

REDIM V4 FAQs

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1 Where can I download REDIM?

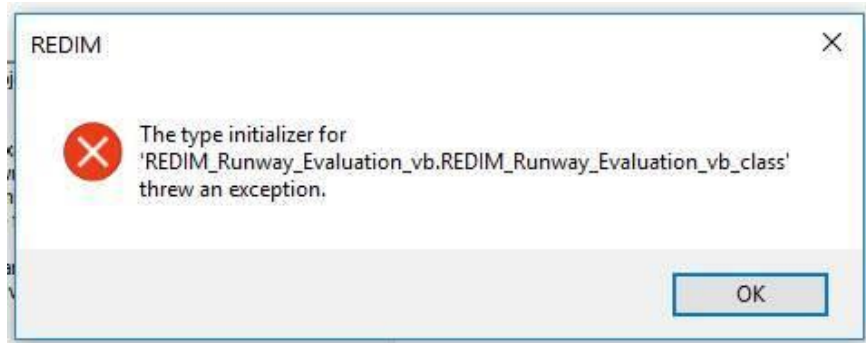
<https://www.atsl.cee.vt.edu/products/redim.html>

2 Where is the REDIM User Group?

<https://groups.google.com/d/forum/runway-exit-design-interactive-model>

3 How do I fix the error “The type initializer for...”?

The MATLAB R2021b 64Bit runtime may not have installed if you get the following type of error:



The MATLAB R2021b 64Bit runtime needs to be installed manually. Please download it from:

https://ssd.mathworks.com/supportfiles/downloads/R2021b/Release/2/deployment_files/installer/complete/win64/MATLAB_Runtime_R2021b_Update_2_win64.zip

4 Why does REDIM 4 produce very different ROT results compared to REDIM 2?

The following changes between REDIM 2 and REDIM 4 can contribute to large differences in the results:

- a. Overall individual aircraft performance:
 - REDIM 2: Based on TERP Grouping
 - REDIM 4: More than 300 individual aircraft modeled. Similar aircraft with few data points fallback to an assigned surrogate aircraft type or AAC grouping.
- b. Runway individual aircraft performance:
 - REDIM 2: Based on video recorded at few select airports.
 - REDIM 4: Based on 370 runways at 43 ASDE-X airports. Each aircraft type will have a unique distribution for each performance parameter in relation with runway length.
- c. Exit individual aircraft performance:
 - REDIM 2: Based on video recorded at few select airports.
 - REDIM 4: Based on 4,800 exits at 43 ASDE-X airports grouped into 20 exit clusters. Each aircraft type and exit cluster will have a unique distribution for each performance parameter.

5 Are any wind factors taken into consideration in the model?

The threshold crossing speeds have been adjusted to ground speed using the historical wind observations at the airport. Therefore, average wind effects are taken into account in the model.

6 The previous model allowed for an input of pilot safety factor. Is there any such factor taken into consideration in this model?

The safety factor included in REDIM 2.1 affected the calculations of runway exit performance. The new model uses Kernel distributions containing observed runway exit speeds estimated from 4,800 runway exits at 43 ASDE-X airports. The safety factor is not required because the Kernel distributions bound the runway exit speeds.

7 Will a more detailed User Guide be released which will explain the inputs and outputs in more detail?

We will provide an updated version soon.

8 What aircraft speeds are assumed for each exit type?

Exit types are grouped into 20 clusters based on all exit types at the 43 airports analyzed. Point of Curvature (PC) speed distributions are generated for all aircraft. Aircraft Approach Category (AAC) PC speeds distributions are used when there is not enough data for a certain type of aircraft.

9 Can the runway gradient be adjusted? If not, is there any assumption made for this?

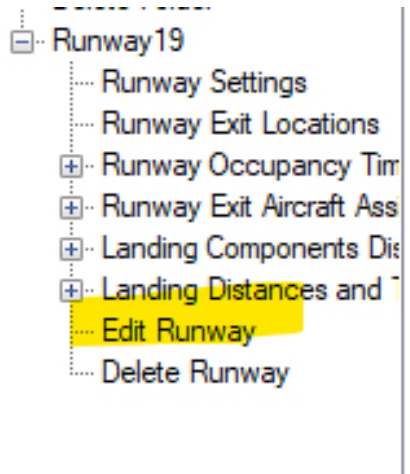
REDIM 4 does not have an adjustment for runway gradient. The data collected for model calibration includes 43 large commercial airports with limited grades. Because we do not have detailed runway gradient information, we do not include a runway gradient correction in the model. Commercial airport runways are limited by design regulations to maximum grades of 1.5% (limited to 0.8% in the first and last quarter of the runway). A simple method to correct the landing distance is to add 10% for every 1% in effective grade.

10 In the ROT results table, what does the provided ROT represent? Wet conditions? Dry conditions? Weighted average? Is there a way to show the differences between the wet and dry ROT for each aircraft type?

The ROT is the weighted average of dry and wet conditions for each aircraft based on the percent wet conditions set for the current analysis. We will add the ability to display the dry and wet ROT in the results table.

11 How can I run multiple scenarios based on similar settings?

You can use the "Edit Runway" feature in the output of your previous run to run a new scenario with previously saved settings. See below.



Then as you edit the runway, rename the analysis, and you will have a clone of the previous analysis with all input features of the previous run inherited to the new one, including the fleet mix. You can then go through the input screens quickly and change the values as needed. This is a quick way to do sensitivity analysis.

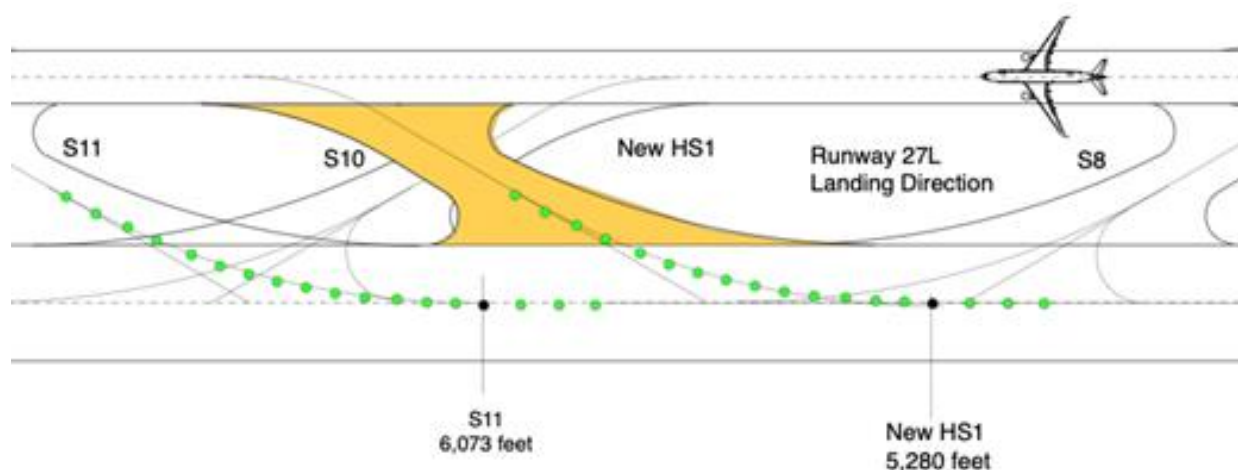
12 Which temperature should be used in the inputs? Average annual?

Average of the hottest month? Average max of the hottest month?

REDIM is calibrated using landing distributions averaged over 6 years. It is recommended to use the average annual temperature. However, if you are interested in some seasonal effects, you can enter other values.

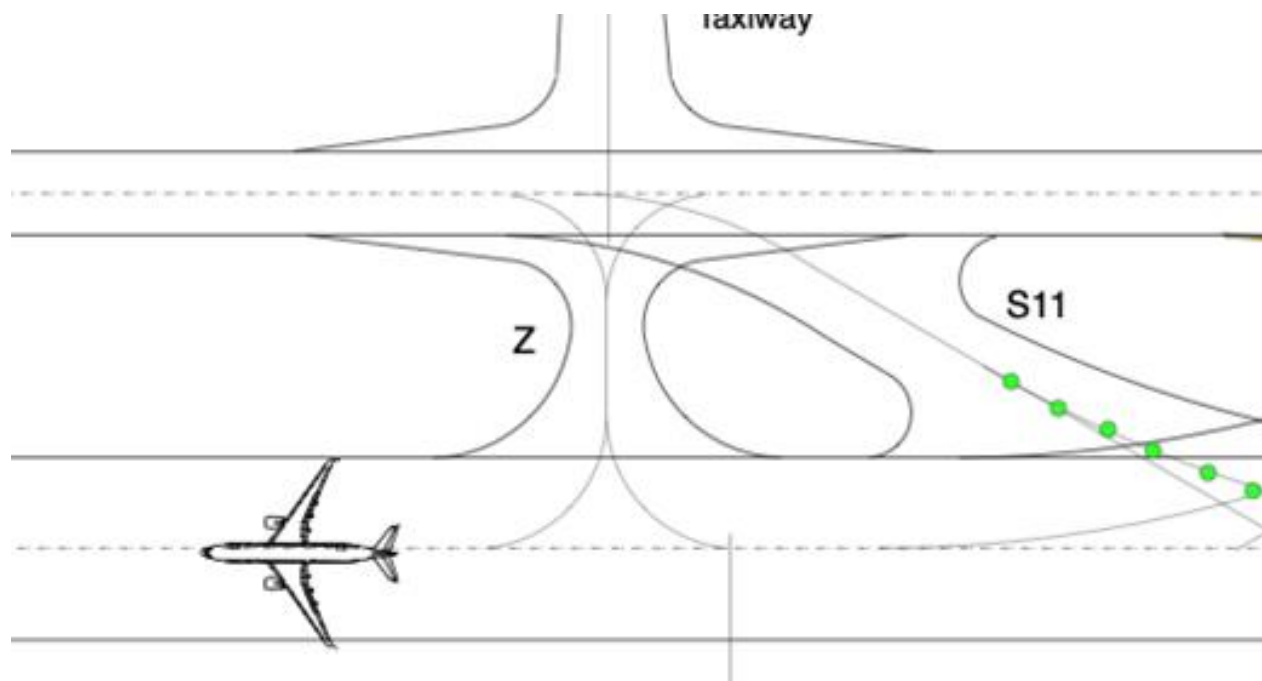
13 What is the background of an 800-foot minimum separation between 2 high-speed exits?

This is our rule of thumb for high-speed runway exits. Right angle exits can be placed closer as needed. The 800 feet is defined so that the centerline light elements of two successive high-speed exits are not confusing to the pilot. See the example below. If you are landing on the runway in a corporate jet (pilot's eye position low), the two high-speed runway exits could be confusing at night.



14 How about the separation between two 90-degree exits, or a 90-degree exit and a high-speed exit?

If a 90-degree exit follows an acute angle exit, it would be good to have enough separation to avoid a three-node taxiway junction. The minimum distance will depend on the runway centerline to parallel taxiway centerline. See the example below. This is located at an existing airport.



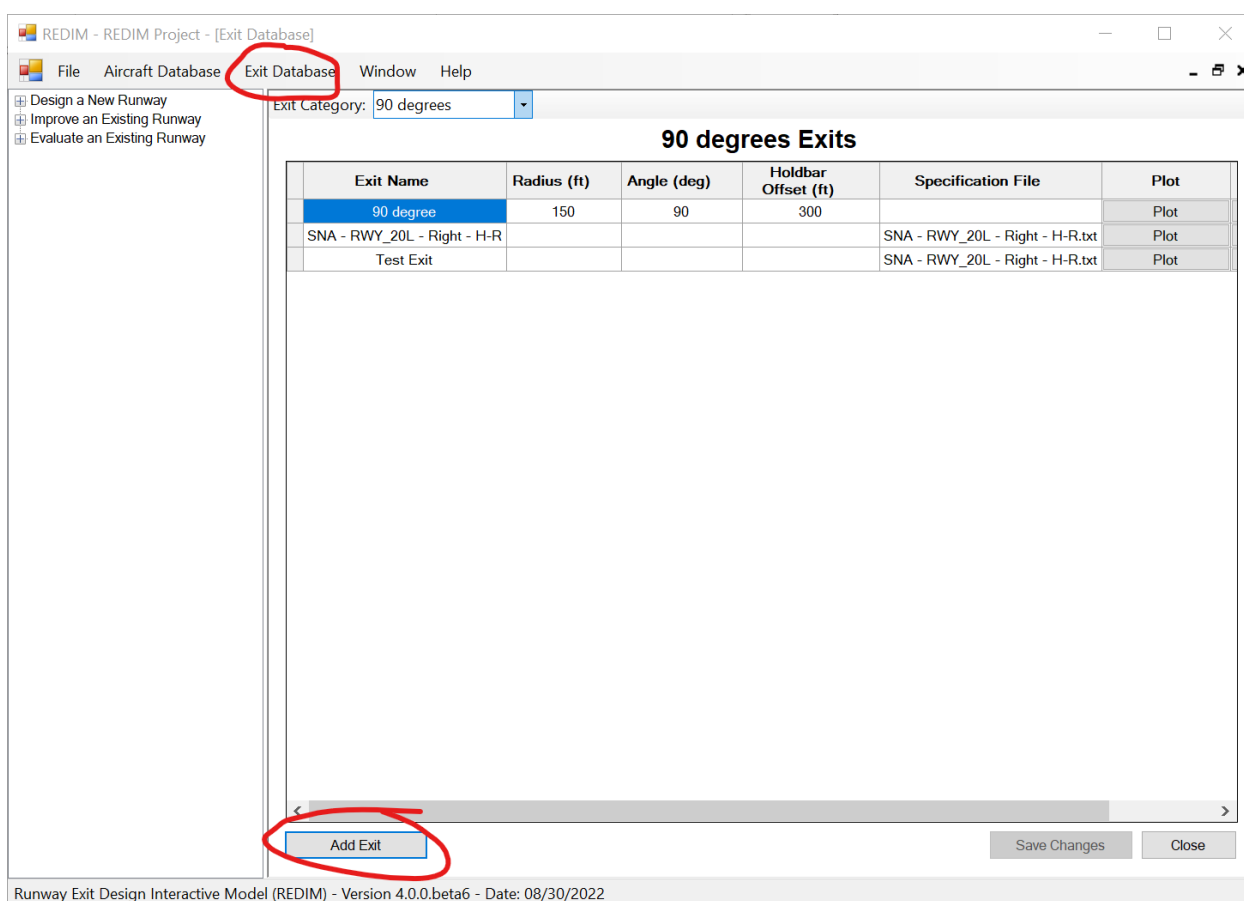
15 What is the minimum speed on the exit ramp?

Aircraft are decelerated to a minimum speed of 5 knots or kept at the exiting speed if it is lower than 5 knots. For example, an aircraft exiting at 36 knots will be decelerated to no less than 5 knots. However, an aircraft exiting at 4 knots, will simply maintain 4 knots on the exit ramp.

16 How is the geometry of the default exits defined in REDIM?

Exit Type	Angle (deg)	Path Length (ft)	Radius (ft)	Holdbar Offset (ft)
30°	30	983	1500	300
90°	90	386	150	300
45°	45	721	800	300

Custom exit geometries can be defined in the “Exit Database” module.



17 How can I define more exit types in REDIM?

REDIM supports simple exit geometries that can be defined by a circular arc starting at the Point of Curvature (PC) and ending with a straight-line segment to the hold bar.



REDIM also supports custom exit geometries that can be imported using cartesian coordinates or latitude/longitudes.

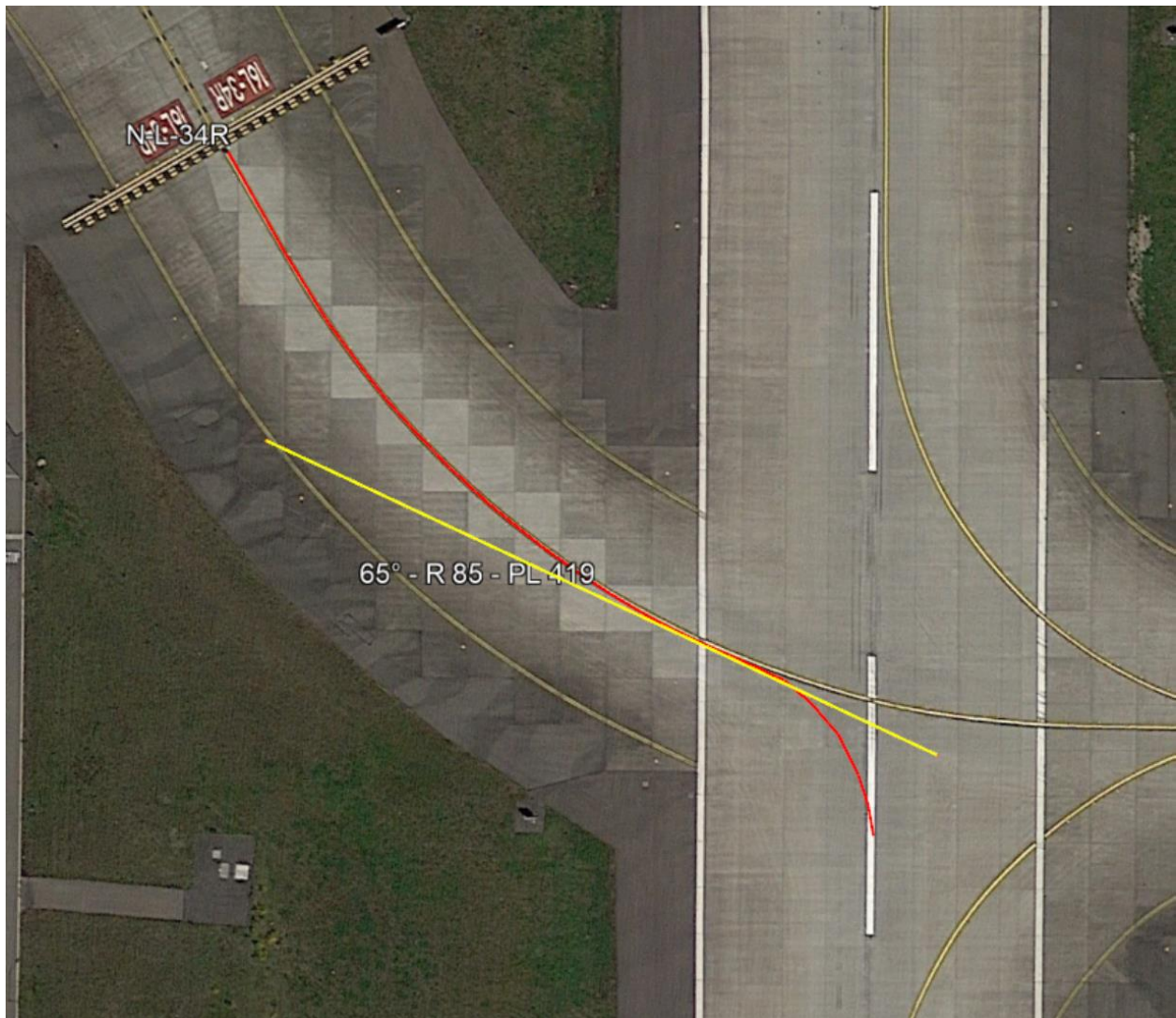
<pre>Name, Cartesian Exit Example Radius_Units, ft Radius, 900 XY_Units, m X, Y 0, 0 26.671, 2.015 42.047, 3.688 57.997, 5.654 72.971, 8.734 97.812, 15.907 113.304, 21.596 125.011, 26.633 138.622, 33.627 152.282, 41.414 164.893, 49.682 177.397, 59.000 292.216, 161.161</pre>	<pre>Name, LonLat Exit Example Radius_Units, ft Radius, 900 XY_Units, lonlat Runway_Azimuth_deg, 41.3968450417015 Lon, Lat -87.8833014762658, 41.9669286085378 -87.8831069436841, 41.9671207368017 -87.8829994220016, 41.9672345446757 -87.8828899817503, 41.9673539681213 -87.8827983987043, 41.9674734340468 -87.8826651370843, 41.9676839077378 -87.8825930378926, 41.9678224048937 -87.8825452274012, 41.9679314508081 -87.8824999334291, 41.9680650192218 -87.8824614291183, 41.9682036320656 -87.8824356467823, 41.9683380281720 -87.8824202207222, 41.9684779508170 -87.8824287593785, 41.9698616096226</pre>
<p>Notes:</p> <ul style="list-style-type: none">• The Point of Curvature (PC) is located at 0,0• The orientation of the runway is along the x-axis.• The direction of landing is from left to right.• Possible units: m (meters) and ft (feet).	<p>Notes:</p> <ul style="list-style-type: none">• Possible radius units: m (meters) and ft (feet)• The landing direction must be specified in degrees (Runway_Azimuth_deg).

18 What exit types are not supported in REDIM?

REDIM is designed to work with conventional exit geometries only. Unconventional geometries must be simplified in order for the model to properly classify the exit type.

S-curved exits:

The angle for S-curved exits should be the steepest angle encountered during the first turn. This is 65 degrees in the example below. The radius should be measured for the arc starting at the Point of Curvature (PC). This is 85 feet in the example below. REDIM will correctly identify the angle for this type of exit when using the custom exit geometry input files.



Two arc exits:

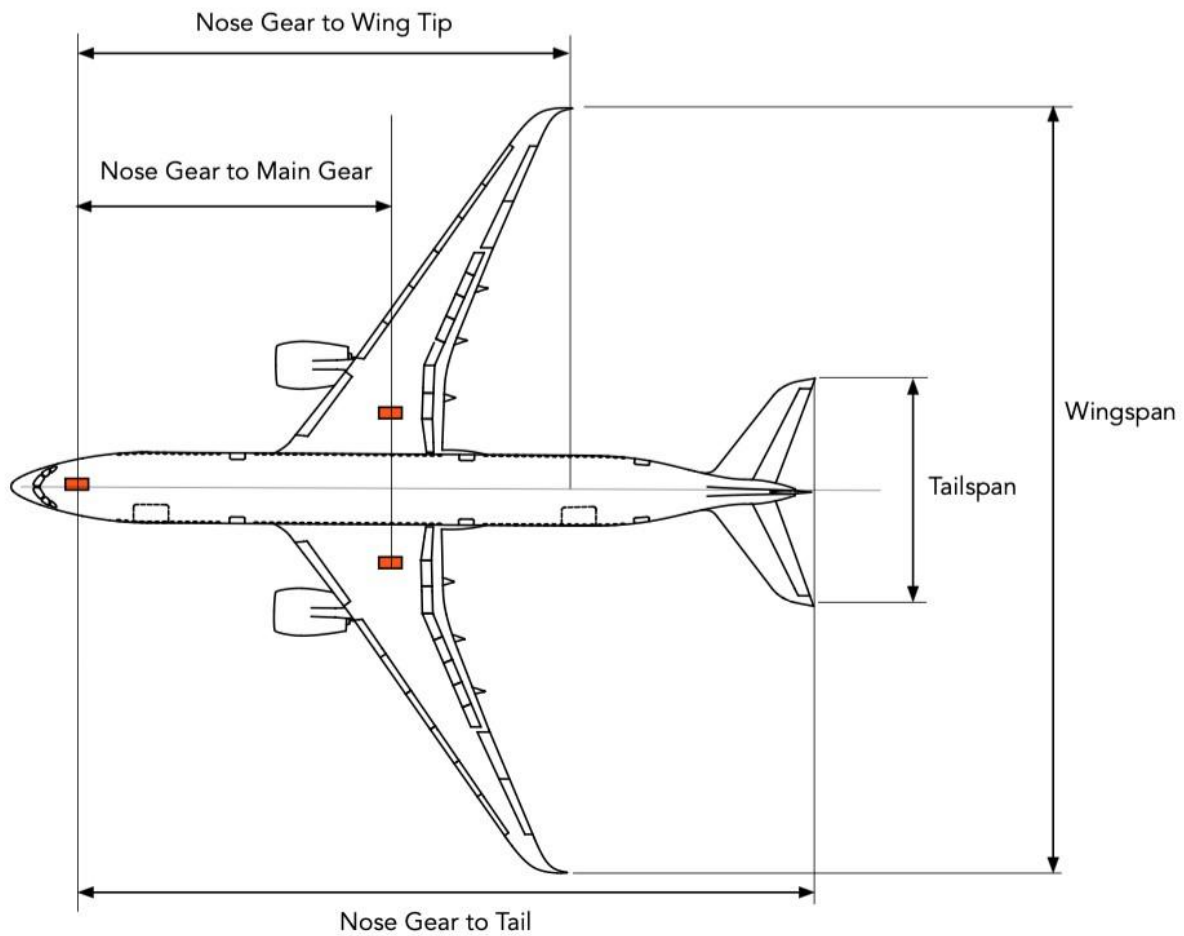
Two arc exits are problematic for REDIM. The second arc needs to be ignored and the geometry should be corrected to be a straight line after the first arc. The exit below should be defined as a 30 degree / 1,800 ft radius exit.



19 How can I export all the raw data of a run?

REDIM saves the raw data of each run automatically. The large CSV file can be found in the project's output folder.

20 What are the definitions of the aircraft dimensions required by REDIM?



21 How can I reduce the memory used by REDIM?

REDIM's memory usage is directly tied to the aircraft with the lowest value in the aircraft mix. REDIM requires at least 1,000 landings per aircraft type to generate accurate results. Therefore, the number of landings simulated follows the example below:

Aircraft Type	Aircraft Mix (%)
A320	25
B737	20
PC12	1
B767	15
A332	8
A321	10
B787	12
A319	9
TOTAL	100

$$\text{Number Of Landings} = \frac{\text{Minimum Number Of Landings Per Aircraft Type}}{\text{Smallest Fraction Of Aircraft Mix}} = \frac{1000}{0.01} = 100,000$$

Smallest Percent Of Aircraft Mix (%)	Corresponding Fraction	Number Of Landings Simulated
10	0.1	10,000
5	0.05	50,000
1	0.01	100,000
0.5	0.005	500,000
0.1	0.001	1,000,000

22 How can I reduce the scenario runtime in REDIM?

REDIM's scenario runtime is affected mainly by the number of landings it needs to simulate to produce an accurate answer. See FAQ #21 on how to reduce the number of simulated landings required.

The runtime is also affected when running edge cases or possibly unreasonable cases. The main unreasonable case is to land large aircraft on short runways. In this case, you should increase the motivation factor to help REDIM land the aircraft so that it can find an exit. As of version 4.0.2, REDIM will automatically slightly increase the motivation factor for a landing that has failed to find an exit. The motivation factor cannot exceed 2.0.