



## Unpaved (Turf) Runways Criteria

There are no references in Advisory Circular 150/5300-13, Airport Design that are for specifically for turf runways. That doesn't mean there isn't any design criteria.

### ***History***

In the early years of aviation, all airplanes operated from relatively unimproved airfields. As aviation developed, the alignment of takeoff and landing paths centered on a well defined area known as landing strip. The requirements of more advanced aircraft necessitated improving or paving the center portion of the landing strip. The term landing strip was retained to describe the surrounding graded area upon which the runway or improved surface was constructed. The primary role of the landing strip was retained to describe the graded area surrounding the runway. The area had to be capable of, under normal conditions, of supporting airplanes without causing structural damage to the aircraft or injury to its occupants. The designation of this area was later changed to "runway safety area" to reflect its functional role. So in essence, we can speak of turf or unpaved runways, runway safety areas and landing strips in the same manner.

### ***Applicable Standards***

#### **AC 150/5300-13 Changes 1 Through 18, Airport Design**

Aircraft Category is a grouping of aircraft based on 1.3 times their stall speed in their landing configurations at their maximum certificated landing weight.

Category A: Speed less than 91 knots

Category B: Speed 91 knots or more but less than 121 knots

Category C: Speed 121 knots or more but less than 141 knots

Category D: Speed 141 knots or more but less than 166 knots

Category E: Speed 166 knots or more

Airplane Design Group (ADG). A grouping of aircraft based on wingspan or tail height. Where an airplane is in two categories, the most demanding category should be used. The categories are as follows:

Group I: Tail Height <20 feet, Wingspan <49 feet.

Group II: Tail Height 20 to <30 feet, Wingspan 49 to <79 feet.

Group III: Tail Height 30 to <45 feet, Wingspan 79 to <118 feet.

Group IV: Tail Height 45 to <60 feet, Wingspan 118 to <171 feet.

Group V: Tail Height 60 to <66 feet, Wingspan 171 to <214 feet.

Group VI: Tail Height 66 to <80 feet, Wingspan 214 to <262 feet.

Note: Small airplane is an airplane of 12,500 pounds or less maximum certified takeoff weight.



## AC 150/5300-13 Changes 1 Through 18, Airport Design

Table 3-1, Runway Design Standards for Approach Category A & B Visual Runways

- **Runway length** is determined by the type of aircraft. Because runway safety areas and unpaved runways by definition are the same, the same length is used to describe both. Runway length is determined using AC150/5325-4, "Runway Length Requirements for Airport Design"
- Again, because runway safety areas and unpaved runways are the same by definition, **runway width** corresponds to the **runway safety area width**.
- Runway shoulder width, runway blast pad width and length do not apply to turf runways.
- **Obstacle free zone (OFZ)**. The OFZ length is the same as the length of the unpaved runway. Width is 400' for large airplanes. For small airplanes, width is 250' for airplanes with approach speeds of 50 knots or more and 120 feet for small airplanes with approach speeds of less than 50 knots.
- **Runway Object Free Area (ROFA)** width is as shown on the table and runway object free area length is the same as the unpaved runway length. For aircraft approach categories A and B this dimension also defines the crop restriction line.

## AC 150/5300-13 Changes 1 Through 18, Airport Design

Table 2-4. Runway Protection Zone (RPZ) Dimensions

- RPZ dimensions correspond to a visual approach.
- RPZ begins at the runway threshold and is trapezoidal in shape. It is 1000' long by 250' inner width by 450' outer width for small aircraft exclusively (<12,500 pounds) and 1000' long by 500' inner width by 700' outer width for large aircraft category A & B.
- The airport must own the RPZ or have sufficient interest to keep it free of incompatible activities.



## **AC 150/5300-13 Changes 1 Through 18, Airport Design TURF RUNWAY GRADING CRITERIA**

### **CATEGORY A & B AIRCRAFT**

FIGURE 5-2, Transverse grade limitations for aircraft approach categories A & B

- Maximum longitudinal grade is  $\pm 5\%$ .
- Maximum transverse grade is  $\pm 5\%$ .
- Grading should be done such that water will not pond and will flow away from the runway. Grading should be done so that water will also not pond on the taxiway so that access to the runway is not limited.

## **AC 150/5370-10E, Standards for Specifying Construction of Airports COMPACTION REQUIREMENTS**

- FAA Specification P-152, Excavation and Embankment
- Compaction requirements are dependent on soil type and wheel loading

## **14 CFR Part 77, Objects Affecting Navigable Airspace FAR PART 77 SURFACES**

- Establishes standards for determining obstructions to air navigation
- Primary surface ends at the end of the unpaved runway and the 20:1 approach surface begins.



## **DEFINITIONS**

*Runway.* A defined rectangular surface on an airport prepared or suitable for the landing or takeoff of airplanes. (AC150/5300-13)

*Runway Safety Area (RSA).* A defined surface surrounding the runway prepared or suitable for reducing the risk of damage to airplanes in the event of an undershoot, overshoot, or excursion from the runway. (AC150/5300-13)

*Runway Object Free Area (ROFA).* An area on the ground centered on a runway centerline provided to enhance the safety of aircraft operations by having the area free of objects, except for objects that need to be located in the OFA for air navigation or aircraft ground maneuvering purposes. (AC150/5300-13)

*Runway Protection Zone (RPZ).* An area off the runway end to enhance the protection of people and property on the ground. (AC150/5300-13)

*Obstacle Free Zone (OFZ).* The OFZ is the airspace below 150 feet above the established airport elevation and along the runway and extended runway centerline that is required to be clear of all objects, except for frangible visual NAVAIDS that need to be located in the OFZ because of their function, in order to provide clearance protection for aircraft landing or taking off from the runway, and for missed approaches. (AC150/5300-13)

## **OTHER RESOURCES**

Montana Department of Transportation - Brochures, Reports and Studies

“Airport Turf Building and Maintenance”

“Airstrip Turf Development”

Available at: <http://www.mdt.mt.gov/publications/brochures.shtml>