

Airport



An aerial view of a medium-sized airport.

An **airport** is a facility where [aircraft](#) can [take off](#) and [land](#). At the very minimum, an airport consists of one [runway](#) (or [helipad](#)), but other common components are [hangars](#) and [terminal](#) buildings. Apart from these, an airport may have a variety of facilities and infrastructure, including [fixed base operator services](#), [air traffic control](#), passenger facilities such as restaurants and lounges, and [emergency services](#). A [military](#) airport is known as an [airbase](#) in North American terminology (other countries may use the term airfield or air station in current parlance). The terms **airfield** and **airstrip** may also be used to refer to a facility that has nothing more than a runway. The term **aerodrome** refers to *any* surface used for [take off](#) or [landing](#). The term **airport** refers to an *aerodrome* that is licensed by the responsible government organization (ie FAA, Transport Canada). Airports have to be maintained to higher safety standards. There is usually no minimum standards for a basic aerodrome.

Attributes

Airports vary in size, with smaller or less-developed airports often having only a single runway shorter than 1,000 m (3,300 ft). Larger airports for international flights generally have paved runways 2,000 m (6,600 ft) or longer. Many small airports have dirt, [grass](#), or gravel runways, rather than [asphalt](#) or [concrete](#).

In the [United States](#), the minimum dimensions for dry, hard landing fields are defined by the [FAR Landing And Takeoff Field Lengths](#). These include considerations for safety margins during landing and takeoff. Typically heavier aircraft require longer runways.

The longest public-use runway in the world is at [Ulyanovsk-Vostochny International Airport](#), in [Ulyanovsk](#), [Russia](#). It has a length of 16,404ft.

As of 2005, there were approximately 50,000 airports around the world, including 19,815 in the United States alone.

Airport structures



A view of the Frankfurt airport terminal showing [jetways](#) and luggage carts.

Airports are divided into landside and airside areas. Landside areas include [parking lots](#), [tank farms](#) and access [roads](#). Airside areas include all areas accessible to aircraft, including [runways](#), [taxiways](#) and [ramps](#). Access from landside areas to airside areas is tightly controlled at most airports. Passengers on [commercial flights](#) access airside areas through [terminals](#), where they can purchase tickets, clear security, check or claim luggage and board aircraft. The waiting areas which provide passenger access to aircraft are typically called concourses, although this term is often used interchangeably with terminal.

The area where aircraft park next to a terminal to load passengers and baggage is known as a ramp. Parking areas for aircraft away from terminals are generally called aprons.

Both large and small airports can be [towered](#) or [uncontrolled](#), depending on air traffic density and available funds. Due to their high capacity and busy [airspace](#), most international airports have [air traffic control](#) located on site.

International airports

[Customs](#) facilities for international flights define an international airport, and often require a more conspicuous level of physical security. International airports generally have a complex of buildings where passengers can embark on [airliners](#), and where [cargo](#) can be stored and loaded.

The largest international airports are often located next to [freeways](#) or are served by their own freeways. Often, traffic is fed into two access roads, designed as loops, one sitting on top of the other. One level is for departing passengers and the other is for arrivals. Many airports also have [light rail](#) lines or other [mass transit](#) systems directly connected to the main terminals.

Shops and food services



Airport terminal interiors (like this one at [Zurich International Airport](#)) increasingly look like small [shopping centers](#).

Most international airports have shops and food courts. These services usually provide the passengers food and drinks before they board their flight. Many recognizable chain food restaurants have opened branches in large airports to serve often hungry passengers. London's Heathrow Airport, for example, is home to both a Harrods and a Hamleys Toy Shop, providing Duty Free for international passengers.

International areas usually have a [duty-free shop](#) where travellers are not required to pay the usual [duty](#) fees on items. Larger airlines often operate member-only lounges for premium passengers.

Airports have a [captive audience](#), and consequently the prices charged for food is generally higher than are available elsewhere in the region. However, some airports now regulate food costs to keep them comparable to so-called "street prices".



Loading luggage

Cargo and freight services

In addition to people, airports are responsible for moving large volumes of cargo around the clock. [Cargo airlines](#) often have their own on-site and adjacent infrastructure to rapidly transfer parcels between ground and air modes of transportation.

Support services

Aircraft maintenance, pilot services, aircraft rental, and hangar rental are most often performed by a [fixed base operator](#) (FBO). At major airports, particularly those used as hubs, airlines may operate their own support facilities.

History and development

The earliest airplane landing sites were simply open, grassy fields. The plane could approach at any angle that provided a favorable wind direction. Early airfields were often built for the purpose of entertainment. These [aerodromes](#) consisted of a grassy field, with hangar for storage and servicing of airplanes, and observation stands for the visitors.

Increased aircraft traffic during [World War I](#) led to the construction of regular landing fields. Airplanes had to approach these from certain directions. This led to the development of aids for directing the approach and landing slope.

Following the war, some of these military airfields added commercial facilities for handling passenger traffic. One of the earliest such fields was Le Bourget, near [Paris](#). The first international airport to open was the [Croydon Airport](#), in South [London](#) [1]. In [1922](#), the first permanent airport and commercial terminal solely for commercial aviation was built at [Königsberg, Germany](#). The airports of this era used a paved "apron", which permitted night flying as well as landing heavier airplanes.

The first lighting used on an airport was during the later part of the [1920s](#); in the [1930s](#) approach lighting came into use. These indicated the proper direction and angle of descent. The colors and flash intervals of these lights became standardized under the [ICAO](#). In the [1940s](#), the slope-line approach system was introduced. This consisted of two rows of lights that formed a funnel indicating an aircraft's position on the [glideslope](#). Additional lights indicated incorrect altitude and direction.

Following [World War II](#), airport design began to become more sophisticated. Passenger buildings were being grouped together in an island, with runways arranged in groups about the terminal. This arrangement permitted expansion of the facilities. But it also meant that passengers had to travel further to reach their plane.

Airport designation and naming

Airports are uniquely represented by their [IATA airport code](#) and [ICAO airport code](#). IATA airport codes are often, but not always, abbreviated forms of the common name of the airport, such as PHL for [Philadelphia International Airport](#). Exceptions to this rule often occur when an airport's name is changed. [O'Hare International Airport](#) in [Chicago, Illinois](#) retains the IATA code ORD, from its former name of [Orchard Field](#).

In many countries airports are often named after a prominent national celebrity, commonly a [politician](#), e.g. [John F. Kennedy International Airport](#), [Indira Gandhi International Airport](#) or [Charles de Gaulle International Airport](#).

Airport security

Airports are required to have safety precautions in most countries. Rules vary in different countries, but there are common elements worldwide. Airport security normally requires baggage checks, metal screenings of individual persons, and rules against any object that could be used as a weapon..

Airport operations

Outside the terminal, there is a large team of people who work in concert to ensure aircraft can land, take off, and move around quickly and safely. These processes are largely invisible to passengers, but they can be extraordinarily complex at large airports.

Air traffic control

Air traffic control (or ATC) is system whereby ground-based [controllers](#) direct aircraft movements, usually via [radio](#). This coordinated oversight facilitates safety and speed in complex operations where traffic moves in all three dimensions. Air traffic control responsibilities at airports are usually divided into two main areas: ground and tower.

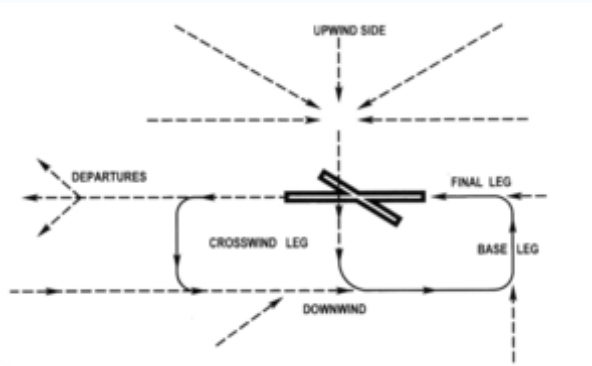


Air traffic controllers inside the control tower at [Misawa Air Base, Japan](#).

Ground Control is responsible for directing all ground traffic in designated "movement areas," except the traffic on runways. This includes planes, baggage trains, snowplows, grass cutters, fuel trucks, and a wide array of other vehicles. Ground Control will instruct these vehicles on which taxiways to use, which runway they will use (in the case of planes), where they will park, and when it is safe to cross runways. When a plane is ready to take off it will stop short of the runway, at which point it will be turned over to Tower Control. After a plane has landed, it will depart the runway and be returned to Ground Control.

Tower Control controls aircraft on the runway and in the [controlled airspace](#) immediately surrounding the airport. Tower controllers use [radar](#) to identify and accurately locate an aircraft's position in three-dimensional space. They coordinate the sequencing of aircraft in the traffic pattern and direct aircraft on how to safely join and leave the circuit. Aircraft which are only passing through the airspace must also contact Tower Control in order to be sure that they remain clear of other traffic and do not disrupt operations.

Traffic pattern



A [Transport Canada](#) diagram of a standard left-handed circuit. This top-down view also shows paths via which aircraft may join and leave the circuit.

Smaller airports and military airfields use a traffic pattern to assure smooth traffic flow between departing and arriving aircraft. Generally, this pattern is a circuit consisting of five "legs" that form a rectangle (two legs and the runway form one side, with the remaining legs each form another side). Each leg is named (see diagram), and ATC directs pilots on how to join and leave the circuit. Traffic patterns are flown at one specific altitude, usually 1000 ft [AGL](#). Most traffic patterns are *left-handed*, meaning all turns are made to the left. Right-handed patterns do exist, usually because of obstacles such as a [mountain](#) or to reduce noise for local residents. The predetermined circuit helps pilots look for other aircraft, and helps reduce the chance of a mid-air collision.

At extremely large airports, a circuit is not usually used. Rather, ATC schedules aircraft for landing while they are still hours away from the airport. Airplanes can then take the most direct approach to the runway and land without worrying about interference from other aircraft. While this system keeps the airspace free and is simpler for pilots, it requires detailed knowledge of how aircraft are planning to use the airport ahead of time and is therefore only possible with large commercial airliners on pre-scheduled flights. The system has recently become so advanced that controllers can predict whether an aircraft will be delayed on landing before it even takes off; that aircraft can then be delayed on the ground, rather than wasting expensive fuel waiting in the air.

Navigational aids



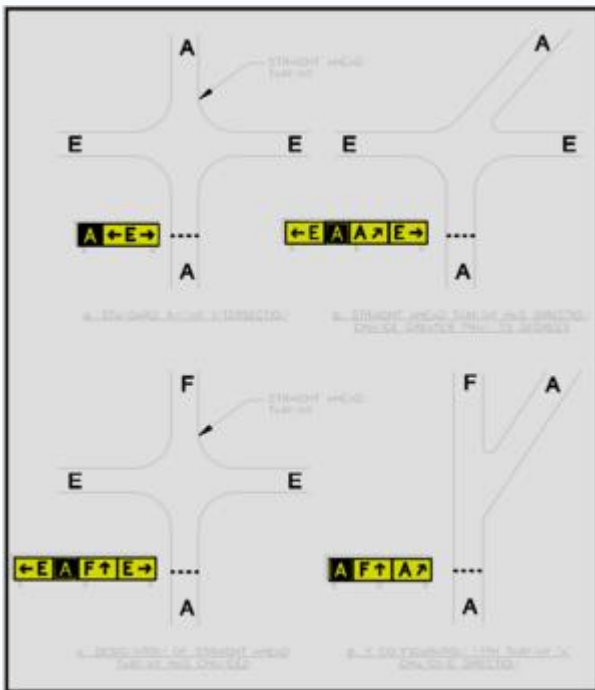
The [Indira Gandhi International Airport, Delhi](#) is one of the few airports in the world that uses the CAT-3B Instrument Landing System.

Before takeoff, pilots usually check an [Automatic Terminal Information Service](#) (ATIS) for information about airport conditions where they exist. The ATIS contains information about weather, which runway and traffic patterns are in use, and other information that pilots should be aware of.

When flying, there are a number of aids available to pilots, though not all airports are equipped with them. A [Visual Approach Slope Indicator](#) (VASI) helps pilots fly a perfect approach for landing once they have found the airport. Some airports are equipped with a [VHF omnidirectional range](#) (VOR) to help pilots find the direction to the airport. VORs are often accompanied by a [Distance Measuring Equipment](#) (DME) to determine the distance to the airport. In poor weather, pilots will use an [Instrument Landing System](#) to find the runway and fly the correct approach, even if they cannot see the ground.

Larger airports sometimes offer [Precision Approach Radar](#) (PAR). The aircraft's horizontal and vertical movement is tracked via radar, and the controller tells the pilot his position relative to the [approach slope](#). Once the pilots can see the runway lights, they may continue with a visual landing.

Guidance signs



Examples of various location sign configurations

Airport guidance signs provide direction and information to taxiing aircraft and airport vehicles and assist in safe and expedient movement of aircraft. Smaller airports may have few or no signs, relying instead on airport diagrams and charts.

There are two classes of signage at airports, with several types of each:

Operational guidance signs

- Location signs - yellow on [black](#) background. Identifies the runway or taxiway currently on or entering.
- Direction/Runway Exit signs - black on yellow. Identifies the intersecting taxiways the aircraft is approaching, with an arrow indicating the direction to turn.
- Other - Many airports use conventional [traffic signs](#) such as [stop](#) and [yield](#) signs throughout the airport.

Mandatory instruction signs

Mandatory instruction signs are white on [red](#). They show entrances to runways or critical areas. Vehicles and aircraft are required to stop at these signs until the [control tower](#) gives clearance to proceed.

- Runway signs - White on a red. These signs simply identify a runway intersection ahead.
- Frequency Change signs - Usually a stop sign and an instruction to change to another frequency. These signs are used at airports with different areas of ground control.
- Holding Position signs - A single solid yellow bar across a taxiway indicates a position where ground control may require a stop. If a two solid yellow bars and two dashed yellow bars are encountered, this indicates a holding position for a runway intersection ahead; runway holding lines must never be crossed without permission. At some airports, a line of red lights across a taxiway is used during low visibility operations to indicate holding positions.

Lighting

Many airports have [lighting](#) that help guide planes using the runways and taxiways at night or in rain or [fog](#).

On runways, green lights indicate the beginning of the runway for landing, while red lights indicate the end of the runway. Runway edge lighting is white lights spaced out on both sides of the runway, indicating the edge. Some airports have more complicated lighting on the runways including lights that run down the centerline of the runway and lights that help indicate the approach. Low-traffic airports may use [Pilot Controlled Lighting](#) to save electricity and staffing costs.

Along taxiways, blue lights indicate the taxiway's edge, and some airports have embedded green lights that indicate the centerline.

Wind indicators

Planes take-off and land *into* the wind in order to achieve maximum performance. Wind speed and direction information is available through the ATIS or ATC, but pilots need instantaneous information during landing. For this purpose, a [windsock](#) is kept in view of the runway.

Safety management

[Air safety](#) is an important concern in the operation of an airport, and almost every airfield includes equipment and procedures for handling emergency situations. Commercial airfields include one or more [emergency vehicles](#) and their crew that are specially equipped for dealing with airfield [accidents](#), crew and passenger extractions, and the hazards of highly flammable airplane [fuel](#). The crews are also trained to deal with situations such as [bomb threats](#), [hijacking](#), and [terrorist](#) activities.

Potential airfield hazards to aircraft include debris, nesting [birds](#), and environmental conditions such as [ice](#) or [snow](#). The fields must be kept clear of debris using cleaning equipment so that loose material doesn't become a projectile and enter an engine duct. Similar concerns apply to birds nesting near an airfield, and crews often need to discourage birds from taking up residence. In adverse weather conditions, ice and snow clearing equipment can be used to improve traction on the landing strip. For waiting aircraft, equipment is used to spray special deicing fluids on the wings.

During the [1980s](#), a phenomenon known as [microburst](#) became a growing concern due to [accidents](#) caused by microburst [wind shear](#). (For example, see [Delta Air Lines Flight 191](#).) Microburst radar was developed as an aid to safety during landing, giving two to five minutes warning to aircraft in the vicinity of the field of an microburst event.

Environmental concerns

The traffic generated by airports both in the air and on the surface can be a major source of [aviation noise](#) and [air pollution](#) which may interrupt nearby residents' sleep or, in extreme cases, be harmful to their [health](#). The construction of new airports, or addition of runways to existing airports, is often resisted by local residents because of the effect on the countryside, historical sites, local [flora](#) and [fauna](#). As well, due to the risk of collision between [birds](#) and airplanes, large airports undertake population control programs where they frighten or shoot birds to ensure the safety of air travellers.

The construction of airports has been known to change local [weather](#) patterns. For example, because they often flatten out large areas, they can be susceptible to [fog](#) in areas where fog rarely forms. In addition, because they generally replace [trees](#) and [grass](#) with pavement, they often change [drainage](#) patterns in [agricultural](#) areas, leading to more [flooding](#), run-off and [erosion](#) in the surrounding land.

Military Airbase

An Airbase, sometimes referred to as a *military airport* or *airfield*, provides basing and support of [military aircraft](#). Some airbases provide facilities similar to their civilian counterparts. For example, [RAF Brize Norton](#) in [Oxfordshire, England](#) has a terminal which caters to passengers for the [Royal Air Force's](#) scheduled [Tristar](#) flights to the [Falkland Islands](#). A special military airfield is an [Aircraft Carrier](#).

Aircraft Carriers

An aircraft carrier is a [warship](#) that functions as a floating airport for military aircraft. Aircraft carriers allow a naval force to project air power great distances without having to depend on local bases for land-based aircraft. After their development in [World War II](#), aircraft carriers rapidly replaced the [battleship](#) as the centrepiece of a modern fleet. Unescorted carriers are considered vulnerable to [missile](#) or [submarine](#) attacks and therefore travel as part of a *carrier battle group* that includes a wide array of other ships with specific functions.

Airports in entertainment

Airports have occasionally played major roles in [motion pictures](#) and [television shows](#) due to being transportation hubs, but also because of their unique characteristics. One such example of this is the movie [The Terminal](#), a film about a man who becomes permanently grounded in an airport terminal and must survive only on the food and shelter provided by the airport. If nothing else, this movie demonstrates the sustaining properties of airport terminals. Movies such as [Airplane!](#), [Airport](#), [Die Hard II](#), [Jackie Brown](#), and [Get Shorty](#) also revolve around the unique culture of the major city airports.

Airport Directories

Each national aviation authority has its own system for pilots to be able to keep track of information about airports in their country.

- The [United States](#) uses the [Airport/Facility Directory \(A/FD\)](#), seven volumes that contain information such as elevation, airport lighting, runway information, communications, hours of operation, nearby NAVAIDs and much more.
- In Canada, a single publication, the [Canada Flight Supplement \(CFS\)](#) provides equivalent information.

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