Runway Length Calculations
Aircraft with Takeoff Weights less than 60,000 lbs

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Runway Design Assumptions (FAA 150/5325-4b)

- For Aircraft with maximum takeoff weights less than 60,000 consult **Chapters 2 and 3 of the FAA AC 150/5325-4B**
- The procedures in the advisory circular also assume:
- No wind conditions
- Zero runway gradient
- Dry runway conditions
- Data is corrected to account for humidity

U.S. Department of Transportation
Federal Aviation Administration

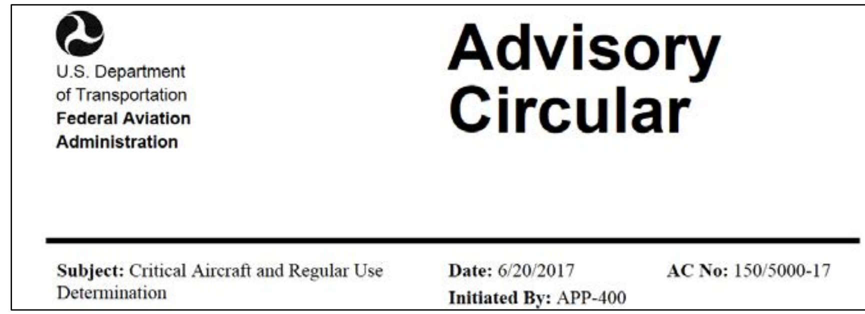
Advisory Circular

Subject: RUNWAY LENGTH REQUIREMENTS FOR AIRPORT DESIGN
Date: 7/1/2005
Initiated by: AAS-100
AC No: 150/5325-4B
Change:

1. **PURPOSE.** This Advisory Circular (AC) provides guidelines for airport designers and planners to determine recommended runway lengths for new runways or extensions to existing runways.

Critical Design Aircraft (FAA AC 150/5000-17)

- Both itinerant and local operations (excluding touch-and-go operations) count towards regular use
  - Itinerant - trips starts at the airport and ends elsewhere
  - Local - trip starts and ends at the airport



U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Critical Aircraft and Regular Use Determination
Date: 6/20/2017
AC No: 150/5000-17
Initiated By: APP-400

- Criteria to be considered
  - Critical Aircraft for runway length (i.e., longest runway length required)
  - Critical Aircraft Runway Design Code (RDC) – the combination of the most demanding AAC and ADG
  - Critical Aircraft or grouping of aircraft for runway length
  - Critical Aircraft or grouping of aircraft in the most demanding Taxiway Design Group (TDG)

The critical aircraft should operate 250 landings and 250 takeoffs (or 500 itinerant operations) at the airport

Steps in the Runway Length Analysis Procedure (5 steps)

1. Identify the list of potential critical airplanes
2. Identify the weights of the critical aircraft and associated weight class
   - If the aircraft MTOW < 60,000 then the method used is based on a "Family Grouping of Airplanes"
   - If the aircraft MTOW >= 60,000 then the method used is based on an "Individual analysis"
   - Regional Jets use the second method even if their weight is below 60,000 lb.
3. Use Table 1-1 and the critical aircraft in step 2 to decide on the recommended method for runway length required

Steps in the Runway Length Procedure (5 steps)

Table 1-1. Airplane Weight Categorization for Runway Length Requirements

Airplane Weight Category Maximum Certificated Takeoff Weight (MTOW)			Design Approach	Location of Design Guidelines
12,500 pounds (5,670 kg) or less	Approach Speeds less than 30 knots		Family grouping of small airplanes	Chapter 2; Paragraph 203
	Approach Speeds of at least 30 knots but less than 50 knots		Family grouping of small airplanes	Chapter 2; Paragraph 204
	Approach Speeds of 50 knots or more	With Less than 10 Passengers	Family grouping of small airplanes	Chapter 2; Paragraph 205 Figure 2-1
		With 10 or more Passengers	Family grouping of small airplanes	Chapter 2; Paragraph 205 Figure 2-2
Over 12,500 pounds (5,670 kg) but less than 60,000 pounds (27,200 kg)			Family grouping of large airplanes	Chapter 3; Figures 3-1 or 3-2 [1] and Tables 3-1 or 3-2
60,000 pounds (27,200 kg) or more or Regional Jets [2]			Individual large airplane	Chapter 4; Airplane Manufacturer Websites (Appendix 1)

Note [1]: When the design airplane's APM shows a longer runway length than what is shown in figure 3-2, use the airplane manufacturer's APM. However, users of an APM are to adhere to the design guidelines found in Chapter 4.

Note [2]: All regional jets regardless of their MTOW are assigned to the 60,000 pounds (27,200 kg) or more weight category.

Source: FAA 150/5325-4b

Steps in the Runway Length Procedure (5 steps)

4. Select the recommended runway length from various runway lengths generated in step # 3
5. Apply adjustments (if applicable) to the runway length obtained in step # 4 for aircraft with maximum takeoff gross weights between 12,500 lbs and 60,000 lbs
   - Runway gradient
   - Wet pavement conditions

Definition of Primary Runway

- Most airports require only one primary runway
- Primary runways are designed and oriented so that 95% of the time the design crosswind components are not exceeded (more later in the course)
- However, sometimes multiple primary runways are needed for:
  - Capacity reasons
  - To accommodate forecasted growth
  - To mitigate noise impacts
- Design objective for additional primary runways is contained in Table 1-2 of the FAA AC 150/5325-4b

Table 1-2 in FAA AC 150/5325-4b

Table 1-2. Runway Length for Additional Primary Runways

Runway Service Type, User	Runway Length for Additional Primary Runway Equals
Capacity Justification, Noise Mitigation, Regional Jet Service	100 % of the primary runway
Separating Airplane Classes - Commuter, Turboprop, General Aviation, Air Taxis	Recommended runway length for the less demanding airplane design group or individual design airplane

Table 1-3 in FAA AC 150/5325-4b

Table 1-3. Runway Length for Crosswind Runway

Runway Service	Runway Length for Crosswind Runway Equals
Scheduled [1] Such as Commercial Service Airports	100 % of primary runway length when built for the same individual design airplane or airplane design group that uses the primary runway
	100% of the recommended runway length determined for the lower crosswind capable airplanes using the primary runway
Non-Scheduled [2] Such as General Aviation Airports	100% of the recommended runway length determined for the lower crosswind capable airplanes using the primary runway

Note [1]: Transport service operated over routes pursuant to published flight schedules that are openly advertised with dates or times (or both) or otherwise made readily available to the general public or pursuant to mail contracts with the U.S. Postal Service (Bureau of Transportation Statistics, Department of Transportation (DOT)).

Note [2]: Revenue flights, such as charter flights that are not operated in regular scheduled service, and all non-revenue flights incident to such flights (Bureau of Transportation Statistics, DOT). For Federally funded programs, such as AIP, there must be at least 500 annual itinerant operations and 100% of the class.

Runway Length Based on Declared Distance Concept

- New runways are expected to be designed according to the principles of Tables 1-1 and 1-2 in the AC 150/5325-4b
- **Existing runways sometimes** do not meet all new safety criteria
- The **Declared Distance Concept** provides a rational procedure to define the operational features of such runways
- We will discuss this procedure later in this course

Runway Length for Small Aircraft with Maximum Takeoff Weight < 12,500 lb (5,670 kg)

- Inputs to the procedure:
- Critical aircraft
- Approach speed (30% above the stalling speed)
- Number of passenger seats
- Airport elevation above mean sea level
- Mean daily maximum temperature of the hottest month of the year
- Use Figures 2-1 and 2-2 in AC 150/5325-4b
- No adjustment for runway gradient or wet pavement (e.g., landing performance)

The method for aircraft with Maximum Takeoff Weight < 12,500 lbs in TFAA AC 150/5325-4b will be replaced with SARLAT 2 (later this year)

Small Airplanes with Approach Speeds < 30 knots

- This group includes ultralight aircraft
- **Recommended runway 300 feet (92 meters) at mean sea level conditions**
- Increase runway by 30 feet for every 1000 feet in airfield elevation (0.03 x airfield elevation)
- In the U.S. ultralights are regulated by FAR Part 103
- Web links:
- FAR 103 (https://www.ecfr.gov/current/title-14/chapter-I/subchapter-F/part-103)

Small Airplanes with Approach Speeds > 30 knots and < 50 knots

- This group includes **Light Sport Aircraft (LSA)**
- **FAA recommends an 800-foot (244 meters) runway at mean sea level conditions**
- Increase runway by 80 feet for every 1000 feet in airfield elevation (0.08 x airfield elevation)
- Web links:
- FAA LSA: https://www.faa.gov/aircraft/gen_av/light_sport

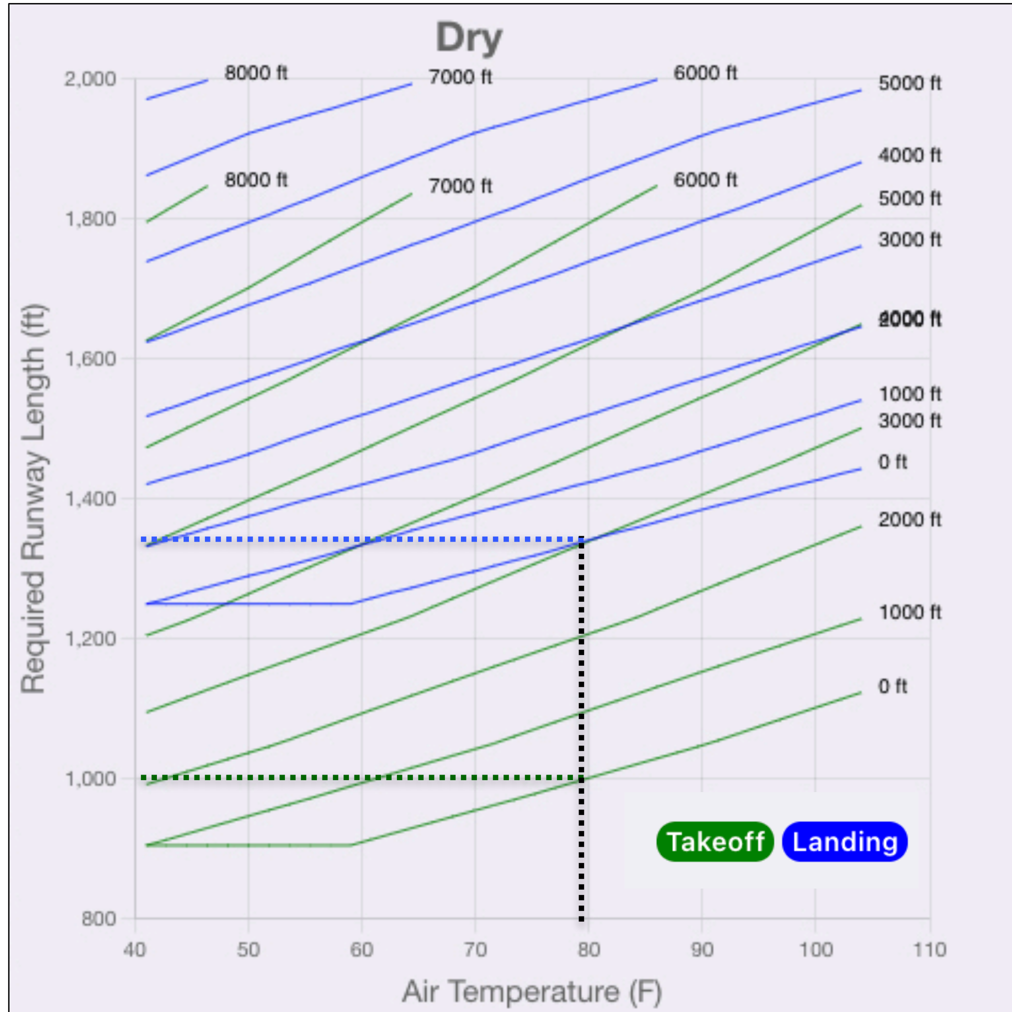
Light Sport Aircraft (LSA)

- Maximum takeoff gross weight : 1,320 lbs (600 kilograms)
- 1,430 lbs if LSA is a seaplane
- Two seats
- 120 knots maximum cruise speed
- Maximum stall speed : 45 knots
- One engine
- Fixed pitch propeller
- Fixed landing gear

Virginia Tech Recommendation for LSA Aircraft

- Based on recent analysis at Virginia Tech for the FAA we recommend:
  - 1,000 ft for takeoff at sea level and 80 deg. F.
  - **1,350 ft** for landing at sea level at 80 deg. F.

Data for the Flight Design CTLS

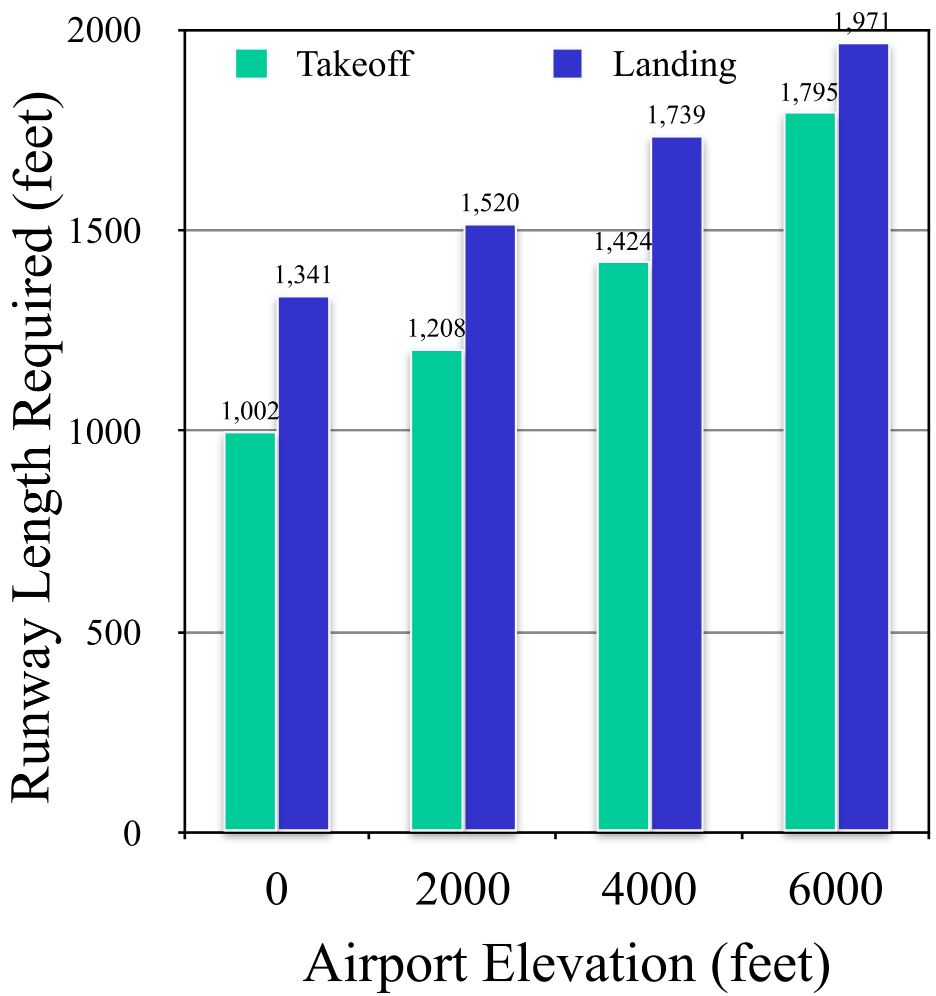


Small Aircraft Runway Length Analysis Tool

Analysis of LSA Aircraft performance Using SARLAT

Airport Elevation (feet)	Takeoff Runway Length (feet)	Landing Runway (feet)	Delta from Datum Point (%)
Sea Level	1,002	1,341	0
2,000	1,208	1,520	13.3
4,000	1,424	1,739	29.7
6,000	1,795	1,971	47.0

The actual LSA performance indicates an increase of 8% for each 1,000 feet in airport elevation



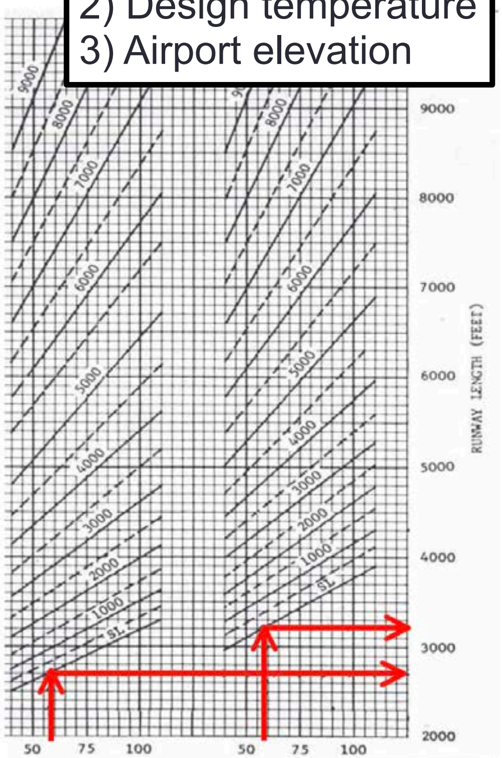
Small Aircraft Runway Length Analysis Tool

Small Airplanes with Approach Speeds > 50 knots or MTOW < 12,500 lb

- This group includes most of the General Aviation (GA) aircraft
- Use Figure 2-1 and 2-2 in the FAA AC 150/5325-4b
- Figure 2-1
  - Aircraft with less than 10 seats (excluding pilot and co-pilot)
  - Two family group designs (95% and 100% of the fleet)
- Figure 2-2
  - Aircraft with more than 10 seats (excluding pilot and co-pilot)

FAA AC 150/5325-4B Method to Estimate Runway Length

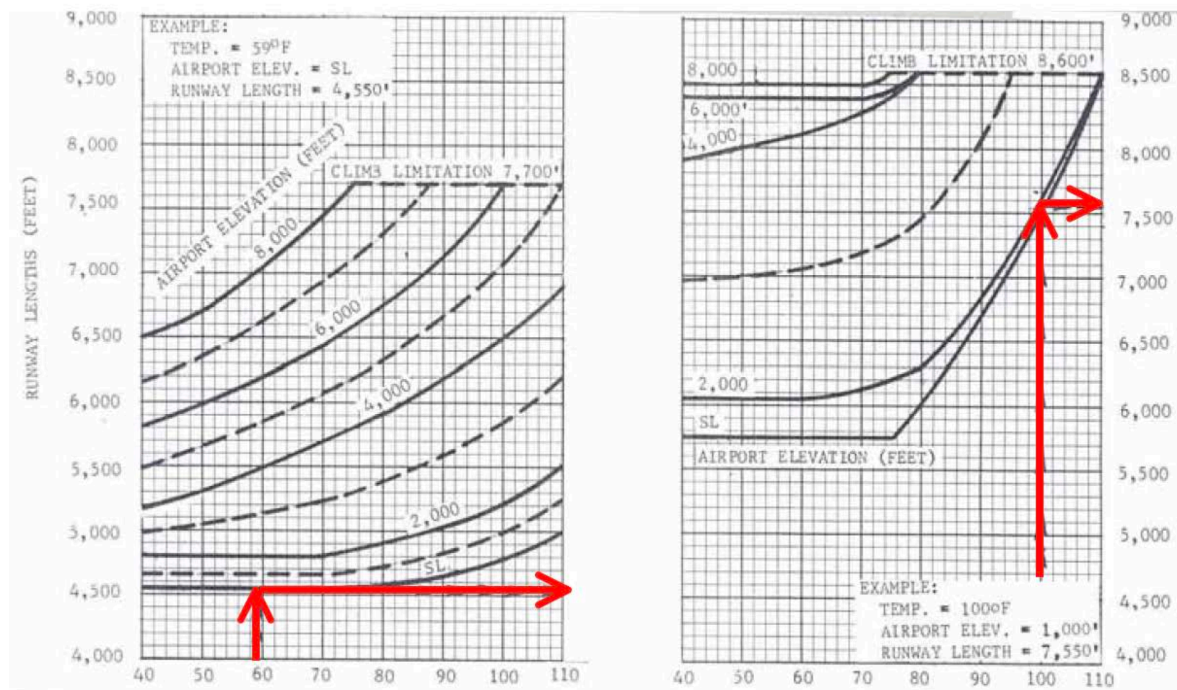
Inputs:
1) Fleet
2) Design temperature
3) Airport elevation



Mean Daily Maximum Temperature of the Hottest Month of Year (Degrees F)

Aircraft with Max. Takeoff Weights Up to 12,500 lbs. (Chapter 2)

Figure 3-1. 75 Percent of Fleet at 60 or 90 Percent Useful Load



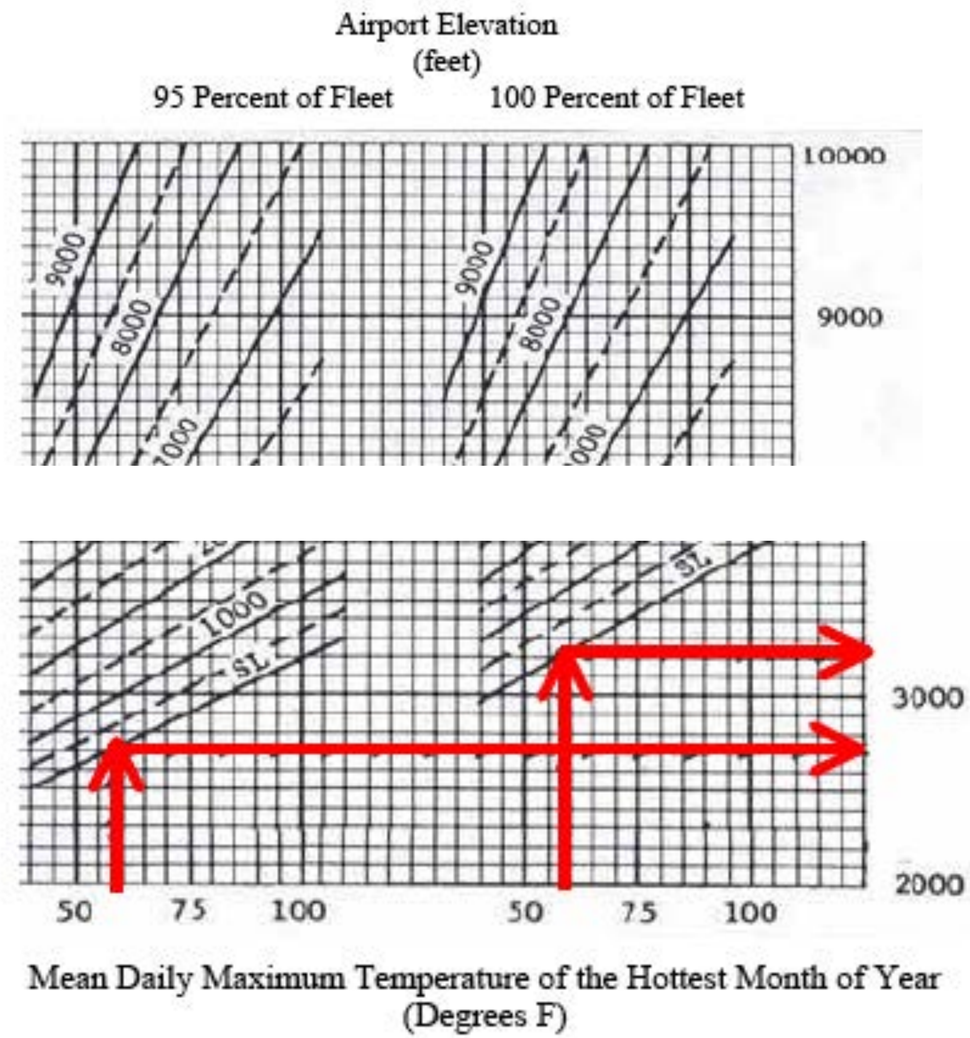
Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

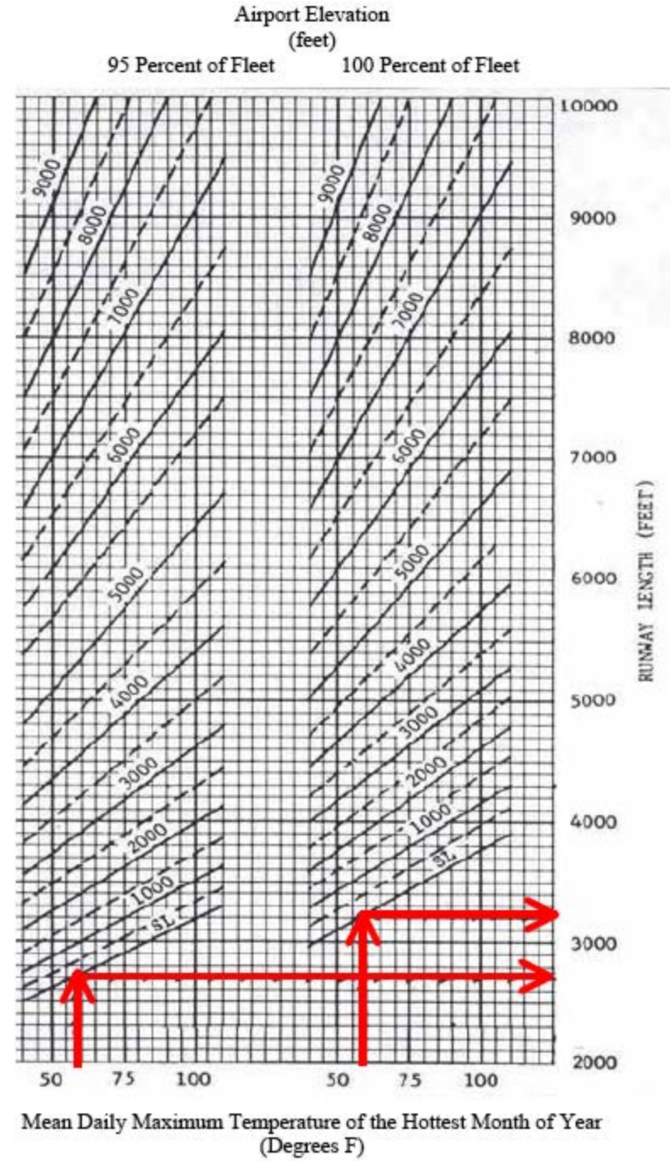
75 percent of feet at 60 percent useful load

75 percent of feet at 90 percent useful load

Aircraft with Max. Takeoff Weights 12,501 to 60,000 lbs. (Chapter 3)

Figure 2-1 in AC 150/5325-4b

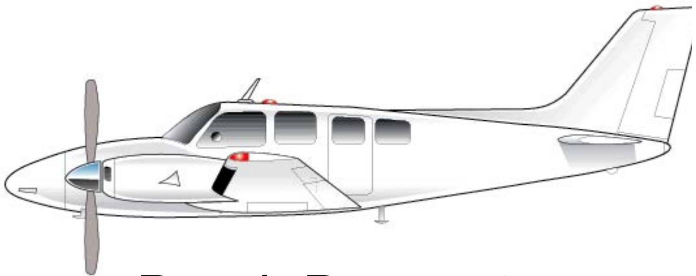




Selection of Percent of the Fleet

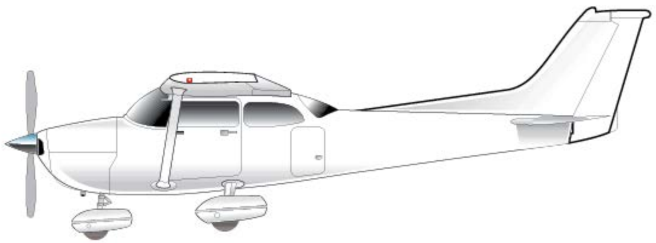
- **95 Percent of Fleet**
  - "This category applies to airports that are primarily intended to **serve medium size population communities** with a diversity of usage and a greater potential for increased aviation activities. Also included in this category are those airports that are primarily intended to serve low-activity"
- **100 Percent of Fleet**
  - "This type of airport is primarily intended to serve communities located on the fringe of **a metropolitan area or a relatively large population** remote from a metropolitan area"

Small Aircraft < 10 seats (and <12,500 lbs)



Beech Baron 58

Cessna 421

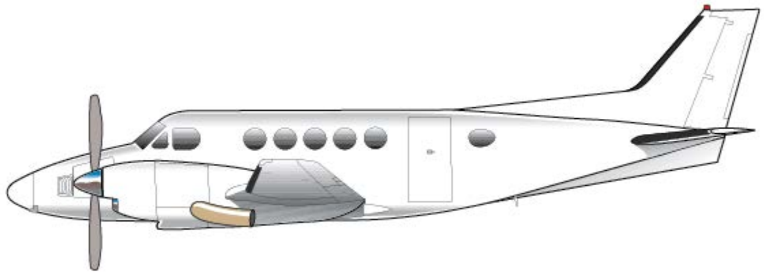


Cessna 172

Shrike Commander

Cessna 208 Caravan

Figure 2-2 in AC 150/5325-4b



Raytheon Beech King Air A100

Raytheon B80 Queen Air
Raytheon E90 King Air
Raytheon B99 Airliner
Raytheon A100 King Air
(Raytheon formerly Beech Aircraft)

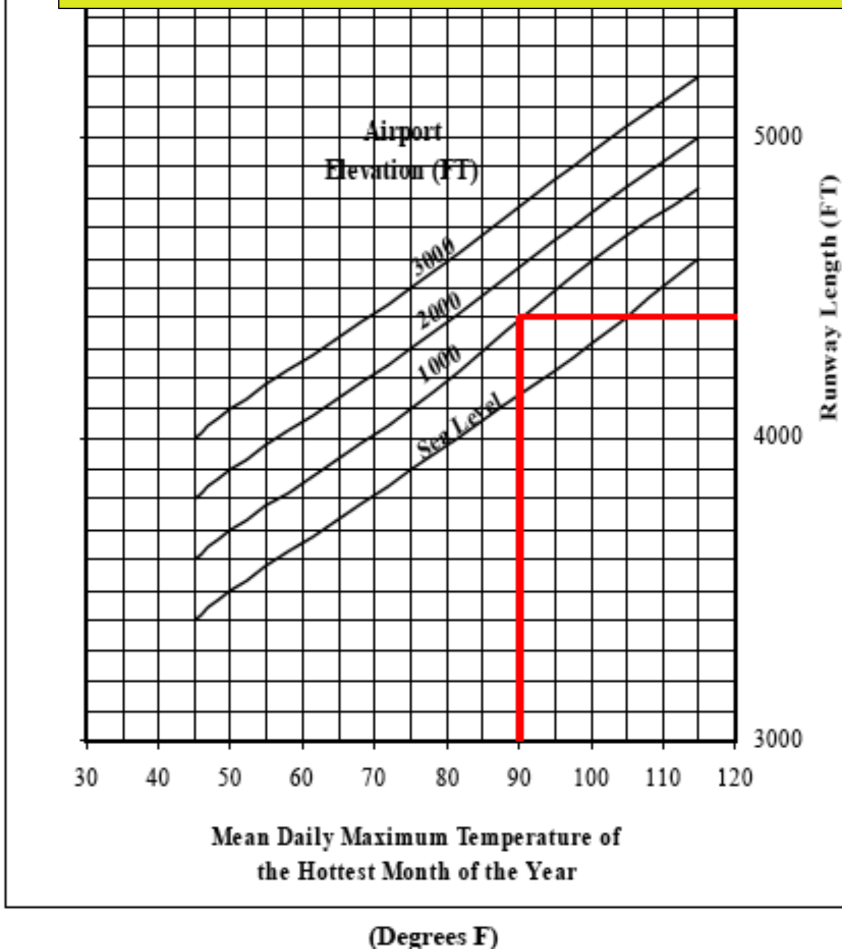
Britten-Norman
Mark III-I Trilander

Mitsubishi MU-2L

Swearigen Merlin III-A
Swearigen Merlin IV-A
Swearigen Metro II

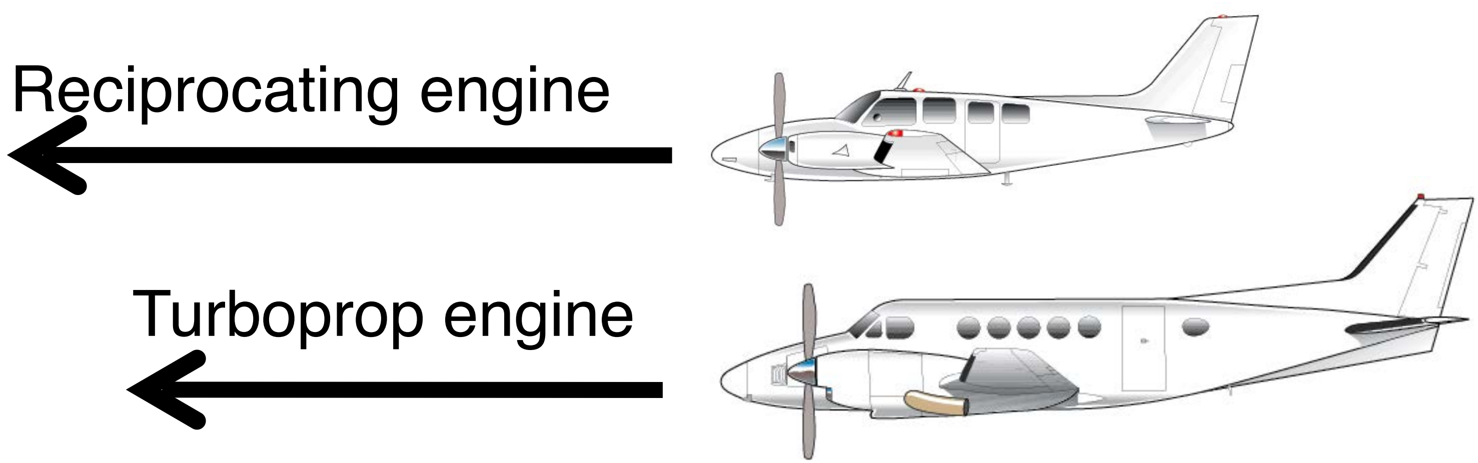
Representative Aircraft

For airfield elevations above 3,000 feet (914 meters) use the 100% fleet graph in Figure 2-1 instead of Figure 2-2



Important Design Consideration

- For airfield elevations above 3,000 feet (914 meters) use the 100% fleet graph in Figure 2-1 instead of Figure 2-2
- Reason:
- Small aircraft in Figure 2-1 are have reciprocating engine technology that is more prone to "power" degradation with altitude that aircraft included in Figure 2-2

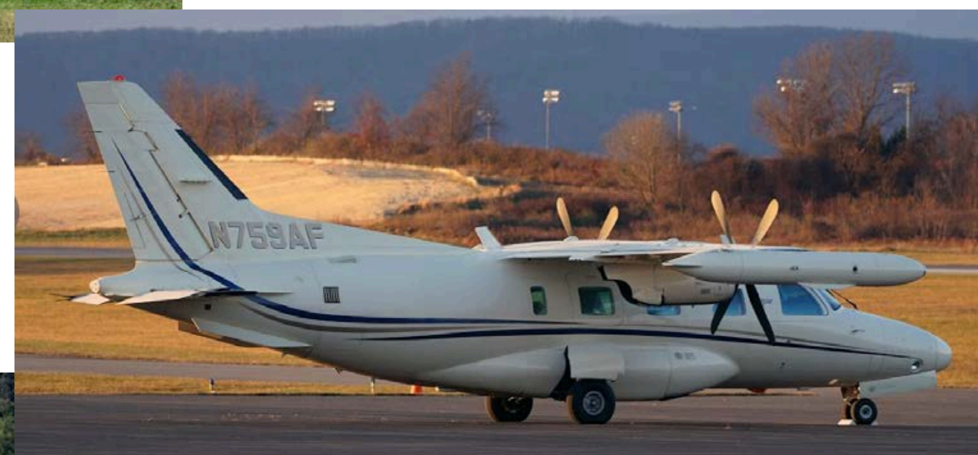


Runway length at high airport elevation

Representative Aircraft with More than 10 Seats

Raytheon Beechcraft King Air 360
ADG II and AAC B

Mitsubishi MU-2B 60 (Long)
ADG I and AAC B



Swearinger Merlin Metro III
ADG II and AAC B

Assumptions in the Development of Curves (applies to curves in Figure 2-1 and 2-2)

- Curves shown in Figures 2-1 and 2-2 comply with Federal Aviation Regulations (FAR) Part 23
- FAR Part 23 applies to the certification of small aircraft
- Assume the following conditions:
  - Zero wind
  - MTOW or MALW
  - Airport elevation and temperature are parameters
- A 10% increase in the runway length values has been accounted for to **compensate for humidity and runway gradient**

Assumptions in the Development of Curves (applies to Figure 2-2)

- Figure 2-2 includes **accelerate and stop distance** calculations for aircraft with more than 10 seats
- Figure 2-1 does not include accelerate and stop distance criteria
- In general, takeoff is the critical maneuver to determine runway length

Runway Length for Small Aircraft with MTOW > 12,500 lb (5,670 kg) and less than 60,000 lb (27,200 kg)

- Inputs to the procedure:
  - Airport elevation (above mean sea level)
  - Mean daily maximum temperature of the hottest month of the year
  - Use Figures 3-1 and 3-2 in AC 150/5325-4b
  - Requires adjustment for runway gradient or wet pavement (e.g., landing performance)

Runway Length for Small Aircraft with MTOW > 12,500 lb (5,670 kg) and less than 60,000 lb (27,200 kg)

- Use Tables 3-1 and 3-2 to determine the design group to use
- Determine the useful load factor (between 60% and 90%)
- Above 5,000 feet (airport elevations) the runway lengths for these aircraft might be less than those for smaller aircraft < 12,500 lb
- Curves are limited to 8,000 feet (2,439 meters)
- For higher elevations consult the aircraft manufacturers
- This procedure does not include runway length for air carriers

Explanation of Useful Load

- Useful load is the weight an aircraft can carry including:
  - Pilot(s)
  - Passengers
  - Baggage
  - Cargo
  - Usable fuel

Beechcraft King Air B350

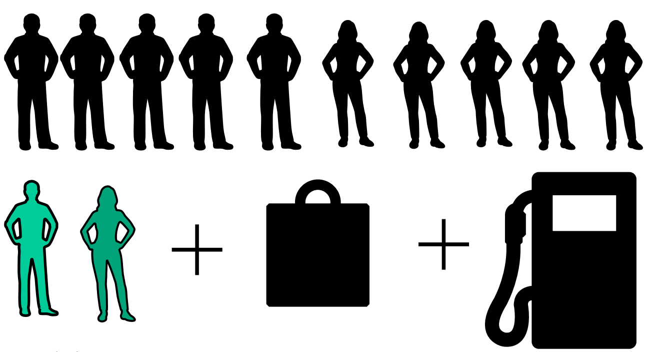
Aircraft Name	FAA Type Designator	Engine Type	Aircraft Design Group (ADG)	Aircraft Approach Category (AAC)	Weight Category	Operating Empty Weight (OEW)	Useful Load	Maximum Takeoff Weight (MTOW)	Maximum Allowable Landing Weight (MALW)
Turboprop									
Beechcraft King Air 350ER	B350	Turboprop	II	B	L	10385 lbs	6115 lbs	16500 lbs	15675 lbs

Source: SARLAT Tool

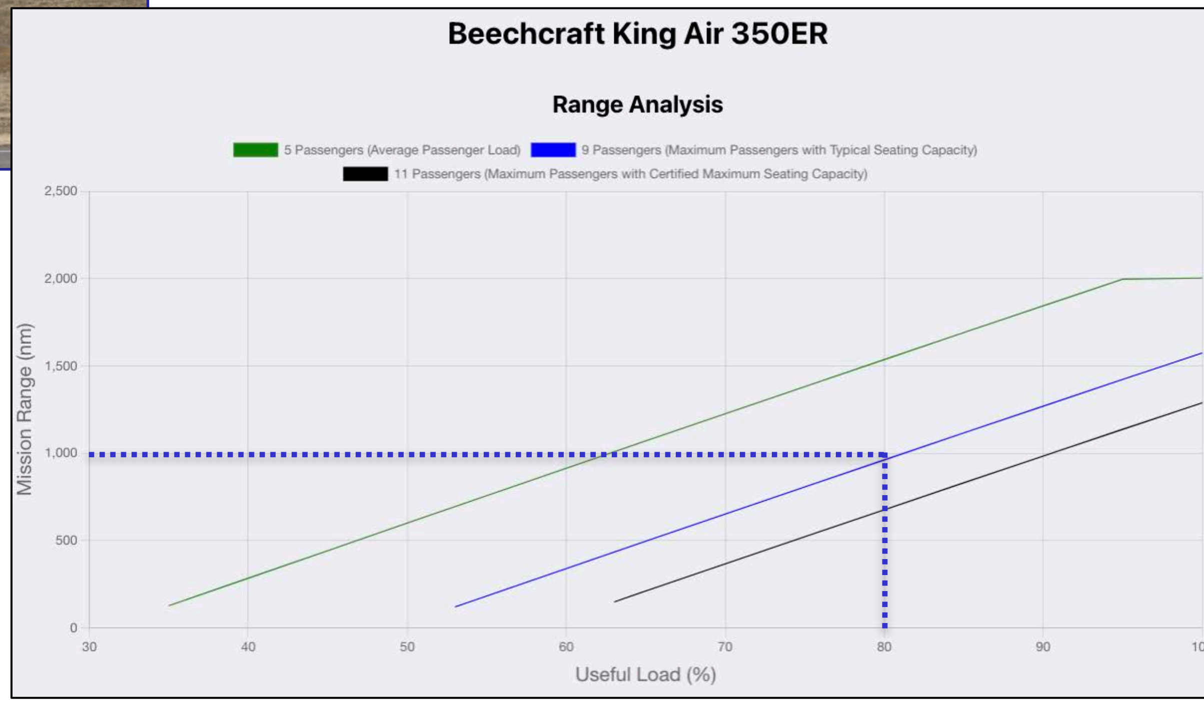
Useful Load and Mission Range

Beechcraft King Air B350

Passengers



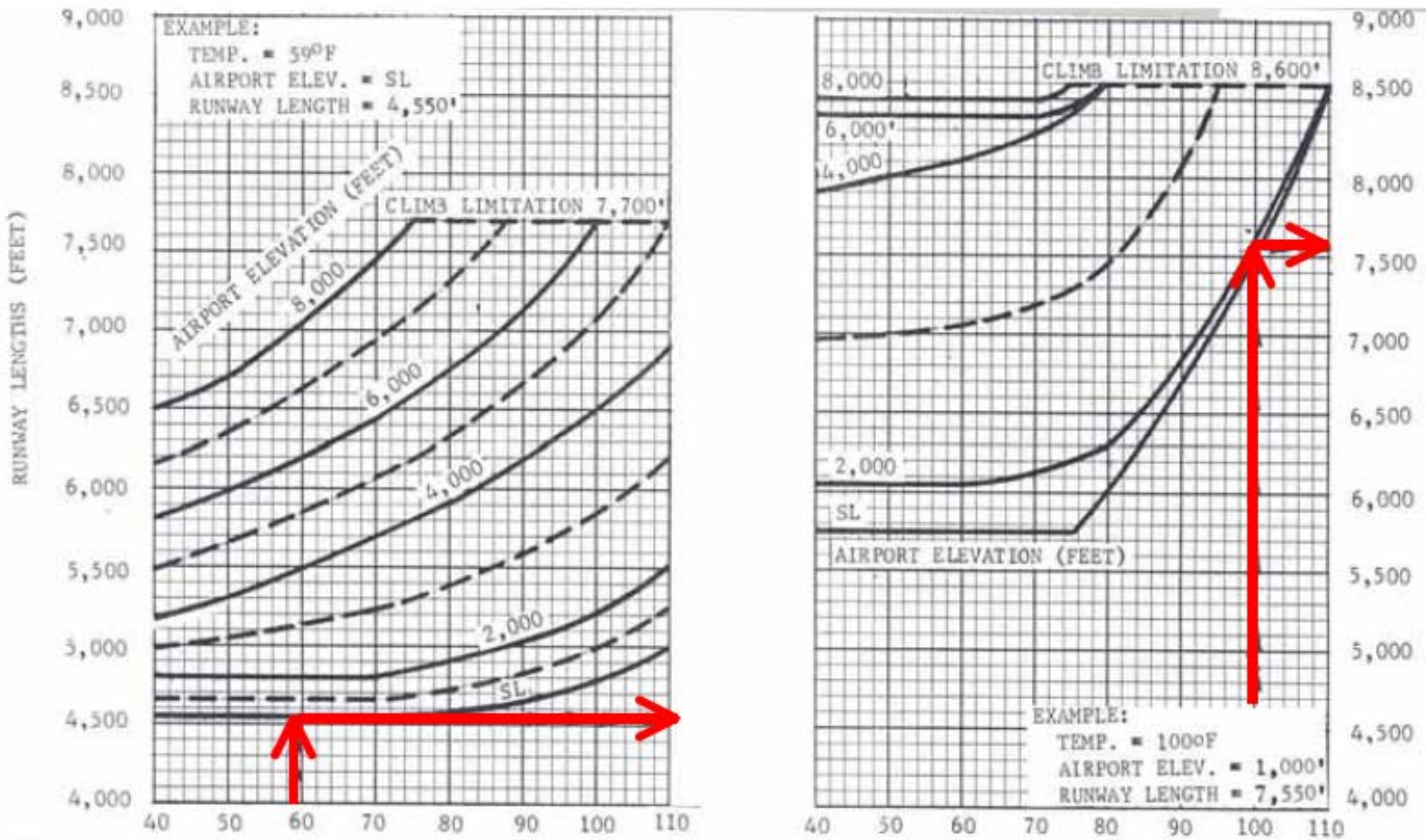
Pilots + Baggage + Fuel



Source: SARLAT 2 Tool

The Beechcraft King Air B350ER can fly 1000 nm with nine passengers, two pilots, and fuel. The takeoff useful load is 80%.

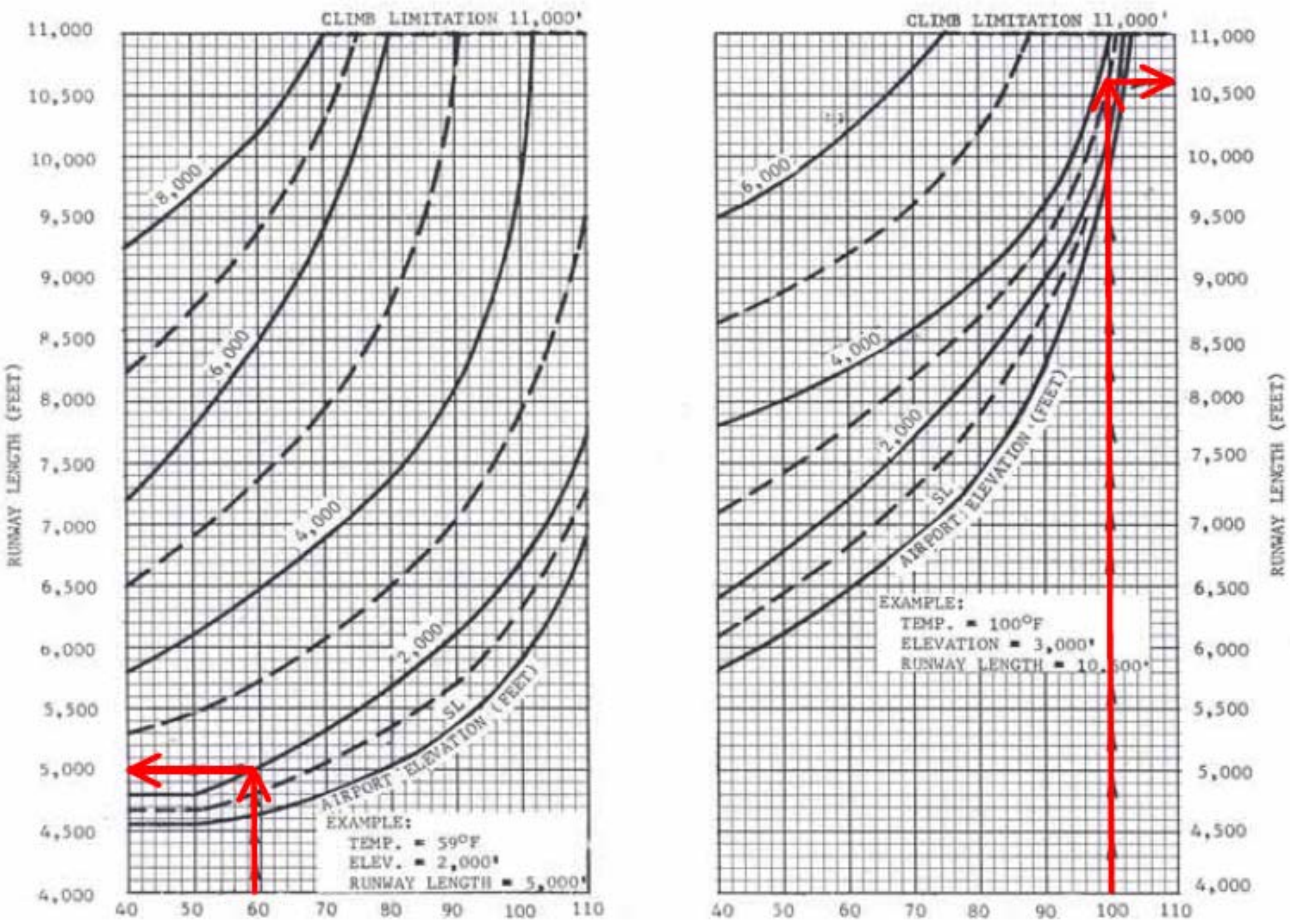
Figure 3-1 75% of Fleet (60 and 90% Useful Load)



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

75 percent of feet at 60 percent useful load | **75 percent of feet at 90 percent useful load**

Figure 3-2 100% of Fleet (60 and 90% Useful Load)



Mean Daily Maximum Temperature of Hottest Month of the Year in Degrees Fahrenheit

100 percent of feet at 60 percent useful load

100 percent of feet at 90 percent useful load

Sample Aircraft in 75% of the Fleet

Manufacturer	Model	Manufacturer	Model
Aerospatiale	Sn-601 Corvette	Dassault	Falcon 10
Bae	125-700	Dassault	Falcon 20
Beech Jet	400A	Dassault	Falcon 50/50 EX
Beech Jet	Premier I	Dassault	Falcon 900/900B
Beech Jet	2000 Starship	Israel Aircraft Industries (IAI)	Jet Commander 1121
Bombardier	Challenger 300	IAI	Westwind 1123/1124
Cessna	500 Citation/501Citation Sp	Learjet	20 Series
Cessna	Citation I/II/III	Learjet	31/31A/31A ER
Cessna	525A Citation II (CJ-2)	Learjet	35/35A/36/36A

Aircraft for Figure 3-1

Source: FAA AC 150/5325-4b

Cessna Citation CJ2

Bombardier Learjet 31A

Sample Aircraft in the Remaining 25% of the Fleet

Manufacturer	Model
Bae	Corporate 800/1000
Bombardier	600 Challenger
Bombardier	601/601-3A/3ER Challenger
Bombardier	604 Challenger
Bombardier	BD-100 Continental
Cessna	S550 Citation S/II
Cessna	650 Citation III/IV
Cessna	750 Citation X
Dassault	Falcon 900C/900EX
Dassault	Falcon 2000/2000EX

Source: FAA AC 150/5325-4b

Aircraft for Figure 3-2

Aircraft MTOW > 12,500 lb. (5,670 kg) and less than 60,000 lb. (27,200 kg)

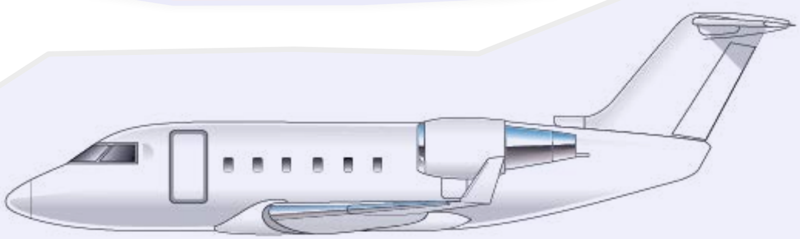
Aircraft for Figure 3-1

Beech King Air 350

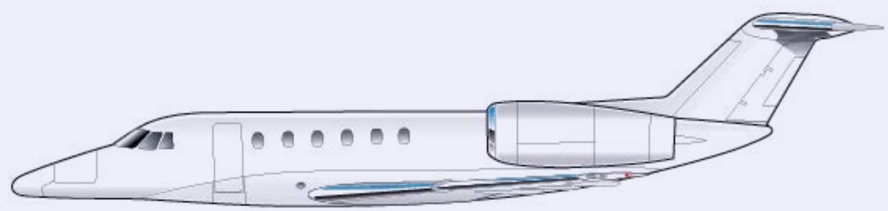
Cessna Citation II (550)

Aircraft for Figure 3-2

Dassault Falcon 900c



Bombardier CL 601



Cessna Citation X (750)

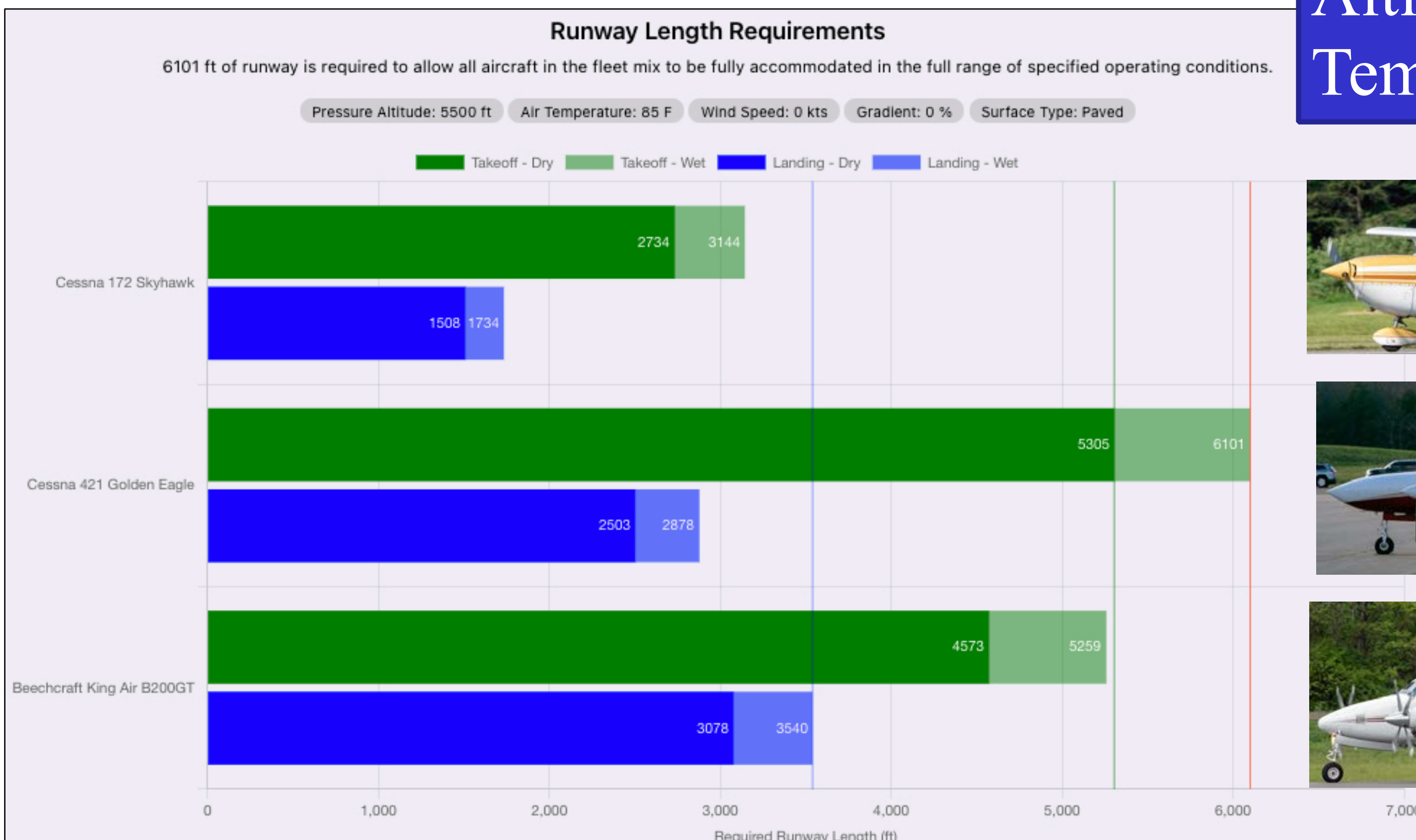
Runway Length Adjustments Small Aircraft MTOW > 12,500 lb (5,670 kg) and less than 60,000 lb (27,200 kg)

- Values shown in Figures 3-1 and 3-2 apply with zero wind conditions and dry runway pavements
- Effective gradient correction (takeoff case)
  - Increase runway length by 10 feet (3.05 meters) for every foot (0.305 meters) of runway elevation difference (low-high)
- Wet and slippery runway correction (landing case)
  - Increase values obtained using the 60% useful load by 15% (for turbojet powered aircraft) up to 5,500 feet whichever is less
  - Increase values obtained using the 90% useful load by 15% (for turbojet powered aircraft) up to 7,000 feet whichever is less

Final Note on Runway Length for Small Aircraft

- For high elevation airports, the performance of smaller aircraft below 12,500 lb may be critical
- Example analysis using the SARLAT tool.
- The Cessna 421C (piston-powered) is the critical aircraft

Altitude = 5,500 ft
Temp. 85 deg. F



Example: BCB Improvements

- Airport: BCB (Blacksburg)
- Issue: **Improve the airport to serve 75% of the aircraft population < 60,000 lbs and 60% of useful load**
  - Airport elevation = 2,132 feet
  - Mean daily maximum temperature of the hottest month of the year = 83 ^{o}F
  - Obtained from average high temperatures on the weather channel (or at NOAA)

Information about BCB Airport (source: www.airnav.com)

KBCB **Virginia Tech/Montgomery Executive Airport**
Blacksburg, Virginia, USA

GOING TO BLACKSBURG? Reserve a Hotel Room | Rent a Car

FAA INFORMATION EFFECTIVE 15 JANUARY 2009

Location

FAA Identifier:	BCB
Lat/Long:	37-12-27.5000N / 080-24-28.2000W 37-12.458333N / 080-24.470000W 37.2076389 / -80.4078333 (estimated)
Elevation:	2132 ft. / 649.8 m (surveyed)
Variation:	06W (1985)
From city:	3 miles S of BLACKSBURG, VA
Time zone:	UTC -5 (UTC -4 during Daylight Savings Time)
Zip code:	24060

Satellite View of BCB Airport in Spring 2019 (source: Google Maps)

BCB Mean Maximum Daily Temperature Profiles

(source: www.weather.com)

https://crt-climate-explorer.nemac.org/climate_graphs/

BCB Runway Information in Spring 2019 (source: www.airnav.com)

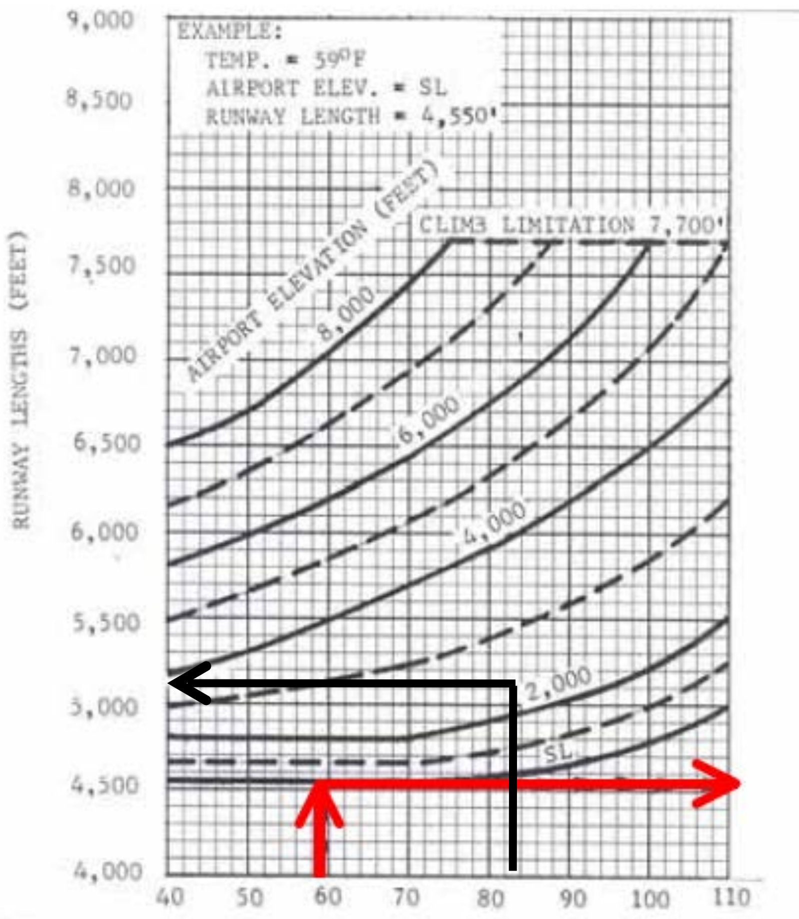
Runway Information

Runway 12/30

	RUNWAY 12	RUNWAY 30
Dimensions:	4539 x 100 ft. / 1383 x 30 m	
Surface:	asphalt, in fair condition	
Runway edge lights:	medium intensity	
Latitude:	37-12.629310N	37-12.287662N
Longitude:	080-24.886423W	080-24.054668W
Elevation:	2112.7 ft.	2131.7 ft.
Gradient:	0.4% UP	0.4% DOWN
Traffic pattern:	left	left
Runway heading:	123 magnetic, 117 true	303 magnetic, 297 true
Markings:	nonprecision, in fair condition	nonprecision, in fair condition
Visual slope indicator:	4-light PAPI on left (3.00 degrees glide path)	2-light PAPI on left (3.75 degrees glide path)
Approach lights:	ODALS: omnidirectional approach lighting system	NSTD
Runway end identifier lights:		yes
Touchdown point:	yes, no lights	yes, no lights
Instrument approach:	LOC/DME	
Obstructions:	24 ft. road, lighted, 600 ft. from runway, 309 ft. right of centerline, 16:1 slope to clear	12 ft. brush, 275 ft. from runway, 154 ft. right of centerline, 6:1 slope to clear

Runway Length Calculation

- Use Figure 3-1 and 60% useful load curve
- Recall: 75% of the GA and corporate jet population is served by this analysis
- **Runway length = 5,200 feet**



Mean daily maximum temperature °F

Runway Length Estimation (BCB) Corrections

- Effective gradient correction (takeoff case)
  - Increase runway length by 10 feet (3.05 meters) for every foot (0.305 meters) of runway elevation difference (low-high)
  - 0.4% grade implies a delta elevation of around 18 feet
  - **Increase Runway Length by 180 feet (or 5380 feet)**
- Wet and slippery runway correction (landing case)
  - Increase values obtained using the 60% useful load by 15% (for turbojet powered aircraft) up to 5,500 feet whichever is less
  - **Min (5980 feet, 5500 feet) = 5,500 feet**

Runway Improvement at BCB

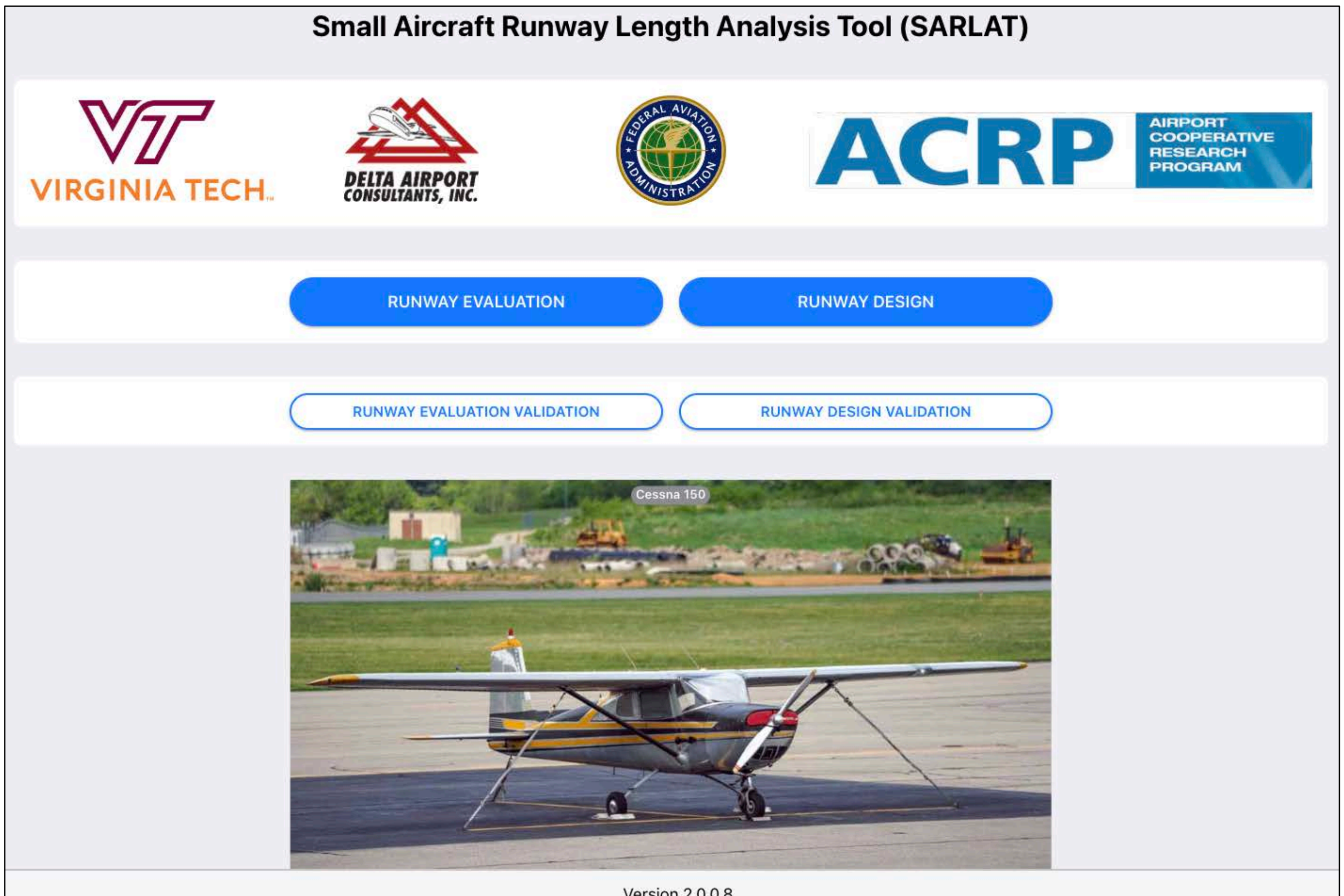
- BCB requires a **5,500 feet runway according to the design procedure**
- Accommodates 75% of the aircraft population below 60,000 lb at 60% useful load factor
- This improvement would better serve a higher population of corporate jets in the U.S.
- During football games many small corporate jets operate in and out of the airport

Blacksburg Montgomery Executive Airport (BCB) ramp during a football game

Satellite View of BCB Airport in Spring 2022 (source: Google Maps)

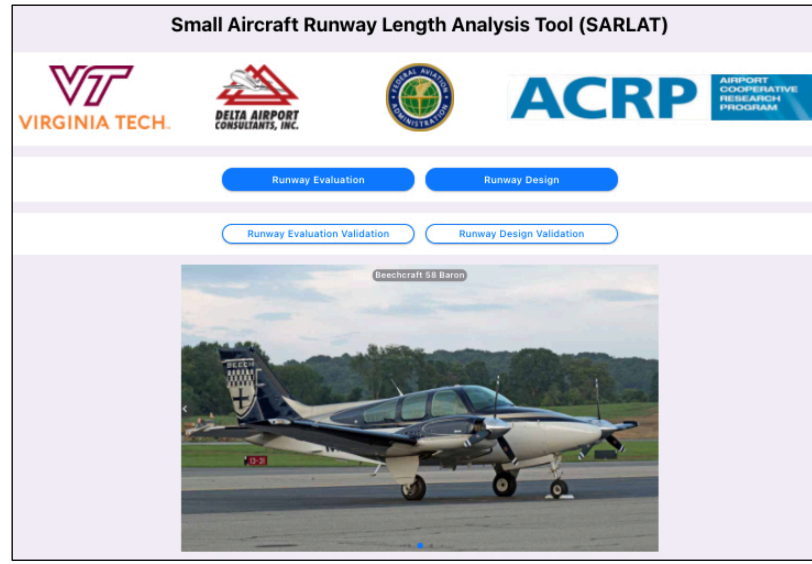
Small Aircraft Runway Analysis Tool (SARLAT)

Computer Software Tool to Estimate Runway length for Small Aircraft



New FAA Guidance for Airport Projects Requires Using the Small Aircraft Runway Length Analysis Tool (SARLAT)

- A computer program developed at the Virginia Tech Air Transportation Systems Laboratory
- SARLAT includes detailed runway performance data for forty two representative small aircraft
  - Includes business jets weighing up to 76,000 lbs
  - Includes dozens of single-engine and multi-engine piston aircraft
  - Includes representative turboprop aircraft



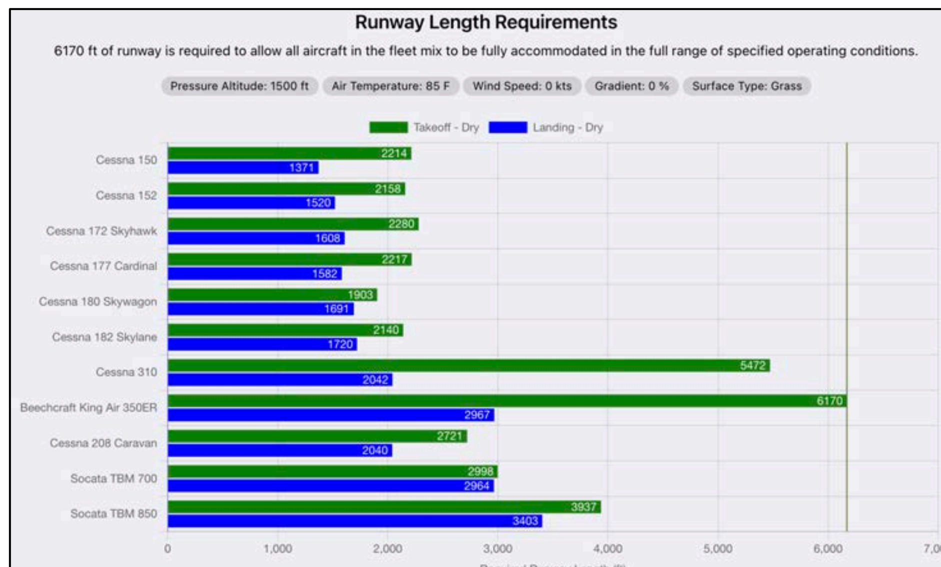
http://128.173.204.63/cee4674/cee4674_pub/SARLAT_Tool_UserGuide_128.pdf

Get the SARLAT User Guide at the link above

SARLAT Tool

- Stand-alone tool
- Consider individual aircraft performance
- Consider all airport design factors
  - Temperature
  - Wind conditions
  - Airport elevation
  - Aircraft climb limits (if applicable)
  - Aircraft useful load
- Produce runway length requirements for both takeoff and landing conditions

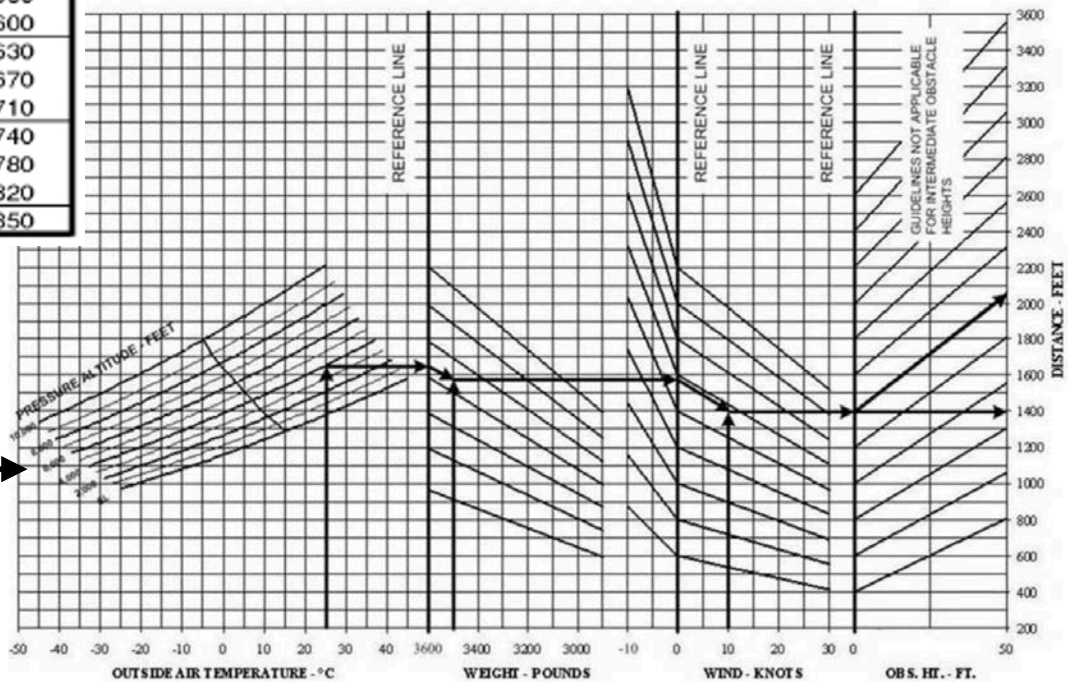
SARLAT uses Javascript and Matlab
Runs on Windows and Mac OS systems



SARLAT 2 : Data Gathering and Analysis

WEIGHT = 16500 POUNDS VREF = 111 KIAS VAPP = 117 KIAS					
TEMP DEG C	TAILWIND 10 KTS	ZERO WIND	HEADWINDS 10 KTS	HEADWINDS 20 KTS	HEADWINDS 30 KTS
–25	3290	2760	2600	2450	2300
–20	3330	2790	2640	2490	2340
–15	3370	2830	2680	2520	2370
–10	3410	2870	2710	2560	2410
–5	3450	2910	2750	2600	2450
0	3490	2950	2790	2640	2490
5	3540	2990	2830	2670	2520
10	3580	3030	2870	2710	2560
15	3620	3070	2910	2750	2600
20	3660	3110	2950	2790	2630
25	3710	3150	2990	2830	2670
30	3750	3190	3020	2860	2710
35	3790	3230	3060	2900	2740
40	3830	3270	3100	2940	2780
45	3870	3310	3140	2980	2820
50	3910	3340	3180	3010	2850

Cessna Citation 560XL



Columbia 400

SARLAT 2 : Translate Data Into a Common Graphical Format

Cessna Citation Jet 3 Data

Elevation = Sea Level								
Ambient Temp	Takeoff Weight (lb)							
°C / °F	13,870	13,400	13,000	12,500	12,000	11,500	11,000	10,000
10 / 50	3,130	2,940	2,820	2,700	2,580	2,570	2,580	2,640
15 / 59	3,180	2,990	2,870	2,740	2,620	2,600	2,610	2,670
20 / 68	3,230	3,040	2,910	2,780	2,660	2,630	2,650	2,710
25 / 77	3,290	3,090	2,960	2,820	2,700	2,660	2,680	2,740
30 / 86	3,440	3,230	3,070	2,900	2,770	2,640	2,630	2,680
35 / 95	3,690	3,460	3,280	3,060	2,860	2,720	2,600	2,570
40 / 104	4,030	3,740	3,530	3,290	3,070	2,850	2,680	2,450
45 / 113	4,480	4,130	3,850	3,540	3,290	3,060	2,840	2,510
50 / 122	5,050	4,610	4,280	3,900	3,550	3,280	3,040	2,600
55 / 131	—	5,180	4,770	4,310	3,910	3,550	3,240	2,760
Climb Wght Temp Limits °C/°F	54/129	55/131	55/131	55/131	55/131	55/131	55/131	55/131
Field Length at Temp Limits (ft)	5,580	5,180	4,770	4,310	3,910	3,550	3,240	2,760

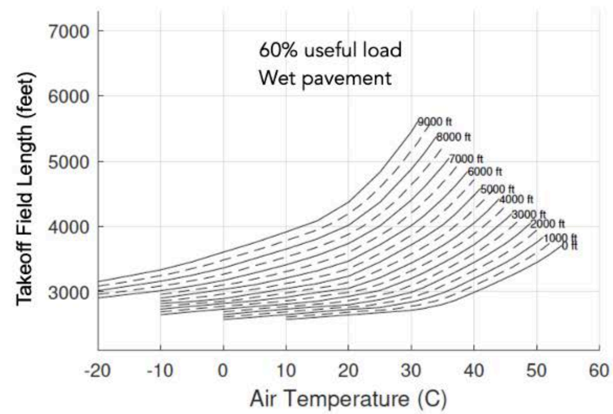
Elevation = 3,000 Feet								
Ambient Temp	Takeoff Weight (lb)							
°C / °F	13,870	13,400	13,000	12,500	12,000	11,500	11,000	10,000
-10 / 14	3,220	3,030	2,910	2,780	2,660	2,640	2,660	2,720
0 / 32	3,330	3,130	3,010	2,870	2,750	2,720	2,740	2,800
10 / 50	3,470	3,260	3,110	2,980	2,840	2,780	2,790	2,850
15 / 59	3,610	3,390	3,220	3,040	2,910	2,780	2,770	2,810
20 / 68	3,760	3,530	3,340	3,120	2,980	2,840	2,740	2,780
25 / 77	4,000	3,740	3,540	3,300	3,080	2,920	2,780	2,700
30 / 86	4,330	4,010	3,790	3,530	3,290	3,050	2,870	2,600
35 / 95	4,800	4,420	4,110	3,800	3,530	3,280	3,040	2,680
40 / 104	5,450	4,970	4,610	4,200	3,830	3,540	3,270	2,800
45 / 113	—	5,650	5,190	4,690	4,250	3,850	3,510	2,990
Climb Wght Temp Limits °C/°F	44/111	47/117	47/117	47/117	47/117	47/117	47/117	47/117
Field Length at Temp Limits (ft)	6,080	5,980	5,470	4,920	4,440	4,010	3,640	3,070

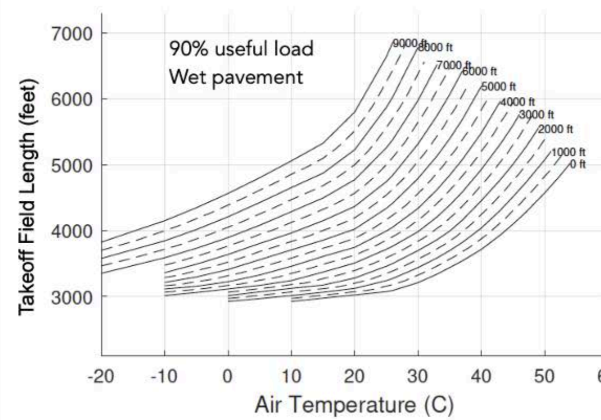
Climb Limits Considered

Intermediate Step

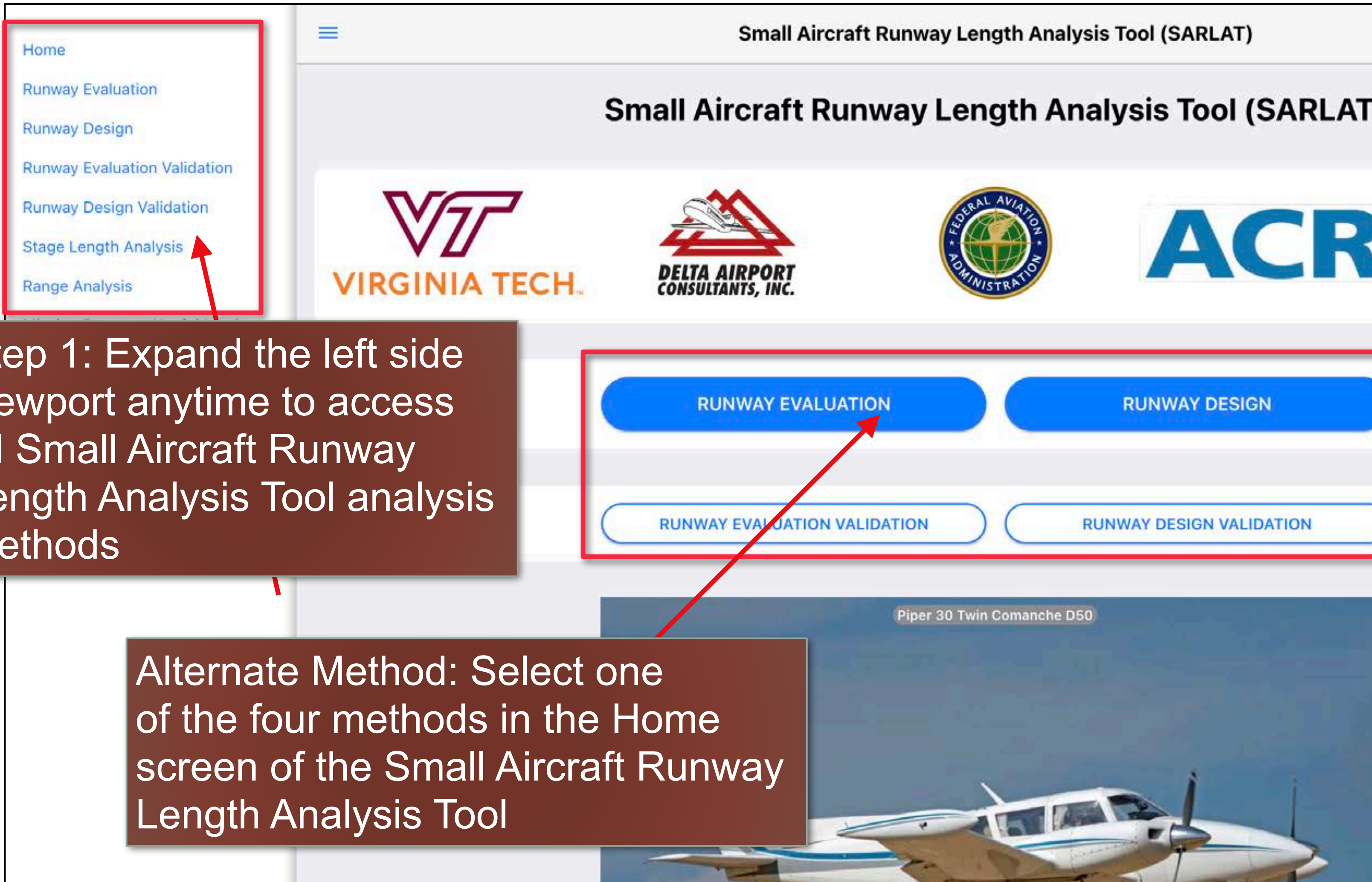
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1		-20	-10	-5	0	5	10	15	20	24	25	27	30	31	34	35	37	40	41	44	45	48	50
2	0						3130	3180	3230	3274	3290	3337	3440	3480	3633	3690	3813	4030	4110	4381	4480	4809	5050
3	1000				3120	3176	3230	3280	3340	3429	3460	3539	3690	3740	3904	3970	4130	4420	4521	4850	4970	5365	5650
4	2000				3230	3274	3330	3400	3520	3666	3710	3803	3970	4034	4263	4350	4547	4890	5011	5407	5550	6030	
5	3000		3220	3271	3330	3391	3470	3610	3760	3945	4000	4118	4330	4411	4693	4800	5038	5450	5597	6080			
6	4000		3330	3369	3440	3557	3710	3870	4050	4282	4350	4491	4740	4839	5197	5330	5617	6110	6300				
7	5000		3440	3529	3650	3810	3990	4180	4380	4664	4750	4937	5270	5394	5822	5980	6340						
8	6000		3600	3751	3920	4110	4320	4530	4780	5099	5200	5439	5880	6041	6590								
9	7000	3580	3860	4038	4240	4460	4690	4920	5240	5659	5790	6100	6670	6890									
10	8000	3840	4180	4380	4600	4840	5100	5360	5760	6343	6520	6930											
11	9000	4150	4530	4750	5010	5280	5570	5880	6450	7560													

Final Presentation In SARLAT





Small Aircraft Runway Length Analysis Tool Menu Structure and Interface



Step 1: Expand the left side viewport anytime to access all Small Aircraft Runway Length Analysis Tool analysis methods

Alternate Method: Select one of the four methods in the Home screen of the Small Aircraft Runway Length Analysis Tool

Runway Evaluation Mode

Objective: Determine if a group of **aircraft can safely operate** from an existing runway

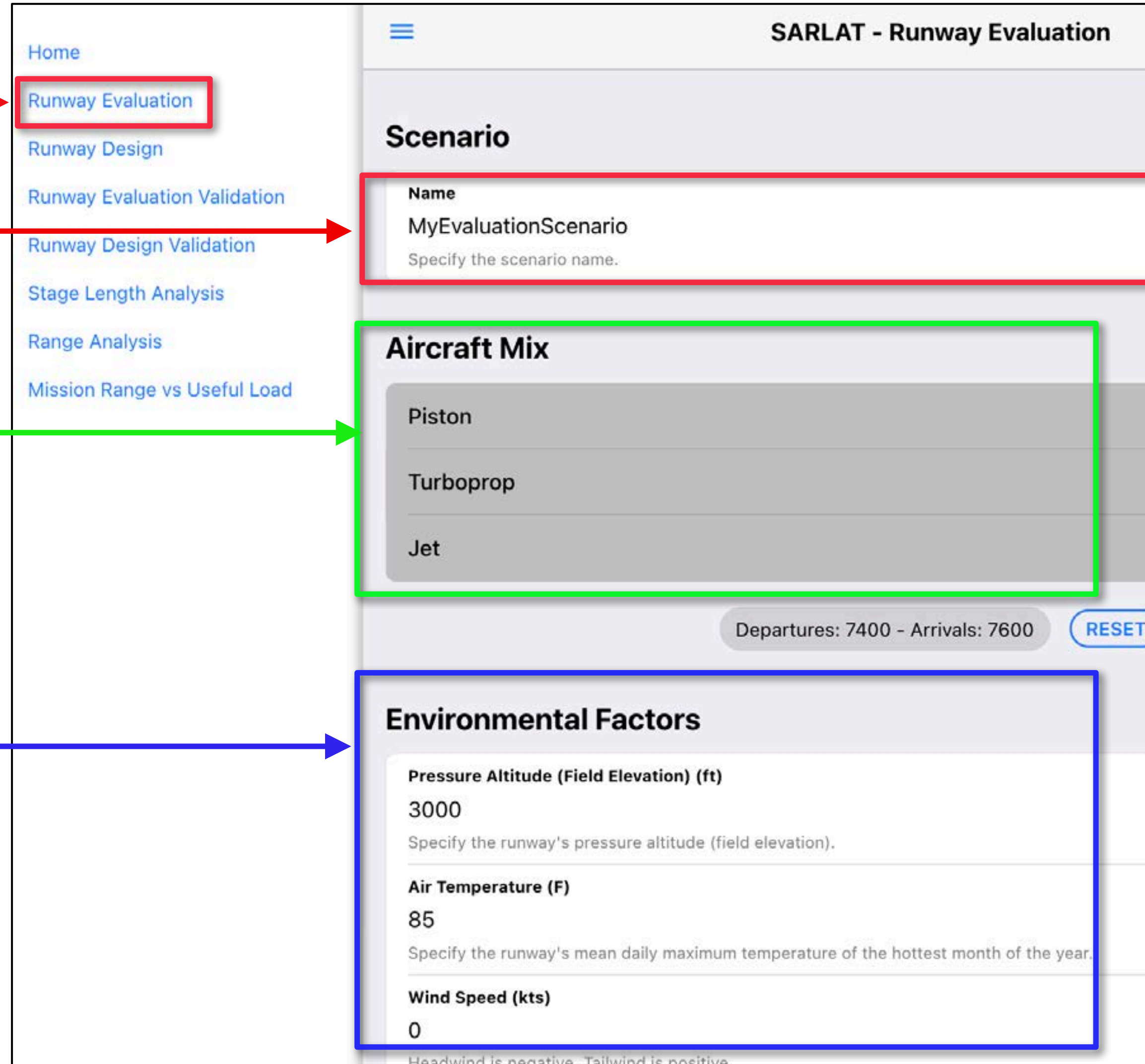
Runway Evaluation Mode Interface

Step 1: Select Runway Evaluation mode

Step 2: Select a scenario name

Step 3: Select the aircraft using the airport and enter the fleet mix (expandable list)

Step 4: Enter the airport environmental conditions



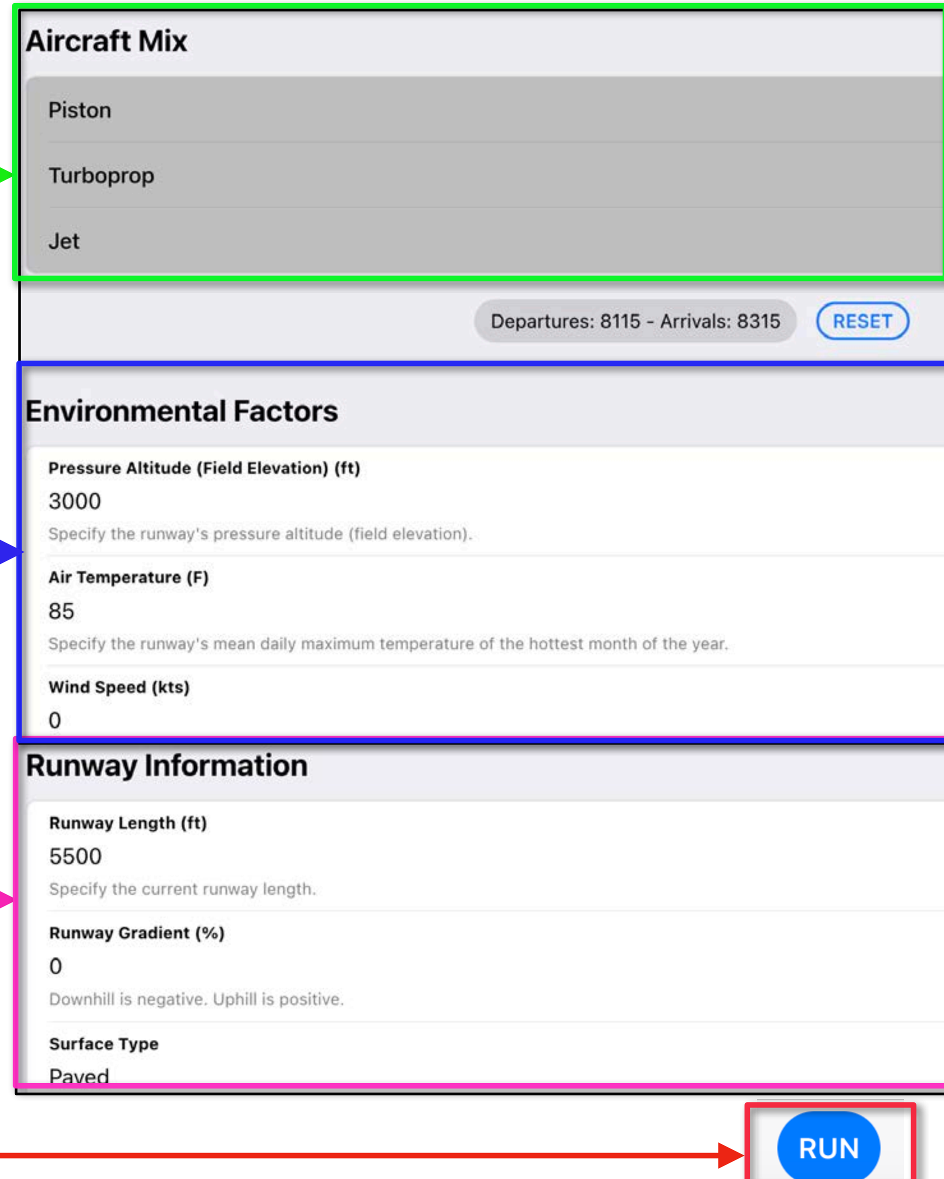
Runway Evaluation Mode Interface

Step 3: Select the aircraft using the airport and enter the fleet mix (expandable list)

Step 4: Enter the airport environmental conditions

Step 5: Enter the runway information

Step 6: Run the case



Runway Evaluation Mode: Aircraft Fleet Mix

Aircraft Mix

Piston

Turboprop

Select the aircraft fleet mix and expand each one of three engine groups

Jet

Jet aircraft group expanded

Aircraft Name	Annual Operations	
	Departures	Arrivals
Bombardier Challenger 350	150	150
Bombardier Challenger 605	200	200
Bombardier LearJet 35	215	215
Bombardier Learjet 45	200	200
Bombardier Learjet 60	100	100
Cessna 560 XL	100	100
Cessna Citation Latitude	300	300
Cessna Citation Longitude	250	250

VirginiaTech
Invent the Future

Runway Evaluation Output Interface

Evaluation Conditions

Pressure altitude = 3,000 feet
Runway length = 5,500 feet
Design temperature = 85 deg. F.
Runway gradient = 0.0%
Surface = paved

Runway Evaluation Conditions

Landing Suitability Table Includes 14 CFR Part 135 Landing Checks

Takeoff Weights and Useful Load Constraints

Runway Takeoff and Landing Restrictions

Pressure Altitude: 3000 ft | Air Temperature: 85 F | Wind Speed: 0 kts | Runway Length: 5500 ft | Gradient: 0 % | Surface Type: Paved

Aircraft Name	Aircraft Mix	NBAA IFR Maximum Range SAMPLE DATA		Useful Load (Takeoff Weight)		Landing at Maximum Landing Weight					
						No Correction		Part 135 Eligible		Part 135	
		Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Piston											
Beechcraft 55 Baron	12%			100 % 5100 lbs	100 % 5100 lbs	✓	✓				
Cessna 172 Skyhawk	37%			100 % 2300 lbs	100 % 2300 lbs	✓	✓				
Piper 30 Twin Comanche D50	1%			100 % 3600 lbs	100 % 3600 lbs	✓	✓				
Turboprop											
Beechcraft 300 Super King Air	1%			79 % 12833 lbs	37 % 10524 lbs	✓	✓			✗	✗
Beechcraft King Air 350ER	1%	100% FLIGHTS IN NAS 1350 nm / 5 pax	53% FLIGHTS IN NAS 220 nm / 5 pax	74 % 14918 lbs	38 % 12708 lbs	✓	✓			✓	✓

Runway Evaluation Output Interface

Evaluation Conditions	
	Pressure altitude = 3,000 feet Runway length = 5,500 feet Design temperature = 85 deg. F. Runway gradient = 0.0% Surface = paved

Aircraft useful load and mission range are reported as output

Runway Takeoff and Landing Restrictions

Pressure Altitude: 3000 ft | Air Temperature: 85 F | Wind Speed: 0 kts | Runway Length: 5500 ft | Gradient: 0 %

Surface Type: Paved

Runway Evaluation Conditions

Aircraft Name	Aircraft Mix	NBAA IFR Maximum Range SAMPLE DATA		Useful Load (Takeoff Weight)	
		Dry	Wet	Dry	Wet
Jet					
Bombardier Challenger 350	2%	100% FLIGHTS IN NAS 1986 nm / 4 pax	93% FLIGHTS IN NAS 1315 nm / 4 pax	70 % 35914 lbs	53 % 33109 lbs
Bombardier Challenger 605	2%	98% FLIGHTS IN NAS 1782 nm / 4 pax	88% FLIGHTS IN NAS 1232 nm / 4 pax	58 % 39367 lbs	45 % 36535 lbs
Bombardier LearJet 35	3%	78% FLIGHTS IN NAS 837 nm / 5 pax	52% FLIGHTS IN NAS 513 nm / 5 pax	68 % 15810 lbs	56 % 14915 lbs
Bombardier Learjet 45	2%	100% FLIGHTS IN NAS 1224 nm / 5 pax	85% FLIGHTS IN NAS 861 nm / 5 pax	93 % 20909	78 % 19554 lbs

The Bombardier Challenger 350 can operate from the 5500 ft. runway at 70% useful load (dry runway conditions)

The Bombardier Learjet 45 can operate at 78% useful load in wet runway conditions. The Learjet 45 can fly 861 nm with five passengers plus two pilots from the 5500-foot runway (wet pavement conditions).

Evaluation Mode: Mission Range vs. Useful Load Diagram

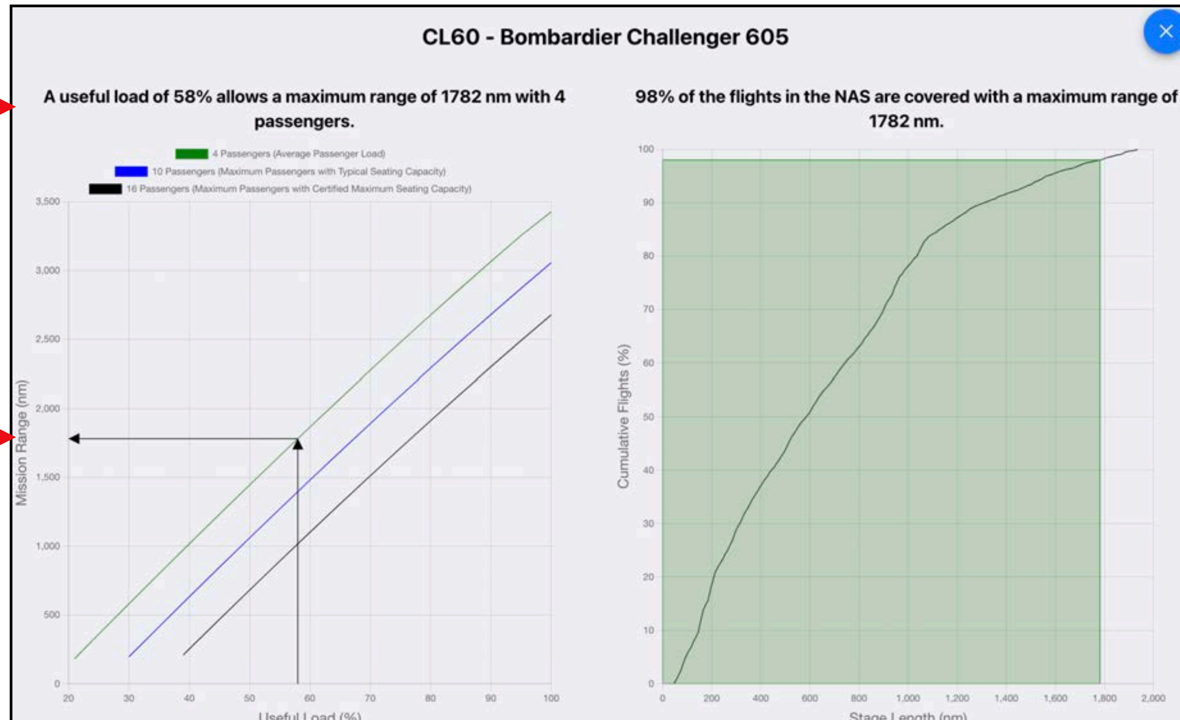
Aircraft Name	Aircraft Mix	NBAA IFR Maximum Range SAMPLE DATA		Useful Load (Takeoff Weight)	
		Dry	Wet	Dry	Wet
Jet					
Bombardier Challenger 350	2%	100% FLIGHTS IN NAS 1986 nm / 4 pax	93% FLIGHTS IN NAS 1315 nm / 4 pax	70 % 35914 lbs	53 % 33109 lbs
Bombardier Challenger 605	2%	98% FLIGHTS IN NAS 1782 nm / 4 pax	88% FLIGHTS IN NAS 1232 nm / 4 pax	58 % 39367 lbs	45 % 36535 lbs

The Bombardier Challenger 605 can takeoff at 58% useful load from a dry 5500-foot runway.

The Challenger 605 can fly four passengers and two pilots 1782 nm (with NBAA fuel reserves) from the 5,500-foot runway in dry conditions.

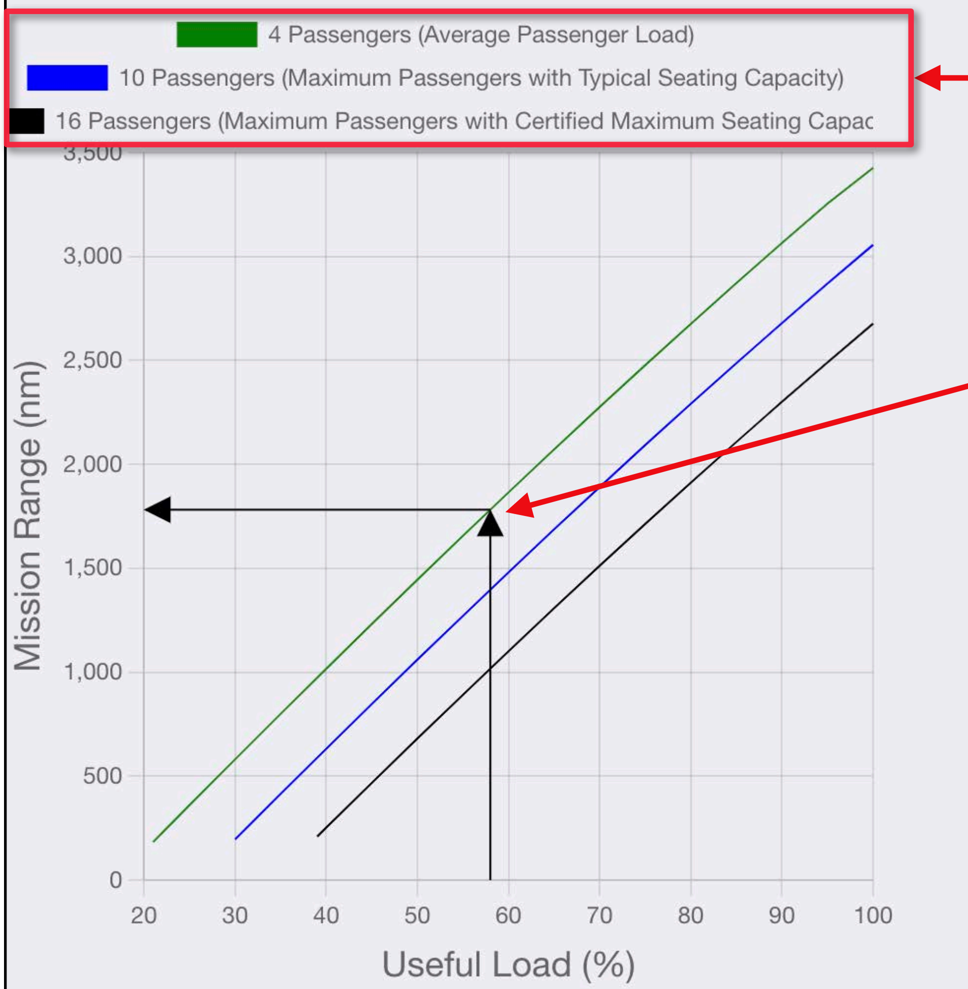
Click on the green area to see the cumulative plot of distances flown.

The Bombardier CL605 can fly 4 passengers and two pilots passengers 1782 nm (with NBAA fuel reserves) from the 5,500-foot runway in dry conditions



Evaluation Model: Mission Range vs. Useful Load Diagram

A useful load of 58% allows a maximum range of 1782 nm with 4 passengers.

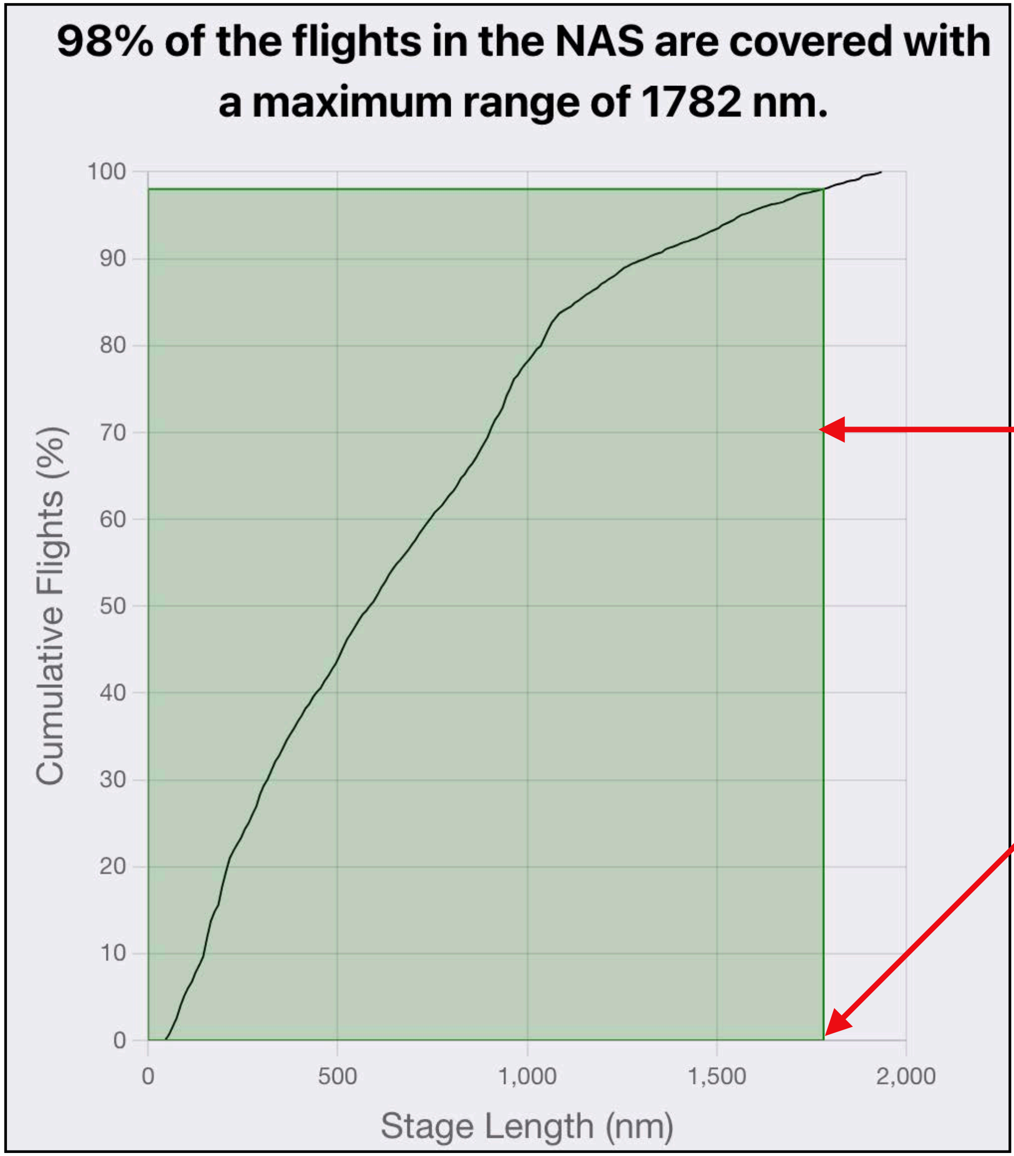


Three passenger loading conditions are displayed in SARLAT 2

The Bombardier Challenger 605 can fly four passengers and two pilots 1782 nm (with NBAA fuel reserves) from the 5,500-foot runway in dry conditions.

SARLAT 2 displays the mission range using the average passenger load (four passengers).

Evaluation Model: Cumulative Flights Coverage



SARLAT 2 displays the cumulative flights in the National Airspace System considering the mission stage length for the flight.

The Bombardier CL605 with a mission range of 1782 nm covers 98% of the historical flights performed in the National Airspace System.

The Bombardier CL605 can fly four passengers and two pilots 1782 nm (with NBAA fuel reserves) from the 5,500-foot runway in dry conditions.

Runway Evaluation: Aircraft Data Table

Aircraft table with general information about each aircraft modeled in SARLAT 2.

Information includes engine type, aircraft design group, aircraft approach category, operating empty weight, useful load, maximum takeoff weight, maximum allowable landing weight, takeoff flap setting used in SARLAT 2, landing flap setting used in SARLAT 2, and the criteria for the takeoff distance estimate (e.g., accelerate-stop distance, takeoff distance, etc.)

Aircraft Name	FAA Type Designator	Engine Type	Aircraft Design Group (ADG)	Aircraft Approach Category (AAC)	Weight Category	Operating Empty Weight (OEW)	Useful Load	Maximum Takeoff Weight (MTOW)	Maximum Allowable Landing Weight (MALW)	Takeoff Flap Settings	Landing Flap Settings	Takeoff Distance
Piston												
Beechcraft 55 Baron	BE55	Piston	I	B	T	3236 lbs	1864 lbs	5100 lbs	5100 lbs	Up	Down	Accelerate stop distance
Cessna 172 Skyhawk	C172	Piston	I	A	S	1419 lbs	881 lbs	2300 lbs	2300 lbs	Up	40°	Takeoff distance (short field)
Piper 30 Twin Comanche D50	PA30	Piston	I	A	T	2160 lbs	1440 lbs	3600 lbs	3600 lbs	15°	27°	Takeoff over 50ft obstacle
Turboprop												
Beechcraft 300 Super King Air	BE30	Turboprop	II	B	L	8488 lbs	5512 lbs	14000 lbs	14000 lbs	0°	Down	Accelerate stop distance
Beechcraft King Air 350ER	B350	Turboprop	II	B	L	10385 lbs	6115 lbs	16500 lbs	15675 lbs	Approach	Down	Takeoff field length

Runway Design Mode

Objective: Estimate the unconstrained runway length required by a known aircraft fleet mix

Runway Design Mode Interface

Step 1: Select Runway Design mode

Step 2: Name your scenario

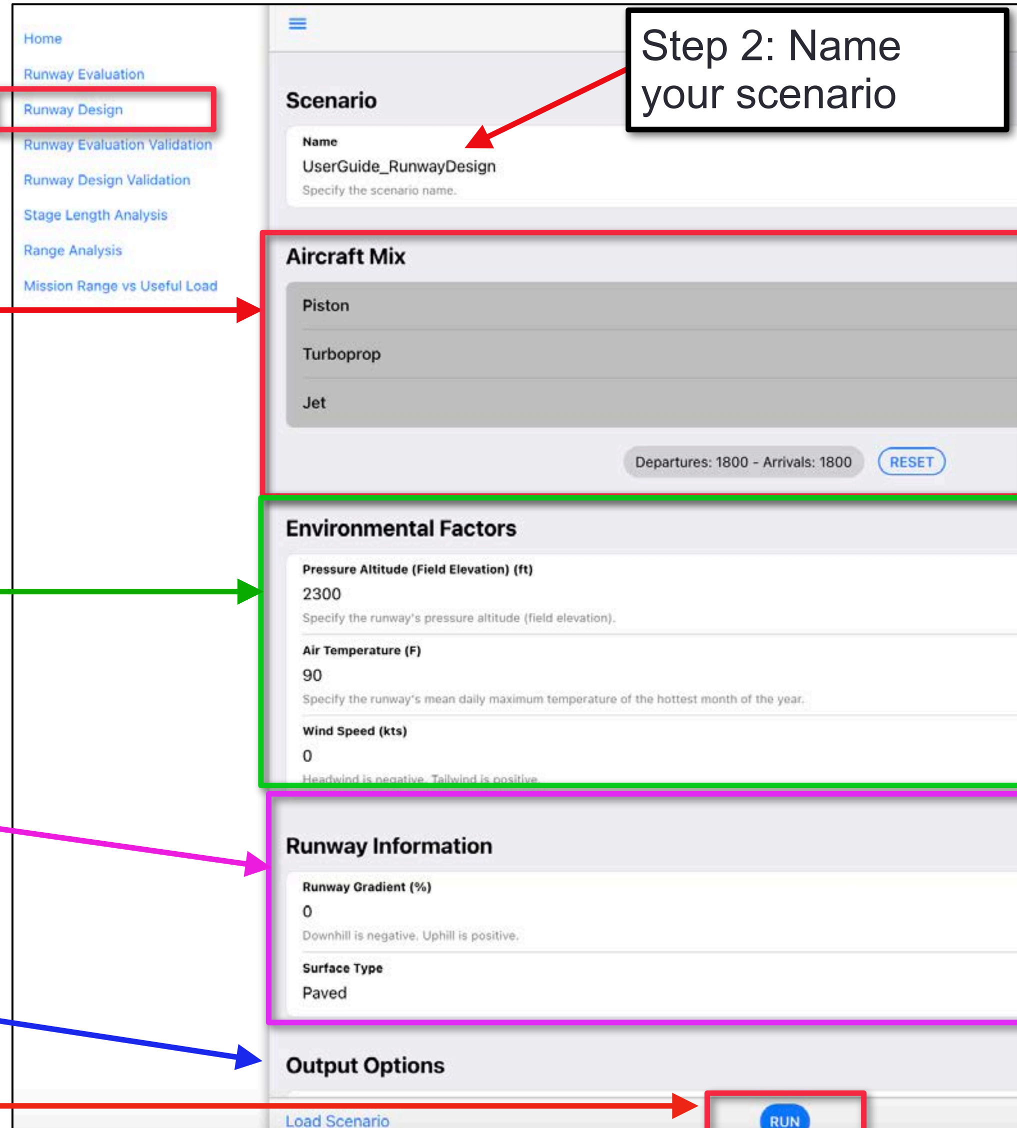
Step 3: Select the aircraft to be considered in the runway design

Step 4: Enter the airport environmental conditions

Step 5: Enter the runway grade and surface

Step 6: Select the output options

Step 7: Run the case



Runway Design Mode: Fleet Mix Parameters for Jet-Powered Aircraft

Step 1: Define the annual operations for each aircraft. Arrivals and departures are defined separately.

Step 3: Define if SARLAT 2 is expected to report Part 135 landing requirements.

Aircraft Mix

Piston

Turboprop

Jet

Aircraft Name	**Annual Operations**		Critical Range with Average Passenger Load (nm)	Useful Load (%)	Part 135
	Departures	Arrivals			
Bombardier Challenger 350	100	100	1434	56	No
Bombardier Challenger 605	100	100	1529	52	No

Step 2: Define the critical range for each aircraft for runway design calculations. The critical range is determined using TFMC data.

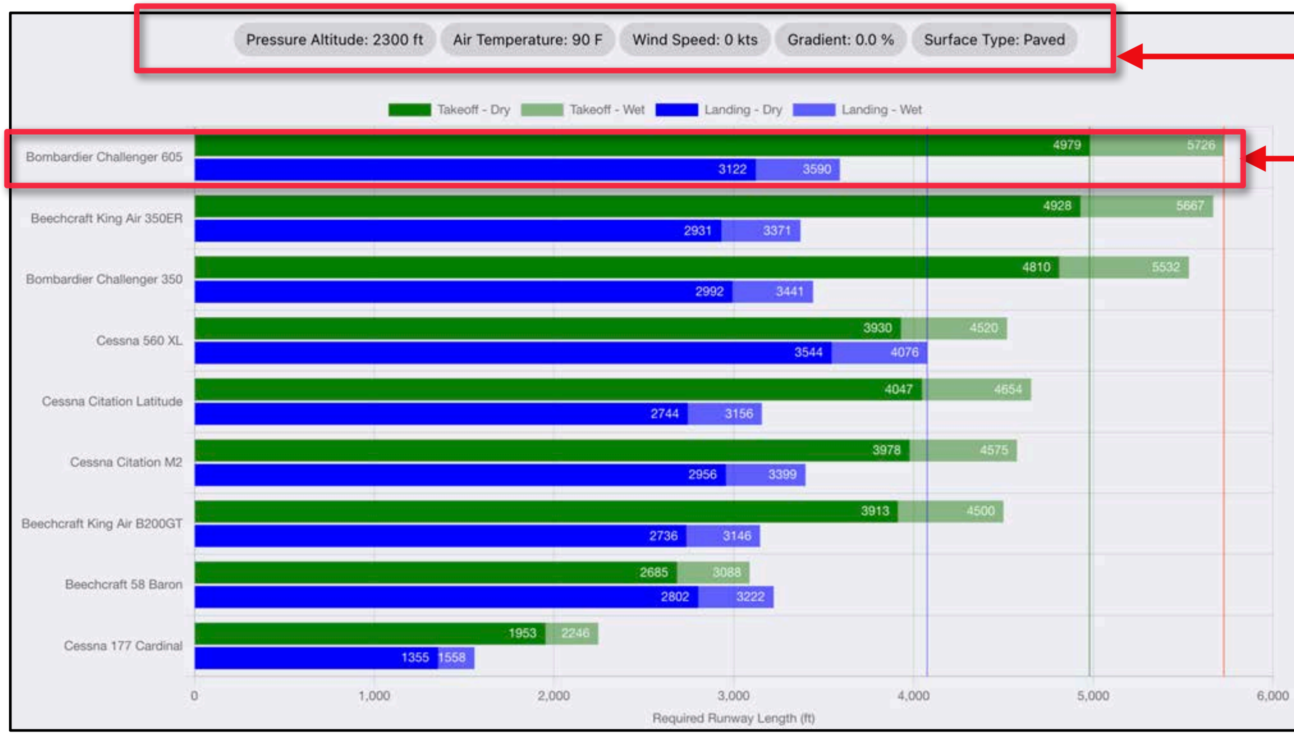
SARLAT 2 automatically calculates the useful load equivalent to fly the critical range selected in the third column.

Runway Design Graphical Output

Design Conditions

Pressure altitude = 2,300 feet
Design temperature = 90 deg. F.
Useful loads determined by the critical length flown by each aircraft
Wind speed = 0 knots
Runway gradient = 0%

- Provides a graphical output of runway length requirements for each aircraft
- The Bombardier Challenger 605 is the critical aircraft in this example.



Runway Design Conditions

The Bombardier Challenger 605 requires 4,970 feet of runway for takeoff (dry pavement) Round to 5,000 feet.

5,726 feet of runway needed with wet pavement Rounded to 5,700 feet.

Runway Design Table Output

Design Conditions

Pressure altitude = 2,300 feet
Design temperature = 90 deg. F.
Wind speed = 0 knots
Runway gradient = 0%

- Provides a table output of runway length requirements for each aircraft
- Two takeoff conditions provided (wet/dry)
- Multiple landing conditions provided (wet, dry and Part 135)

Aircraft Name	Useful Load (%)	Takeoff (ft)		Landing (ft)					
				No Correction		Part 135 Eligible		Part 135	
		Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Piston									
Beechcraft 58 Baron	100	2685	3088	2802	3222				
Cessna 177 Cardinal	100	1953	2246	1355	1558				
Turboprop									
Beechcraft King Air 350ER	50	4928	5667	2931	3371				
Beechcraft King Air B200GT	78	3913	4500	2736	3146				
Jet									
Bombardier Challenger 350	56	4810	5532	2992	3441				
Bombardier Challenger 605	52	4979	5726	3122	3590				

Landing distance output

Takeoff distance output

Critical Aircraft Considering Runway Design Parameters

Design Conditions

Pressure altitude = 2,300 feet
Design temperature = 90 deg. F.
Wind speed = 0 knots
Runway gradient = 0%

- Provides a table output of runway length requirements for each aircraft
- Shows the cumulative annual operations for all aircraft sorted from the highest to the smallest runway length

Critical Aircraft for Runway Length

Beechcraft King Air 350ER is the critical aircraft and requires **4928 ft** of runway to be fully accommodated in the full range of specified operating conditions.

Aircraft Name	Engine Type	Aircraft Design Group (ADG)	Aircraft Approach Category (AAC)	Taxiway Design Group (TDG)	Useful Load (%)	Annual Operations	Cumulative Annual Operations	Dry Takeoff (ft)	Wet Landing (ft)
Bombardier Challenger 605	Jet	II	C	1B	52	200	200	4979	3590
Beechcraft King Air 350ER	Turboprop	II	B	2A	50	400	600	4928	3371
Bombardier Challenger 350	Jet	II	C	1B	56	200	800	4810	3441
Cessna 560 XL	Jet	II	B	1B	70	300	1100	3930	4076
Cessna Citation Latitude	Jet	II	B	1B	70	250	1350	4047	3156
Cessna Citation M2	Jet	I	B	1A	80	480	1830	3978	3399
Beechcraft King Air B200GT	Turboprop	II	B	2A	78	400	2230	3913	3146
Beechcraft 58 Baron	Piston	I	B	1A	100	600	2830	2685	3222
Cessna 177 Cardinal	Piston	I	A	1A	100	400	3230	1953	1558

The Beechcraft King Air B350ER is the critical aircraft and requires 4,928 feet of runway for takeoff (dry pavement)
Round to 4,900 feet.

The critical aircraft for runway length requirement is the first aircraft with 500 or more annual operations (highlighted in yellow).

Critical Aircraft According to Other Design Parameters

Design Conditions	Pressure altitude = 2,300 feet Design temperature = 90 deg. F. Wind speed = 0 knots Runway gradient = 0%

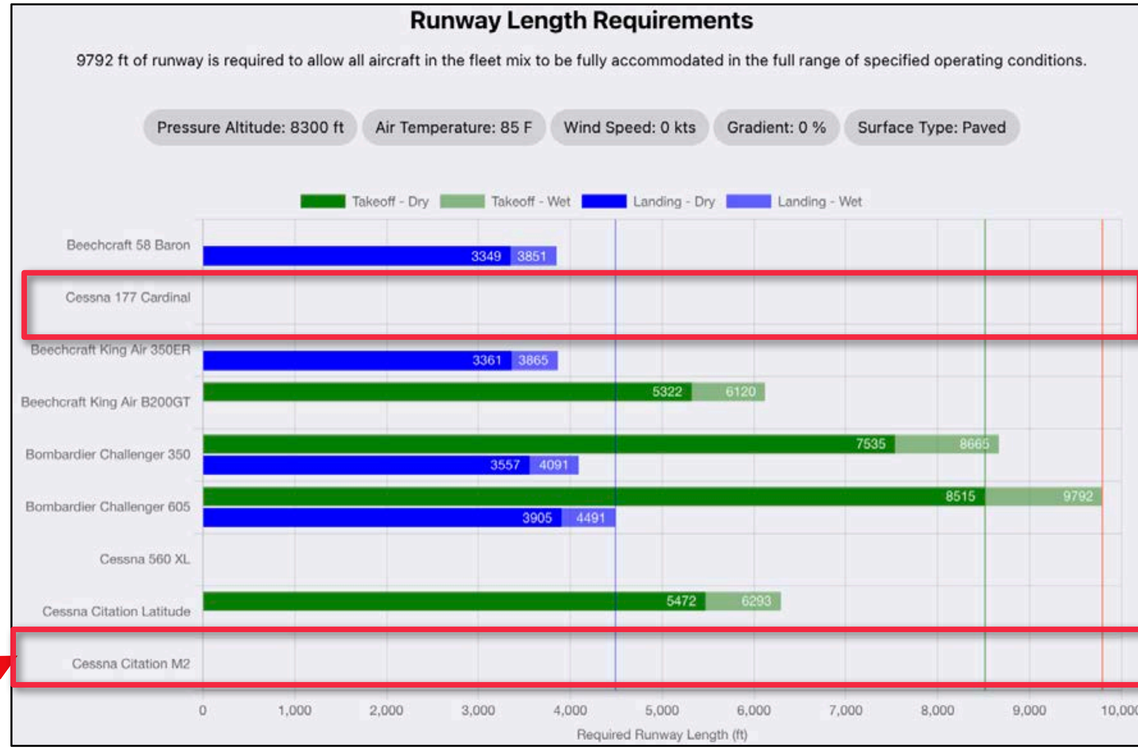
- For the example shown:
- The critical aircraft according to ADG group is II (the Challenger 605)
- The critical aircraft according to AAC group is C (the Challenger 605)
- Runway Design Code (RDC) is C-II
- The critical aircraft for Taxiway Design Group (TDG) is 2A (the King Air B350ER)

Group	Critical Group
Aircraft Design Group (ADG)	II
Aircraft Approach Category (AAC)	C
Runway Design Code (RDC)	C-II
Taxiway Design Group (TDG)	2A

Infeasible Operating Conditions in the Runway Design Mode

Example:

- Demanding airport design conditions
- 8300 feet pressure altitude
- 85 deg. F. design temperature



Aircraft not reported in bar plot cannot operate at the airport design conditions

Aircraft Name	Error
Beechcraft 58 Baron	Temperature is above maximum takeoff temperature.
Cessna 177 Cardinal	Altitude is above maximum takeoff altitude.
Cessna 177 Cardinal	Altitude is above maximum takeoff altitude.
Beechcraft King Air 350ER	Temperature is above maximum takeoff temperature.
Beechcraft King Air B200GT	Temperature is above maximum takeoff temperature.
Cessna 560 XL	Temperature is above maximum takeoff temperature.

Runway Evaluation Validation Mode

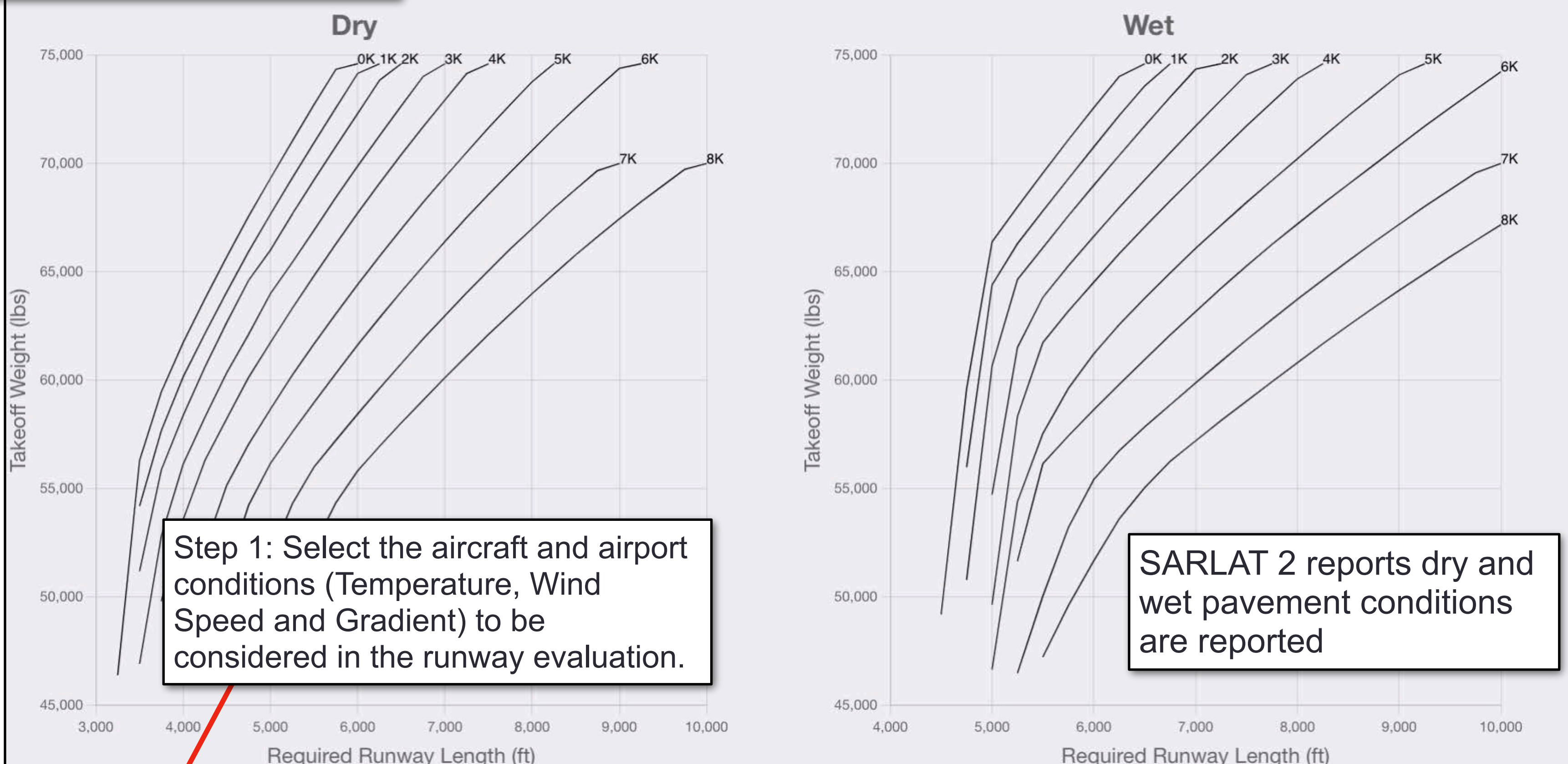
Objective: Provides a graphical depiction of aircraft takeoff weight and runway length required for various design parameters (temperature, runway grade, and wind speed)

Runway Evaluation Validation Mode Plots

Plot shows the aircraft takeoff weight and runway length required for selected airport environmental conditions

GLF4 - Gulfstream G450

Temperature: 77 F - Wind Speed: 0 kts - Runway Gradient: 0 %



Step 1: Select the aircraft and airport conditions (Temperature, Wind Speed and Gradient) to be considered in the runway evaluation.

SARLAT 2 reports dry and wet pavement conditions are reported

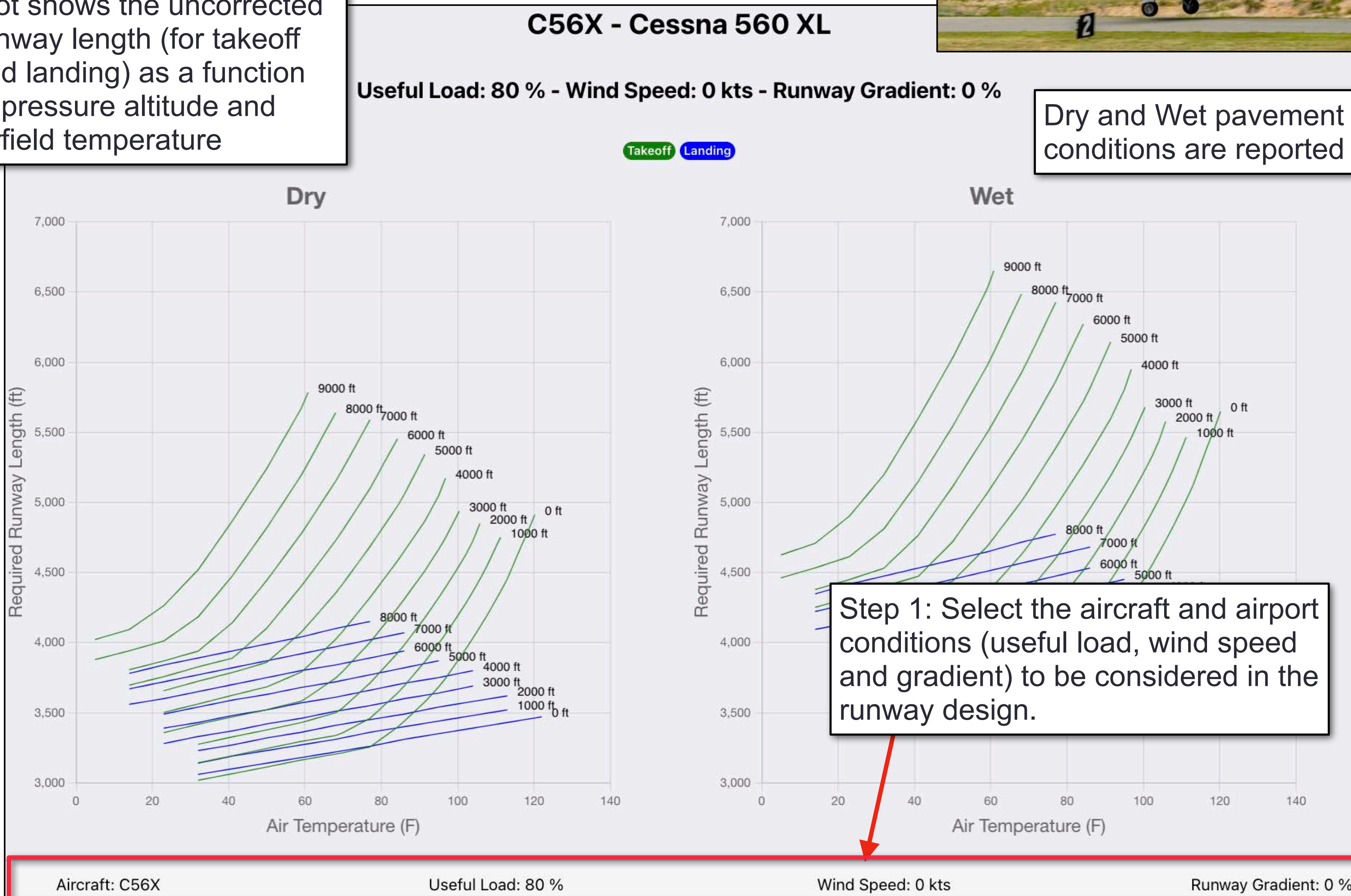
Aircraft: GLF4	Temperature: 77 F	Wind Speed: 0 kts	Runway Gradient: 0 %

Runway Design Validation Mode

Objective: Provides a graphical depiction of aircraft takeoff weight and runway length required for various design parameters (temperature, runway grade, and useful load

Runway Design Validation Mode Plots

Plot shows the uncorrected runway length (for takeoff and landing) as a function of pressure altitude and airfield temperature



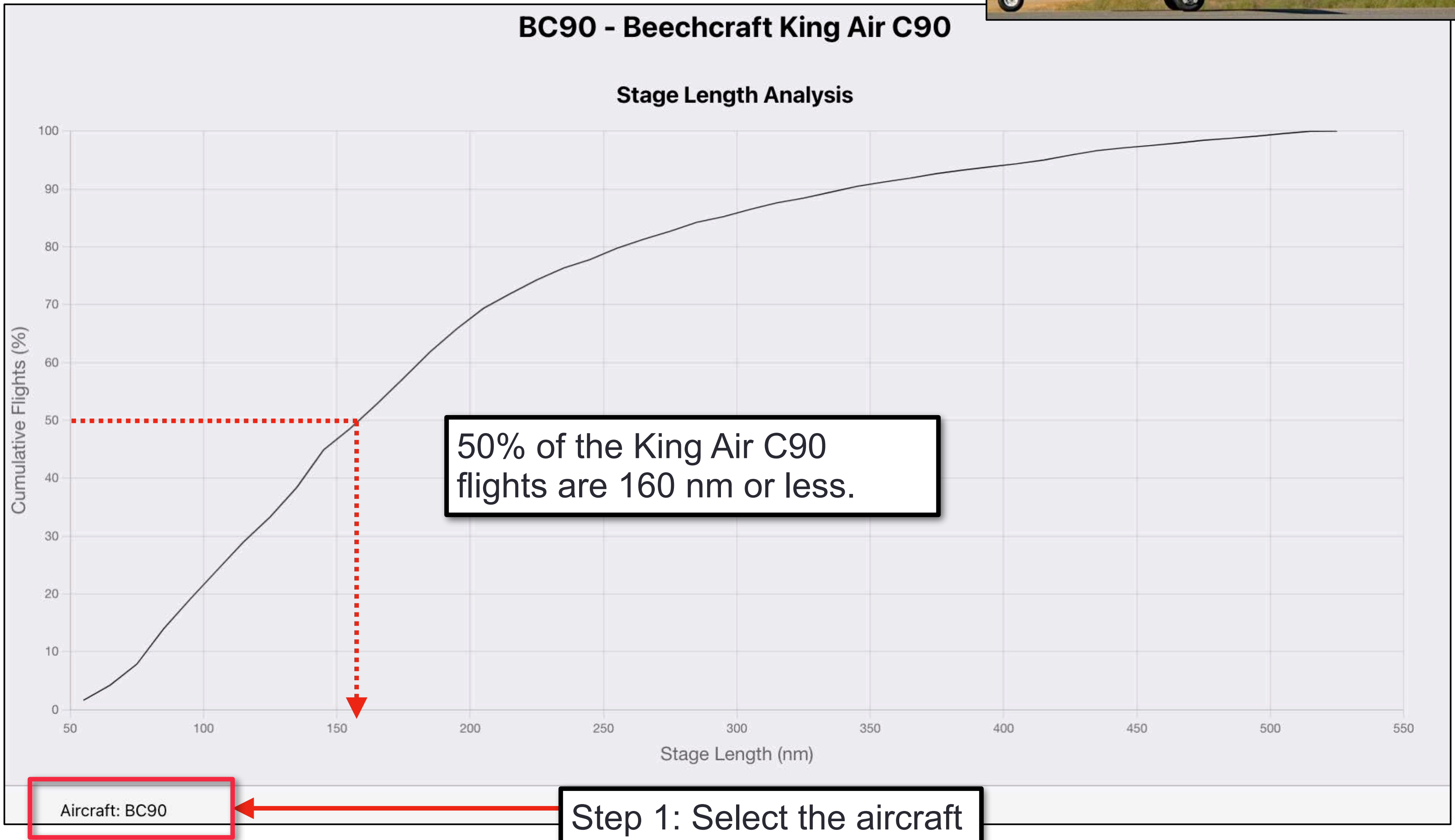
Dry and Wet pavement conditions are reported

Step 1: Select the aircraft and airport conditions (useful load, wind speed and gradient) to be considered in the runway design.

Aircraft Stage Length Analysis

Objective: Provides a graphical information of the cumulative number flights versus distance flown in the National Airspace System

Stage Length Analysis

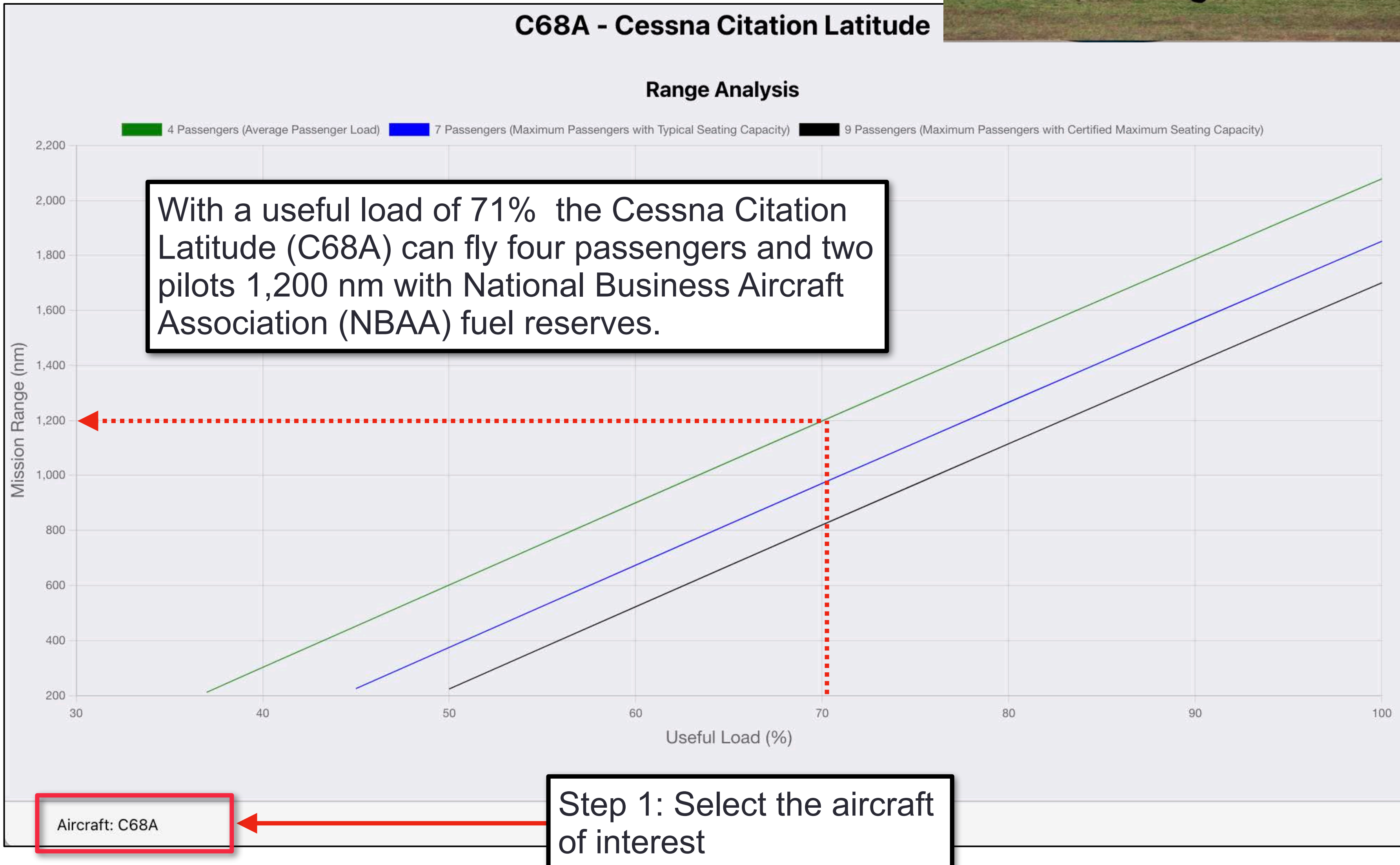


Step 1: Select the aircraft to be plotted

Aircraft Range Analysis

Objective: Provides a graphical information of useful load and mission distance flown for jet-powered aircraft and turboprops whose maximum takeoff gross weight is 12,500 lbs. or more.

Aircraft Range Analysis



Exporting and Saving Scenario Runs

- SARLAT can export data for use in spreadsheets or the clipboard
- SARLAT can load saved scenarios
- SARLAT can save the graphical output produced in Portable Graphics Format (PNG)
- SARLAT exports table results in two formats:
  - Clipboard
  - Excel

Runway Design Mode

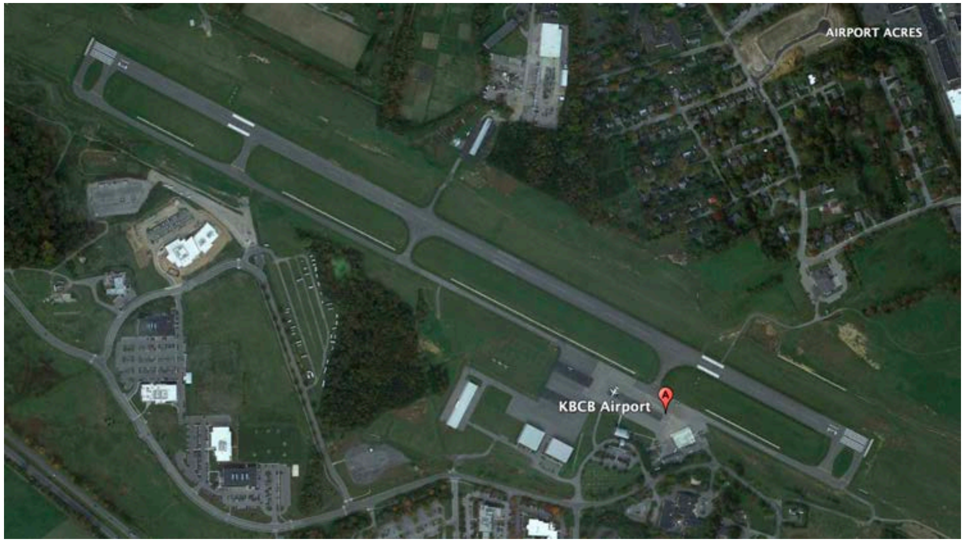
Objective: Estimate the unconstrained runway length required by a known aircraft fleet mix

Example: Virginia Tech Airport Runway Extension Using SARLAT 2

Aircraft	*Departures/ Arrivals*	*Useful Load (%)*	*Engine Type*
Cessna 172	***3000 / 3000***	***100***	***Piston***
Beechcraft King Air B350ER	***400 / 400***	***70***	***Turboprop***
Cessna Citation Latitude	***350 / 350***	***80***	***Jet***
Cessna 560XL	***400 / 400***	***80***	***Jet***
Bombardier Challenger 350	***350 / 350***	***70***	***Jet***

Example: Virginia Tech Airport Runway Extension Using SARLAT 2

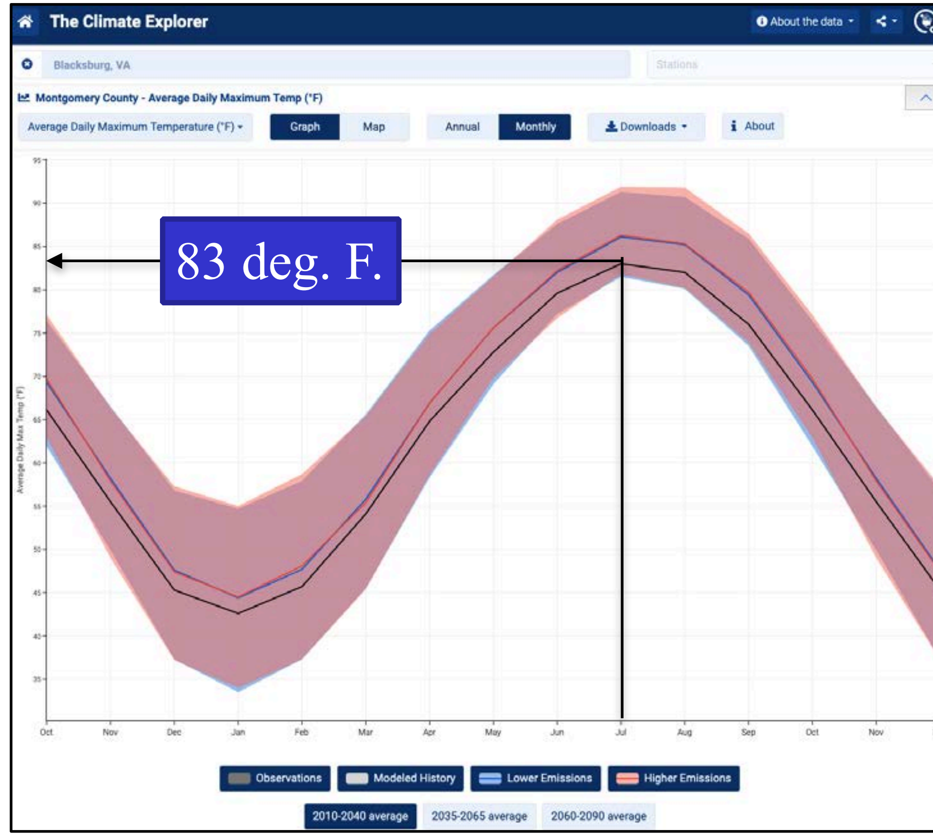
- **BCB Airport in 2019**
  - Runway length 4,539 feet
  - Paved
  - 0.4% grade
- **BCB Airport in 2021**
  - Runway length 5,500 feet
  - Paved
  - 0.4% partial runway



Satellite View of BCB Airport in Spring 2019 (source: Google Maps)

BCB Mean Maximum Daily Temperature Profiles

(source: www.weather.com)



https://crt-climate-explorer.nemac.org/climate_graphs/

86 degrees Fahrenheit considering higher emissions

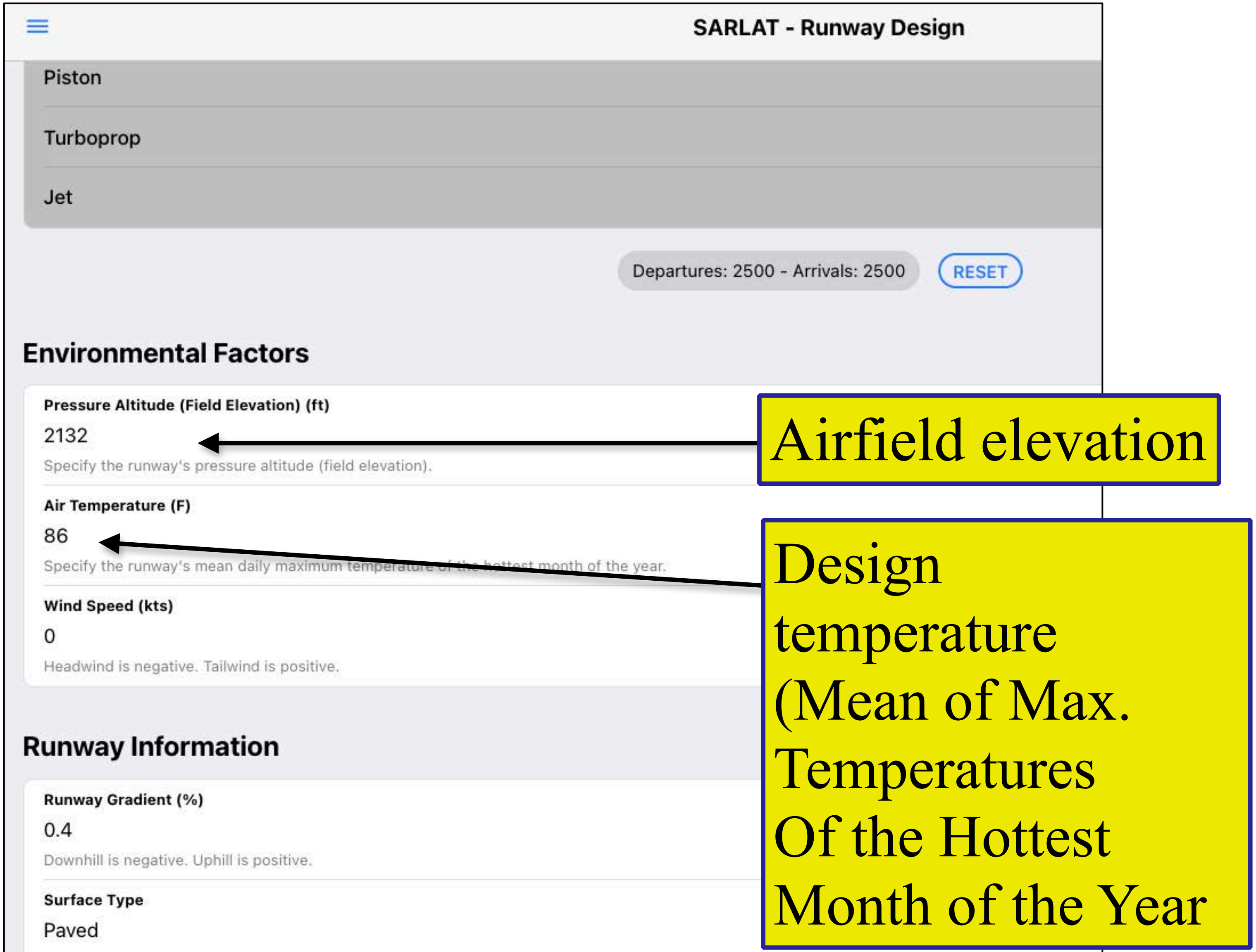
BCB Runway Information in Spring 2019 (source: www.airnav.com)

Runway Information

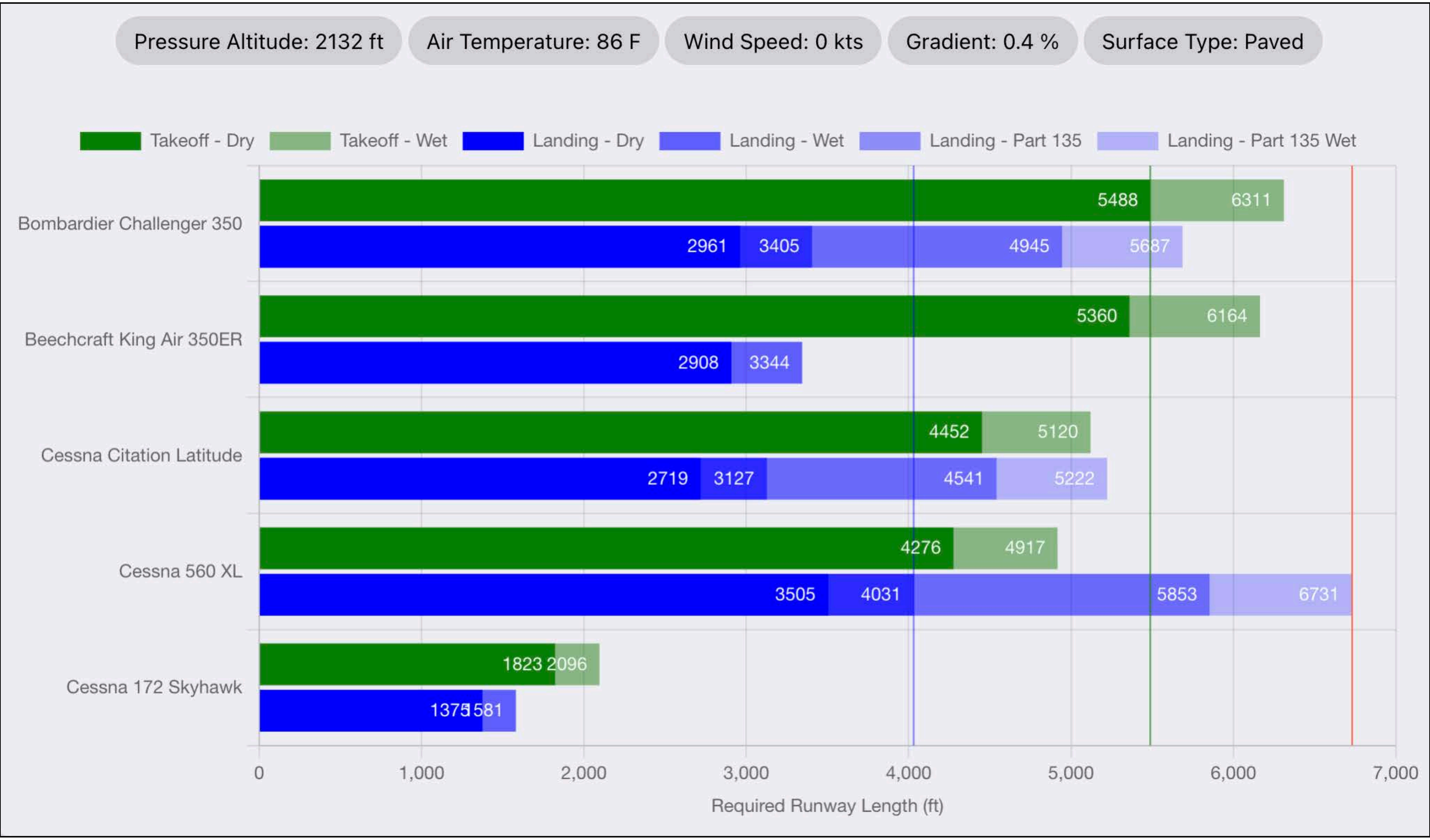
Runway 12/30

	RUNWAY 12	RUNWAY 30
Dimensions:	4539 x 100 ft. / 1383 x 30 m	
Surface:	asphalt, in fair condition	
Runway edge lights:	medium intensity	
Latitude:	37-12.629310N	37-12.287662N
Longitude:	080-24.886423W	080-24.054668W
Elevation:	2112.7 ft.	2131.7 ft.
Gradient:	0.4% UP	0.4% DOWN
Traffic pattern:	left	left
Runway heading:	123 magnetic, 117 true	303 magnetic, 297 true
Markings:	nonprecision, in fair condition	nonprecision, in fair condition
Visual slope indicator:	4-light PAPI on left (3.00 degrees glide path)	2-light PAPI on left (3.75 degrees glide path)
Approach lights:	ODALS: omnidirectional approach lighting system	NSTD
Runway end identifier lights:		yes
Touchdown point:	yes, no lights	yes, no lights
Instrument approach:	LOC/DME	
Obstructions:	24 ft. road, lighted, 600 ft. from runway, 309 ft. right of centerline, 16:1 slope to clear	12 ft. brush, 275 ft. from runway, 154 ft. right of centerline, 6:1 slope to clear

SARLAT 2 Analysis (Design Case)



SARLAT 2 Analysis



Virginia Tech Airport Analysis

- **The Bombardier Challenger 350 (operated at 70% helpful load) requires 5,500 feet of runway (dry takeoff)**
  - We usually round the runway length to the nearest 100 feet
- During the runway extension project at BCB, the runway was extended to 5,500 feet using the old analysis method.

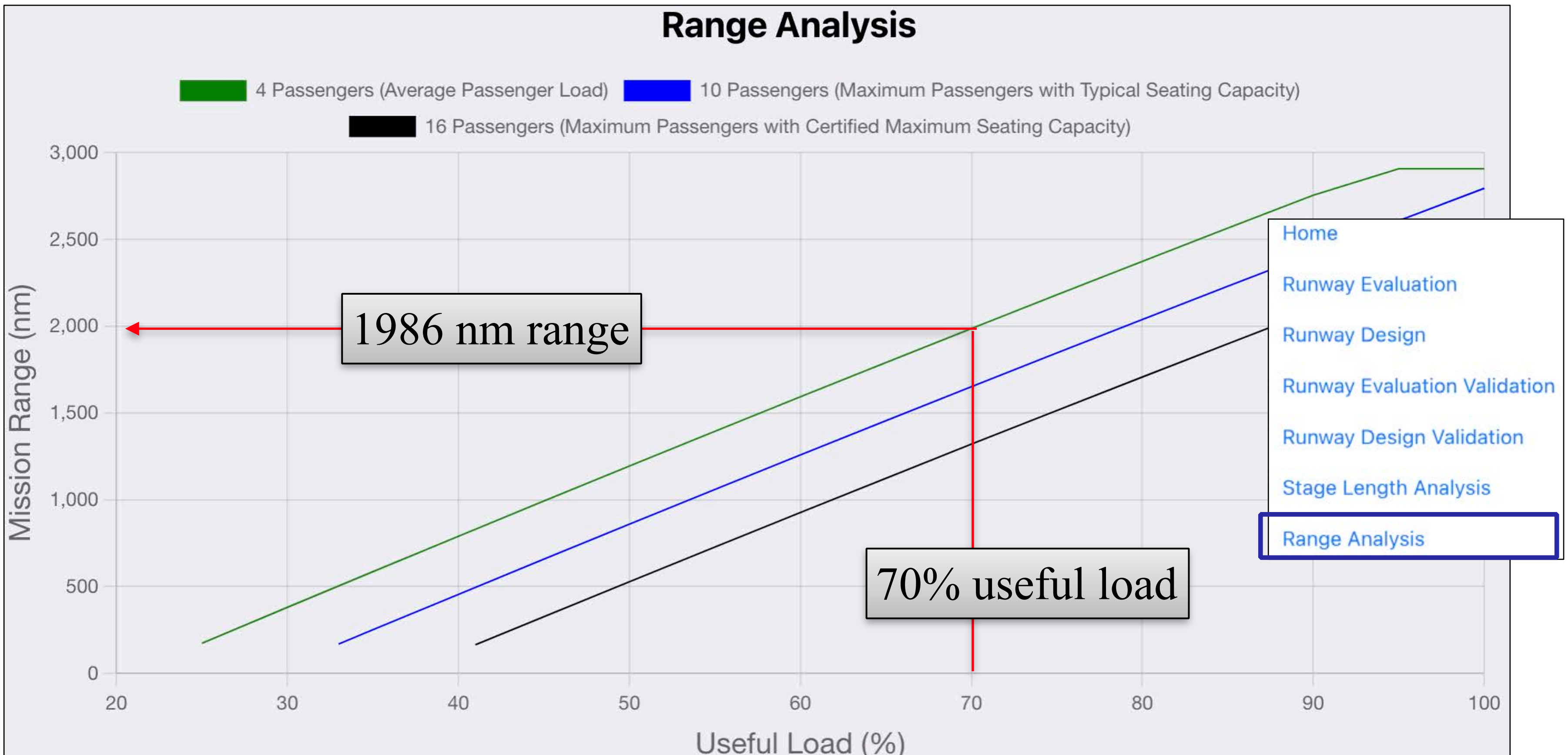
Virginia Tech Airport Analysis : Table of Results

Aircraft Name	Useful Load (%)	Takeoff (ft)		Landing (ft)					
				No Correction		Part 135 Eligible		Part 135	
		Dry	Wet	Dry	Wet	Dry	Wet	Dry	Wet
Piston									
Cessna 172 Skyhawk	85	1823	2096	1375	1581				
Turboprop									
Beechcraft King Air 350ER	70	5360	6164	2908	3344				
Jet									
Bombardier Challenger 350	70	5488	6311	2961	3405				
Cessna 560 XL	80	4276	4917	3505	4031				
Cessna Citation Latitude	80	4452	5120	2719	3127				

Critical aircraft From a runway length view point

Virginia Tech Airport Analysis (2)

- Departing the Virginia Tech Montgomery Executive Airport, the Bombardier Challenger 350 can carry two pilots and four passsengers (with 70% useful load)



Runway Evaluation Mode

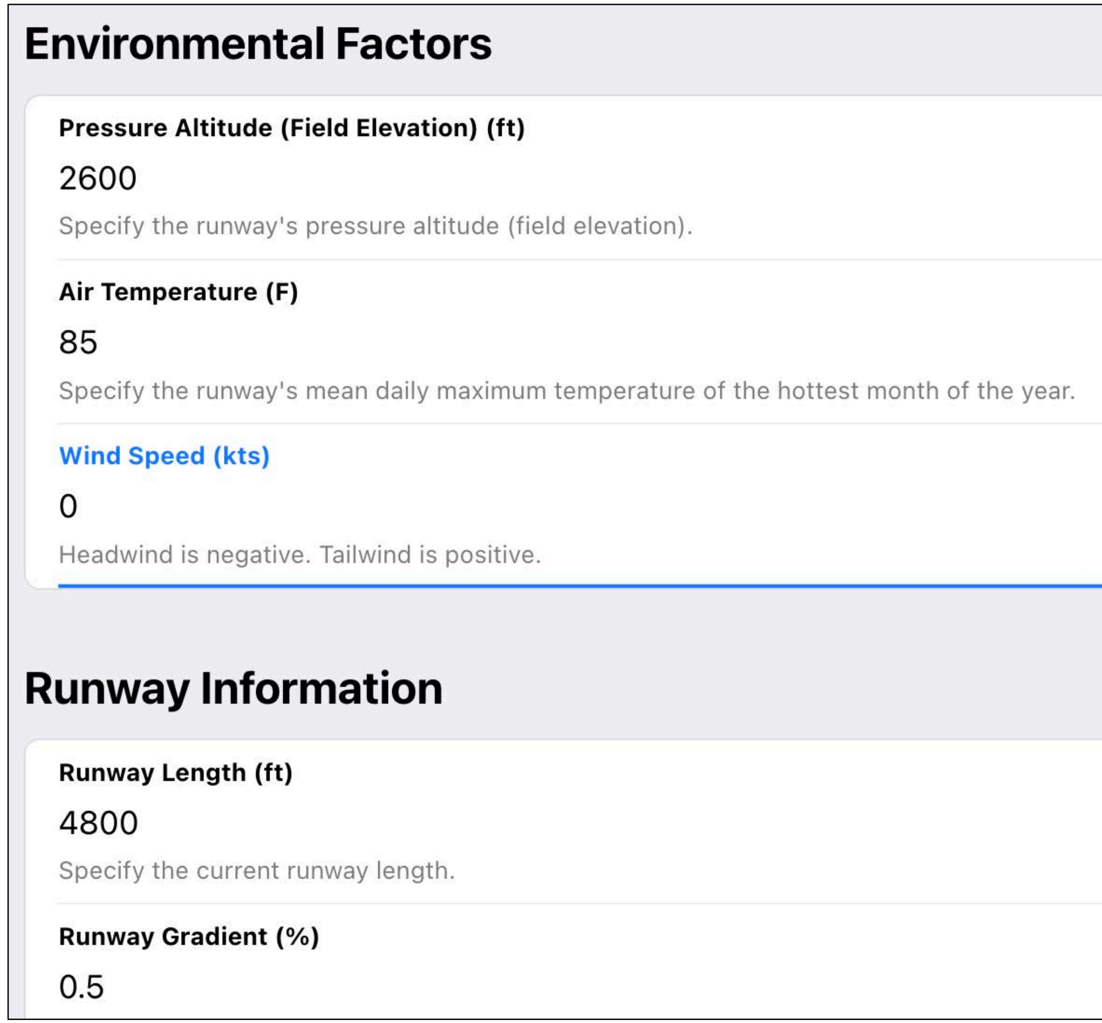
Objective: Determine if a group of aircraft can safely operate from an existing runway

Example: Runway Evaluation Example Using SARLAT 2

Aircraft	*Departures/Arrivals*	*Engine Type*
Beechcraft Baron 58	*2100 / 2100*	*Piston*
Beechcraft King Air B200GT	*400 / 400*	*Turboprop*
Cessna Citation Jet 1	*400 / 400*	*Jet*
Bombardier Challenger 350	*350 / 350*	*Jet*

Example: Runway Evaluation Example Using SARLAT 2

- Existing runway length - 4800 feet
- Airfield elevation - 2600 feet
- Design temperature (mean of maximum temperatures of the hottest month of the year) - 85 degrees. Fahrenheit
- Runway grade - 0.5%



Runway Evaluation Example Using SARLAT 2

Pressure Altitude: 2600 ft | Air Temperature: 85 F | Wind Speed: 0 kts | Runway Length: 4800 ft | Gradient: 0.5 % | Surface Type: Paved

Aircraft Name	Aircraft Mix	NBAA IFR Maximum Range		Useful Load (Takeoff Weight)		Landing a	
						No Correction	
		Dry	Wet	Dry	Wet	Dry	Wet
Piston							
Beechcraft 58 Baron	64%			100 % 5400 lbs	100 % 5400 lbs	✓	✓
Turboprop							
Beechcraft King Air B200GT	12%	100 % FLIGHTS IN NAS 891 nm / 4 pax	100 % FLIGHTS IN NAS 891 nm / 4 pax	100 % 12500 lbs	100 % 12500 lbs	✓	✓
Jet							
Bombardier Challenger 350	12%	70 % FLIGHTS IN NAS 790 nm / 4 pax		40 % 31190 lbs	✗	✓	✓
Cessna CitationJet 1	12%	100 % FLIGHTS IN NAS 895 nm / 3 pax	89 % FLIGHTS IN NAS 615 nm / 3 pax	85 % 9873 lbs	70 % 9373 lbs	✓	✓

Runway Evaluation Example Using SARLAT 2

- The Bombardier Challenger 350 can operate from the 4800-foot runway at 40% useful load
- With 40% useful load, the Challenger 350 can fly 790 nm with four passengers and two pilots

Aircraft Name	Aircraft Mix	NBAA IFR Maximum Range		Useful Load (Takeoff Weight)		No Correction	
		Dry	Wet	Dry	Wet	Dry	Wet
Bombardier Challenger 350	12%	70 % FLIGHTS IN NAS 790 nm / 4 pax		40 % 31190 lbs	✗	✓	✓
Cessna CitationJet 1	12%	100 % FLIGHTS IN NAS 895 nm / 3 pax	89 % FLIGHTS IN NAS 615 nm / 3 pax	85 % 9873 lbs	70 % 9373 lbs	✓	✓

Runway Evaluation Example Using SARLAT 2

- The Bombardier Challenger 350 can operate from a dry 4800-foot runway at 40% useful load
- The Challenger 350 can fly 790 nm distance which covers 70% of the flights in the National Airspace System (NAS)

Aircraft Name	Aircraft Mix	NBAA IFR Maximum Range		Useful Load (Takeoff Weight)		No Correction	
		Dry	Wet	Dry	Wet	Dry	Wet
Bombardier Challenger 350	12%	70 % FLIGHTS IN NAS 790 nm / 4 pax		40 % 31190 lbs	✗	✓	✓
Cessna CitationJet 1	12%	100 % FLIGHTS IN NAS 895 nm / 3 pax	89 % FLIGHTS IN NAS 615 nm / 3 pax	85 % 9873 lbs	70 % 9373 lbs	✓	✓