Cessna 208	2,647 feet	3,044 feet
Pilatus PC 12	3,619 feet	4,162 feet
Piper Malibu Meridian	3,063 feet	3,522 feet
Cessna 560 XL	4,838 feet	**5,564 feet**
Phenom 300	4,427 feet	**5,091 feet**

*Source: FAA AC 150/5325-4B, KLJ Analysis. Note: *Wet conditions are not allowed to be considered for turf runways.*

For other small general aviation aircraft, the FAA runway length requirements of 95 percent of fleet would apply at HZE due to its number of current and forecasted operations. The recommended turf runway length for small general aviation aircraft is **3,700 feet** which is 1,299 feet less than Runway 15-33 at 4,999 feet long.

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. We applied the aircraft listed in **Table D-1** along with some other frequent aircraft seen at Hazen, 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-1**. 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 Air Tractor 502's landing and takeoff distance needed since it is a frequent aircraft seen at the airport. It was determined that 3,330 feet where needed for takeoff which is well within the current length of Runway 15-33 at 4,999 feet. This information can be seen in **Figure D-2**.

Turf Runway

During the planning study it was discovered that a 95% crosswind coverage is not met with only Runway 15-33. It was also expressed by airport users the desire for a turf runway. The Advisory Circular states that 100% of the recommended runway length determined for the lower crosswind capable airplanes using the primary runway for non-scheduled service. These airplanes include the Cessna 172, 182, and 402B and Mooney M20J. Of theses aircraft the longest runway length needed is 4,069 feet for the Cessna 402B. Unfortunately, due to land restriction at Mercer County Regional Airport that length could not be accomplished.

The All Weather Total Wind Observations showed a runway alignment of 6-24 would help accomplish the 95% required crosswind component and proposed crosswind runway options were evaluated based on that general alignment along with proposed Runway Protection Zone (RPZ) locations. Please see **Chapter 2** for more details about the proposed options. It was determined a crosswind runway option in the alignment of 4-22 and a length of 2,500 feet was best suited to meet the needs of the crosswind component and airport user needs.

Figure D-1 – STARLAT Runway Analysis

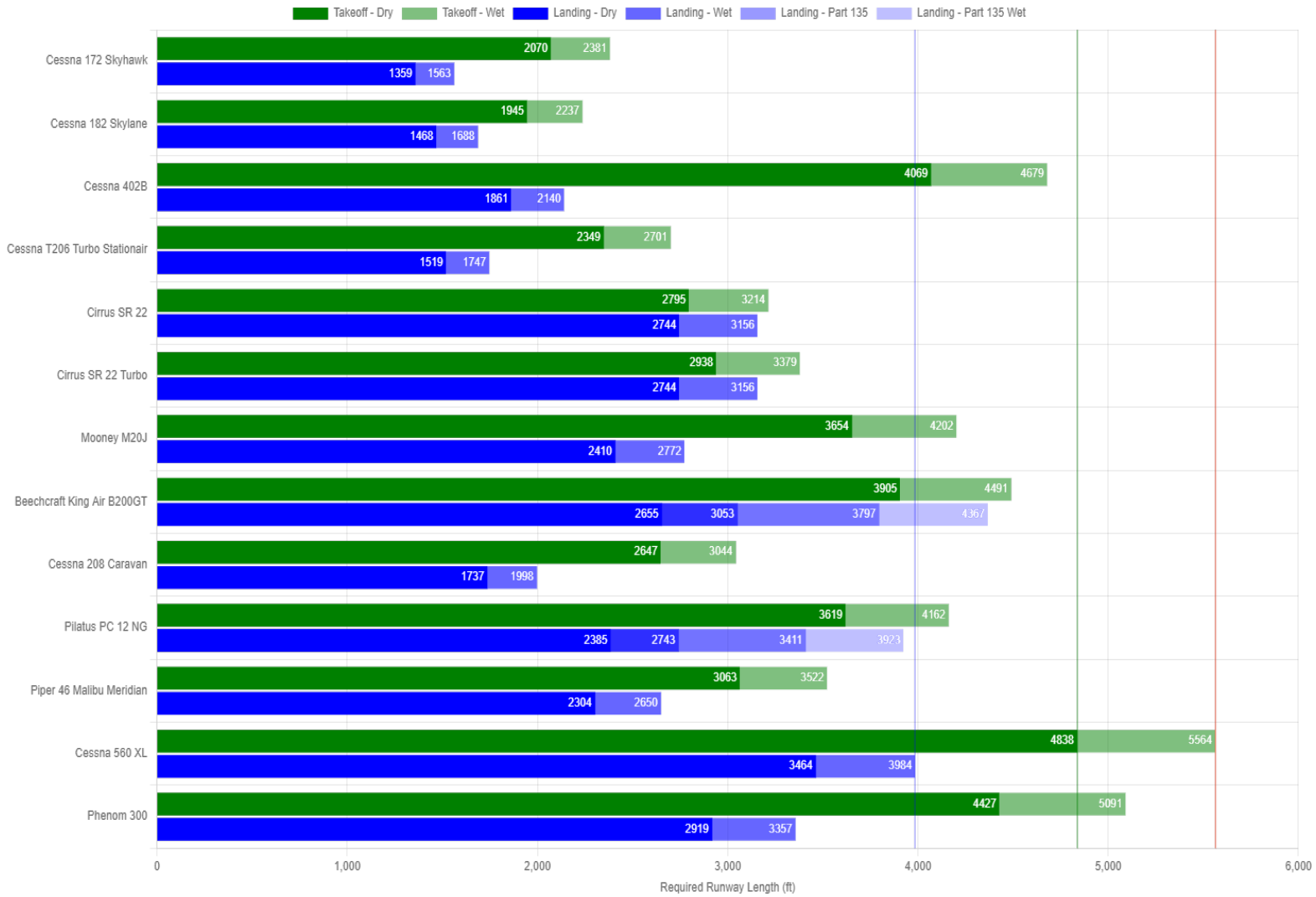


Figure D-2 – Air Tractor 502B Runway Length Requirements

