Designation: F2507 – 15

Standard Specification for Recreational Airpark Design[1]

This standard is issued under the fixed designation F2507; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This specification covers the minimum requirements for the design of a recreational airpark intended to service any aircraft with stall speeds (Vs_1) of 45 knots or less. These aircraft include but are not limited to, standard category aircraft, light sport aircraft, ultralights, microlights, and advanced ultralights

1.2 Recreational airparks are designed for daylight operations from 60 min before official sunrise to 60 min after official sunset.

1.3 Recreational Airparks may provide commercial services in support of the recreational operation of light sport aircraft, including, but not limited to: flight instruction, introductory flights, aircraft rental, glider towing, and maintenance services.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D4814 Specification for Automotive Spark-Ignition Engine Fuel

D6227 Specification for Unleaded Aviation Gasoline Containing a Non-hydrocarbon Component

F2317/F2317M Specification for Design of Weight-Shift-Control Aircraft

F2352 Specification for Design and Performance of Light Sport Gyroplane Aircraft

F2244 Specification for Design and Performance Requirements for Powered Parachute Aircraft

F2245 Specification for Design and Performance of a Light Sport Airplane

2.2 *FAA Documents:*[3]

FAA Form 7460-1 Notice of Proposed Construction or Alteration

FAR Part 157 Notification of Construction, Alteration, Activation, and Deactivation of Airports

AC 150-5300-13A Advisory Circular for Airport Design

2.3 *NFPA Standard:*[4]

NFPA Standard No. 30 Flammable and Combustible Liquids Code

3. Terminology

3.1 *Definitions:*

3.1.1 *airport elevation*—highest point on the surface of an airport's usable runway.

3.1.2 *civil aviation authority (CAA)*—government which has regulatory oversight for aircraft operations/safety in the country which the airport is located; for example, United States → Federal Aviation Administration.

3.1.3 *NFPA*—National Fire Protection Association.

3.1.4 *runway protection zone (RPZ)*—area off the runway end to enhance the protection of people and property on the ground.

3.1.5 *runway safety area (RSA)*—defined surface surrounding the runway prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot or excursion from the runway.

3.1.6 *taxiway (TW)*—defined path established for the taxiing of aircraft from one part of an airpark to another.

3.1.7 *taxiway safety area (TSA)*—defined surface alongside the taxiway prepared or suitable for reducing the risk of damage to an aircraft unintentionally departing the taxiway.

3.1.8 *threshold (TH)*—beginning of that portion of the runway available for landing.

4. Significance of Use

4.1 The purpose of this specification is to establish minimum standards for an airpark on which light aircraft designed

[1] This specification is under the jurisdiction of ASTM Committee F37 on Light Sport Aircraft and is the direct responsibility of Subcommittee F37.70 on Cross Cutting.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Federal Aviation Administration (FAA), 800 Independence Ave., SW, Washington, DC 20591.

[4] Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101.

in accordance with Specifications F2317/F2317M, F2352, F2244, F2245, and other similar aircraft may safely operate.

5. Site Requirements

5.1 *General*—An airpark site should take into consideration the need to ensure safe approaches and departures of aircraft.

5.1.1 Each facility shall have a means by which a person can contact an appropriate authority in case of an emergency. One example would be a public phone.

5.1.2 Each facility shall have a functioning wind sock.

5.1.3 The grading of the airport shall be such that all shoulders and slopes drain away from runways, taxiways, and all paved areas. Surfaces within the RSA and TSA shall be graded so as not to present a hazard to aircraft due to excursion from the runway or taxiway surfaces.

5.1.4 An airport should have smooth, well drained operational areas with sufficient stability to permit the safe movement of recreational aircraft.

5.1.5 *U.S. Federal Requirements*—Notification of the intent to establish an airpark is required under the provisions of FAR Part 157. FAA Form 7480-1, which is used to provide this notice (as well as guidance in its preparation), is available from any FAA Regional Airports Division or Airports District/Field Office.

5.1.6 *Local Requirements*—Most communities have established zoning laws, building codes, fire regulations, and other legal requirements to provide for the safety and comfort of the citizenry. A thorough study of these requirements should be made to determine their effect on the establishment and operation of an airpark.

6. Airpark Geometry

6.1 Runway location and orientation are important to airport safety, efficiency, economics, and environmental impact. The weight and degree of concern given to each of the following factors depend, in part, on: the meteorological conditions; the surrounding environment; topography; and the volume of air traffic expected at the airpark.

6.2 *Wind*—Appendix X1 provides information on wind data analysis for airport planning and design. Such an analysis considers the wind velocity and direction as related to the existing and forecasted operations. It may also consider wind by time of day.

6.3 *Airspace Availability*—Check with the respective Civil Aviation Authority to ensure the airpark location will not interfere with existing and planned approach and departure procedures, control zones, special use airspace, restricted airspace, and traffic patterns currently established for other aviation facilities.

6.4 *Obstructions to Air Navigation*—An obstruction survey should identify those objects that may affect aircraft operations. Approaches free of obstructions are desirable and encouraged, but as a minimum, locate and orient runways to ensure that the approach areas associated with the ultimate development of the airport are clear of hazards to air navigation.

6.5 *Wildlife Hazards*—In orienting runways, consider the relative locations of bird sanctuaries, sanitary landfills, or other areas that may attract large numbers of birds or wildlife.

7. Runway Design and Marking

7.1 *Runway Dimensions:*

7.1.1 *Airparks Supporting Light Sport Airplanes, Weight-Shift, or Gyroplane Aircraft, or a Combination Thereof:*

7.1.1.1 Minimum length (L_R) is to be twice the demonstrated or published minimum landing and takeoff distance requirements of the aircraft to be served or 275 m (902 ft) at sea level, whichever is greater. Runway lengths for airparks located at elevations above sea level should be increased as necessary to accommodate the landing and takeoff distance requirements of the aircraft to be served at the airport's elevation. In the absence of a more rational calculation, an increase of 25 m (82 ft) per 300 m (984 ft) of elevation may be used. Runway length is measured from the landing threshold to the threshold at the end of the landing distance available. See Fig. 1.

7.1.1.2 Width shall be a minimum of 10 m (33 ft) for unpaved runways and a minimum of 6 m (19.7 ft) for paved runways.

7.1.1.3 A minimum runway safety area (RSA) with a width of 32 m (104 ft) centered over the runway centerline and extending 75 m (246 ft) past each runway threshold shall be established. See Fig. 2.

7.1.1.4 Except for runway markings flush with the surface and frangible navigational markings (runway edge lights, etc.), no structure, trees, road, or designated vehicle or aircraft parking area shall be located within the runway safety area.

7.1.1.5 For approach end of runways, a runway protection zone (RPZ) shall be maintained clear of obstructions in accordance with the following description:

(1) No object shall penetrate the RPZ. The RPZ is an imaginary surface that starts at the runway landing threshold at the elevation of the runway centerline and slopes upward at a slope of 15 (horizontal) to 1 (vertical). See Fig. 2.

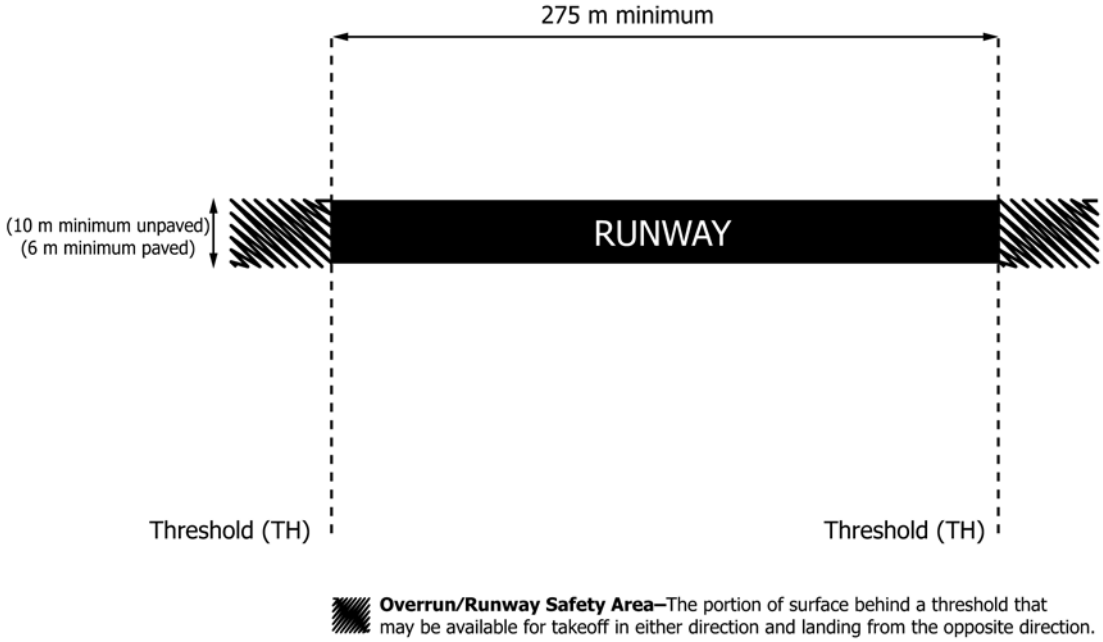
(2) In the plan view, the centerline of the RPZ extends 230 m (750 ft) along the extended runway centerline starting at the runway landing threshold. This surface extends laterally 16 m (52 ft) on each side of the runway centerline starting at the runway threshold and increases in width to 120 m (400 ft) at a point 230 m (750 ft) from the landing threshold at an elevation of 15 m (50 ft) above the elevation of the landing threshold. See Fig. 2.

(3) The RPZ is intended to protect the approach/departure ends of the runway from obstructions due to future potential land development – airpark owners should therefore strive to control the land below the RPZ by ownership or surface lease.

(4) For the purpose of establishing the RPZ, any vehicle or aircraft movement area including taxiways, aircraft run-up areas, cart paths, and roadways and highways shall be considered an obstruction equal to a height of 4.3 m (14 ft).

7.1.2 *Powered Parachute Designated Landing Area* (see Fig. 3):

7.1.2.1 Airparks establishing a separate landing area for powered parachutes shall designate a circular landing area with a minimum radius of 45 m (147 ft). See Fig. 3.



NOTE 1—Not to scale

FIG. 1 Runway Length—Threshold

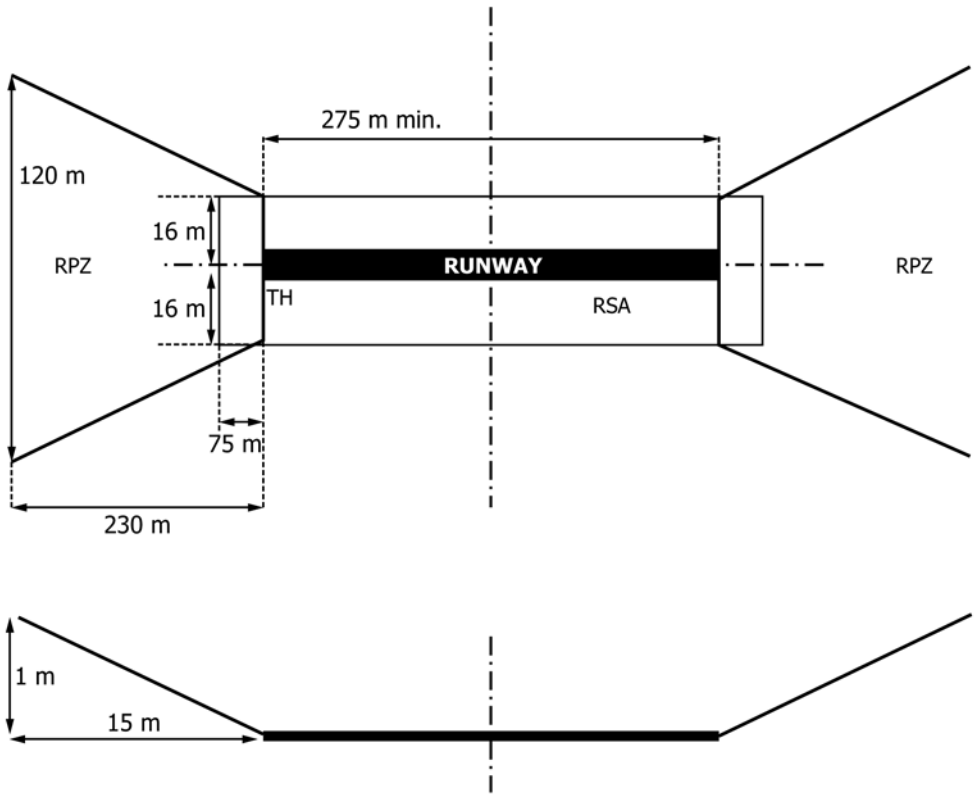


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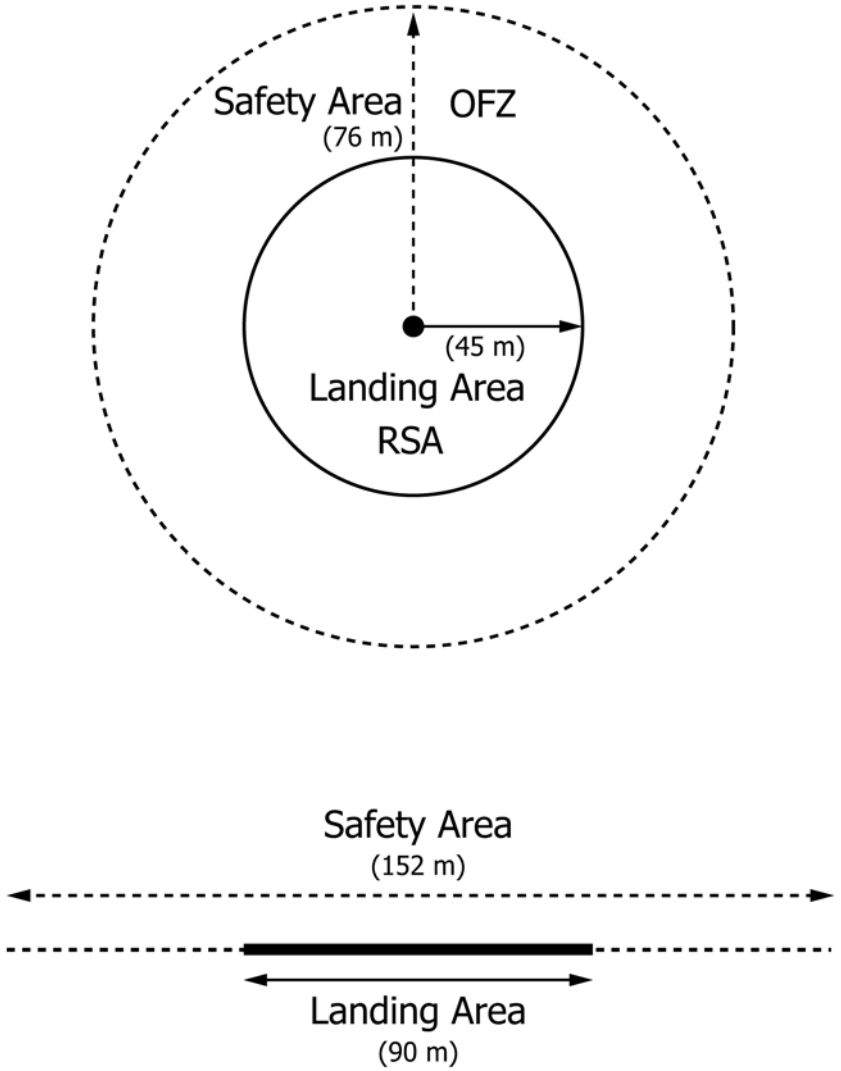
FIG. 2 Safety Areas

7.1.2.2 A safety area with a radius of a minimum of 76 m (249 ft) shall be established. See Fig. 3.

7.1.2.3 In cases where 95 % or greater of the daytime prevailing winds occur within a 60° arc or the inverse of that



NOTE 1—Not to scale

FIG. 3 Powered Parachute Landing Area

arc, or both, the crosswind segment of both the landing area and safety area may be reduced. The reduced width is measured as a width either side of a straight line drawn in the center of the 60° arc of 26 m (85 ft) for the landing area and 44 m (144 ft) for the safety area. See Fig. 4.

7.1.2.4 Except for runway and navigational marking, no structure, trees, road, or designated aircraft parking area should be located within the runway safety area.

7.1.2.5 The designated landing area for powered parachutes may overlap a runway as described in 7.1, where an airpark operator wishes to support both types of aircraft on the same landing surfaces.

7.1.2.6 If prevailing winds allow and an airpark owner so designates, the airpark may support powered parachute landing traffic on a runway in place of a powered parachute landing area.

7.2 Runways should be marked with white paint or white colored break-off markers such as plastic highway cones, or both.

7.3 Runways shall be clear and graded and have no potentially hazardous ruts, humps, depressions, or other abrupt surface variations.

7.4 Runways shall be graded to divert surface water runoff off the runway and into a drainage system.

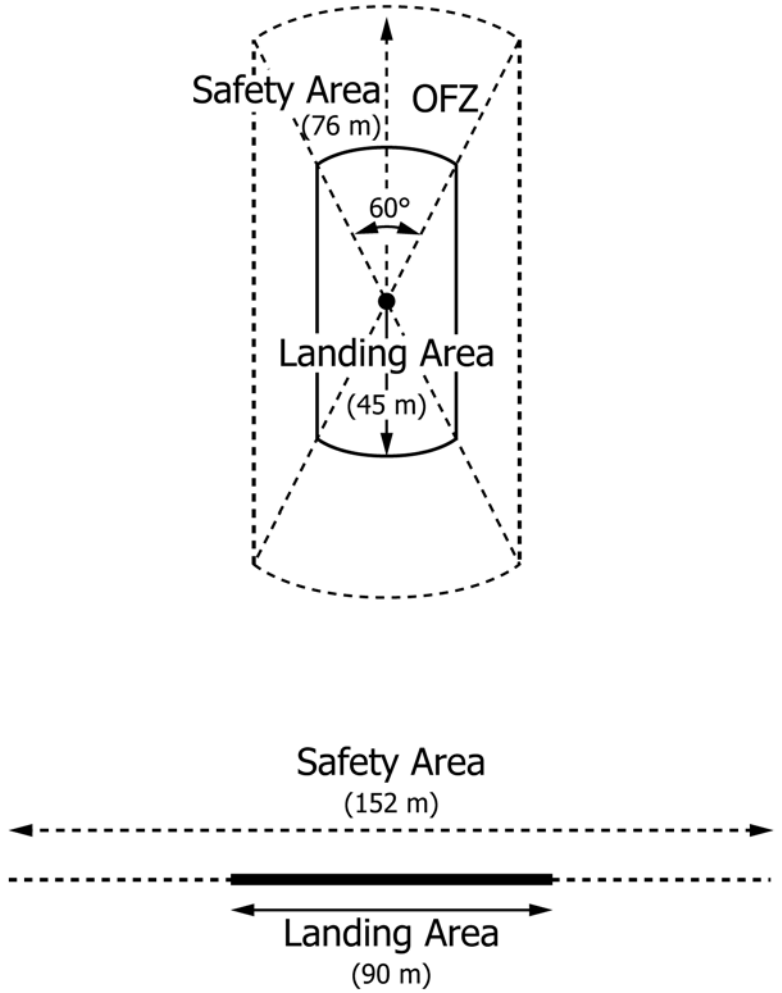
8. Taxiway Design and Marking

8.1 *General*—An airpark is not required to have taxiways. If taxiways are established, then the following minimum standards shall be met.

8.1.1 Each taxiway shall be at least 3 m (10 ft) wide.

8.2 Each taxiway shall have a taxiway safety area with a width of 15 m (50 ft) centered over the taxiway centerline. The TSA shall not overlap the RSA.

8.3 Except for taxiway and navigational marking, no structure, trees, or designated aircraft parking area should be located within the taxiway safety area.



NOTE 1—Not to scale

FIG. 4 Powered Parachute Landing Area

8.4 Taxiways edges should be marked with blue colored markers such as plastic highway cones or break-off markers.

9. Threshold Siting

9.1 *General*—The thresholds should be located at the beginning of the marked runway surface. However, displacement of the landing threshold may be required when an object that obstructs the airspace required for approaching aircraft is beyond the airport owner's power to remove, relocate, or lower. Thresholds may also be displaced for environmental considerations, such as noise abatement.

9.1.1 Runway landing thresholds shall be placed so that no obstruction shall penetrate the RPZ. For the purpose of establishing the landing threshold, the inclined plane of the RPZ shall be extended at a constant width of 120 m (400 ft) centered along the extended runway centerline for the distance required to reach traffic pattern altitude.

9.1.1.1 Should there be an obstruction that will penetrate the RPZ that cannot be removed, the landing threshold may be displaced from the physical runway end at a distance necessary to meet RPZ obstacle clearance requirements, leaving the remainder of the physical runway available for takeoff operations or maximum landing distance available from the opposite direction. In this case the physical runway length must be extended as necessary to maintain minimum landing distance requirements from the displaced landing threshold. Displaced landing thresholds must be clearly marked to prevent landings prior to reaching the displaced landing threshold.

10. Buildings and Airplane Parking

10.1 *General*—Buildings, aircraft hangars, vehicle and aircraft parking areas, and any other permanent structures are to be placed a minimum of 45 m (149 ft) from the runway centerline.

10.2 An area to park automobiles should be provided.

10.3 In addition to auto parking, parking should be provided that facilitates the loading and unloading of trailered aircraft.

11. Traffic Patterns

11.1 Airpark owners and operators are responsible for establishing traffic patterns. In some cases, coordination with the local civil aviation authority is also required.

11.1.1 Light sport airplanes, weight-shift, and gyroplanes generally fly a rectangular pattern. Pattern altitude will typically be 152.4 m (500 ft) or greater above the altitude of the airport but may be lower.

11.1.1.1 In no case shall any obstruction to air traffic penetrate the floor of the minimum pattern altitude.

11.2 Powered parachute aircraft require patterns that allow an approach to landing that is as near as practical directly into the wind.

11.3 The airpark owner shall post a diagram and instructions describing the local pattern in a conspicuous manner in a conspicuous location at or near the parking apron or airport office.

12. Fuel and Fuel Storage

12.1 *General*—The majority of light sport aircraft are designed to use unleaded automotive type fuels complying with Specifications D4814 and D6227, or other similar unleaded gasoline specifications.

12.1.1 If fuel is provided at the airpark, all local fire, environmental, and zoning regulations should be followed. NFPA Standard No. 30, Chapter 2, contains location and installation criteria for fuel storage tanks with respect to other buildings, property lines, and public ways.

12.2 If a fueling facility is provided at the airpark, it is recommended that the smallest tank practical be used to prevent prolonged storage of unused gasoline.

12.3 In calculating the size of tank used, an owner should consider the number of based aircraft, the hours expected to fly in a given period, and the expected number of transient aircraft purchasing fuel. Also, the tank must be large enough to receive a normal minimum fuel delivery offered by the local fuel distributor.

12.4 Light sport aircraft have fuel capacities that typically range between 5 and 20 U.S. gallons. Facilities should be designed with this low volume in mind.

12.5 Fuel storage facilities shall be considered permanent structures and shall be placed outside of the RPZ and runway and taxiway safety areas in accordance with 10.1.

13. Keywords

13.1 airpark; airplane; airport; glider; gyroplane; light sport aircraft; powered parachute aircraft; recreational airpark; runways; taxiway; trike; weight shift aircraft

APPENDIX

(Nonmandatory Information)

X1. GUIDANCE ON DETERMINING RUNWAY ORIENTATION

X1.1 This appendix provides guidance on the assembly and analysis of wind data to determine runway orientation. It also provides guidance on analyzing the operational impact of winds on existing runways. (This information does not apply for the round runway configuration.)

X1.1.1 A factor influencing runway orientation and number of runways is wind. Ideally, a runway should be aligned with the prevailing wind. Wind conditions affect all aircraft in varying degrees. Generally, the smaller the aircraft, the more it is affected by wind, particularly crosswind components. Crosswinds are often a contributing factor in small airplane accidents.

X1.1.2 Airpark planners and designers should make an accurate analysis of wind to determine the orientation and number of runways. In some cases, construction of two runways may be necessary to give the desired wind coverage (75 % coverage). The proper application of the results of this analysis will add substantially to the safety and usefulness of the airport.

X1.2 *Crosswinds*—The crosswind component of wind direction and velocity is the resultant vector which acts as a right angle to the runway. It is equal to the wind velocity multiplied by the trigonometric sine of the angle between the wind direction and the runway direction. Normally, these wind vector triangles are solved graphically.

X1.3 *Coverage and Orientation of Runways*—The most desirable runway orientation based on wind is the one that has the largest wind coverage and minimum crosswind components. Wind coverage is that percent of time when crosswind components are below an acceptable velocity. The desirable wind coverage for an airport is 75 %, based on the total numbers of weather observations. This value of 75 % takes into account various factors influencing operations and the economics of providing the coverage. The data collection should be with an understanding of the objective; that is, to attain 75 % usability. Airparks are not designed to operate after dark so it may be desirable to analyze the wind data on less than a 24-h observation period. At airparks where operations are predominantly seasonal, regard should be given to the wind data for the predominant-use period.

X1.4 *Assembling Wind Data*—The latest and best wind information should always be used to carry out a wind analysis. A record which covers the last 10 consecutive years of wind observations is preferred.

X1.4.1 *Data Source*—A source of wind information in the U.S. is the National Oceanic and Atmospheric Administration, National Climatic Data Center (NCDC).[5]

[5] The NCDC is located at Climate Services Branch, National Climatic Data Center, 151 Patton Avenue, Asheville, NC 28801-5001, Public Web Address: http://www.ncdc.noaa.gov/.

X1.4.1.1 The Center should be contacted directly to determine the availability of data for a particular site.

X1.4.2 Other sources such as the local public library and internet sites also provide this data.