



World Class Airports

Introduction

Airports and airlines share a common interest in developing functional airport facilities that can efficiently meet demand at required levels of service while being affordable to develop and operate.

While each airport has its own local conditions to consider, world class airports are distinguished by their use of principles and practices to achieve optimal results.

Prerequisites that help support the successful implementation of best practices include:

- A stable and supportive political, regulatory, and economic environment.
- A strategy that balances the economic and social benefits of an airport with its impact on surrounding communities and the environment.
- Robust, independent economic regulation that follows the ICAO charges principles of transparency, non-discrimination, cost-relatedness, and consultation.
- A recognition that airlines are the primary users and customers of airports and a major source of revenue.
- Consultation between airports and airlines on capital infrastructure projects to capture user requirements and safeguard functionality.
- A quality regime to monitor performance and promote continuous improvement.

The following sections provide recommended practices that should be considered for key elements of airport planning and design.

Master Plan, Land-Use, Forecasts

An airport master plan should be in place to set out the type of facilities to be built, the scale of the investment and that it is properly phased to ensure that development proceeds in a structured balanced and orderly manner. The master plan

should describe how the airport's ultimate development potential is to be achieved. Critical planning elements include:

- Forecasts of future levels of aviation activity (passengers, cargo, aircraft movements) for the next 20 years should be developed and used to form the basis of decision-making.
- A land use plan should be in place to safeguard the overall layout of the airport's runway system, terminals and support facilities and make sure that the airspace around the airport is free from obstacles.
- Land use plans should also confirm that noise sensitive developments do not encroach on key operational areas.
- Expansion should be governed by demand triggers linked to traffic figures and the required lead time for development.

Airside Development

Runways, taxiways, and aprons occupy significant space and determine an airport's layout and ultimate capacity. The following practices can increase efficiency and user convenience.

Runways and Taxiways

The airfield should maintain a continuous flow of aircraft movements and minimize taxi distances and fuel burn while maximizing operational efficiency and flexibility. The following practices should be considered:

- For midfield passenger terminal developments and if wind conditions permit, airports should prioritize staggered independent parallel runways.
- IATA recommends having adequate space between parallel runways (2,000 meters) to deliver optimum space for midfield terminal and apron facilities.
- Runways should be planned with sufficient space for a dual parallel taxiway system to be located adjacent and parallel to all runways.



Actual construction of the dual parallel taxiway system should be done in phases only when required to support increasing peak hour aircraft movement rates.

- The capacity of the taxiway system must be kept in balance with the runway system and should provide short and direct routes to and from an apron parking.
- The minimum separation distances between runways, taxiways, taxi-lanes and objects as set out by ICAO's Annex 14 standards and recommended practices should be followed.
- Runway capacity can be improved by reducing runway occupancy times through the use of Rapid Exit Taxiways (RETs) and Rapid Access Taxiways (RATs).
- Runway Access Taxiways that connect the parallel taxiways with runways should be set at 90° to the runway for safety.
- End-around taxiways (EATs) should be provided when runway crossings result in a reduction of capacity during busy periods.

Aprons

- There should be enough parking positions to accommodate peak hour demand, based on the mix of aircraft and the level of pier service required via contact gates.
- Where economically feasible, fixed electrical ground power and pre-conditioned air may be employed to reduce noise and emissions from aircraft auxiliary power units and diesel-powered ground power units at aircraft stands.
- Centralized de-icing pads should be placed adjacent to primary departure runway thresholds.
- Apron configuration and capacity should enable airline users to collocate operations.
- Aprons should be planned in connection with terminal buildings to minimize taxiing distances between runways and aircraft stands.
- Configure aprons to minimize adverse effects such as engine blast, noise, air pollution, etc. on the apron and the surrounding environment.
- Where required, apron layouts should provide maximum flexibility in terms of the size and

number of aircraft that can be accommodated, e.g., Multiple Aircraft Ramp System (MARS).

- Single taxiway cul-de-sac aircraft parking positions are not recommended to avoid push back conflicts.
- Dedicated space should be provided near aircraft stands for parked ground services equipment, and cargo staging areas.
- Provision should be made for hydrant refuelling (should uplift volumes justify), and for fixed electrical ground power and pre-conditioned air if economically justified.
- Aprons should be located to reduce the need for aircraft and Ground Services Equipment (GSE) to cross runways. End-around taxiways and vehicular tunnels may be considered.
- Front-of-stand service roads are preferred to avoid delays on aircraft push-back and potential conflicts between airside vehicles and aircraft.

Air Traffic Control

- Collaboration with air traffic services is required to maintain schedule integrity and minimize restrictions on airspace capacity.
- Air Traffic Control capacity should not be a limiting factor in airport infrastructure capacity.
- Minimize conflict with adjacent airports or military traffic restrictions.
- All-weather operations should be supported.
- Operational curfews or other artificial capacity limitations should be avoided.

Passenger Terminal

Airport passenger terminals should enable a secure, efficient, and seamless flow of passengers and bags. The following points should be considered:

- Passenger terminals located with convenient access to the airside system with sufficient space set aside for future expansion.
- Terminal facilities designed to accommodate projected typical peak demand, at an IATA Levels of Service (LoS) of "Optimum" to balance service quality with cost.



- Balanced passenger terminal subsystems to avoid bottlenecks.
- Airlines collocated to avoid spilt operations to the greatest extent possible.
- A flexible, modular design that enables enhancements to individual subsystems and facilities, without unnecessary disruption.
- Plans should integrate a 'concept of operations' on how the facility will be used – common use facilities and systems, airline assignments, technology adoption – that supports efficiency.
- Technology such as mobile, self-service and biometrics for passenger processes (e.g., check-in, bag drop, boarding, emigration and immigration) to increase efficiency and safety while improving the passenger experience.
- Advanced imaging technologies to improve the throughput and efficiency of security checkpoints when traffic volumes justify the investment.
- Passenger terminals that facilitate efficient passenger flows with designs that enable direct, unobstructed passenger journeys and minimize changes in level.

Passenger flows can be further aided by an intuitive terminal layout and a consistent wayfinding strategy that is easy to understand and with adequate space at major decision points. In addition, the commercial offerings should be "on the way" and not "in the way" so as to not impede general circulation.

- Convenient access to essential passenger amenities e.g., toilets / washrooms.
- Accurate and timely Flight Information Display Systems (FIDS) that are strategically located throughout the terminal.
- When required and cost effective, dedicated airside transfer facilities for passengers/bags.
- Contact stands should be designed to accommodate passenger boarding bridges even if they are not initially installed.
- Terminal facilities should be designed according to the principles of universal design to ensure access for all persons regardless of age, disability, or other factors.

The IATA Passenger Terminal Design paper is a good reference for more in-depth guidance on terminal planning principles and practices.

Baggage Handling System (BHS)

The processing of passengers and baggage are fully interdependent therefore baggage and passenger flows should be coordinated with respect to processing time and capacity. Key considerations include:

- The BHS should be designed with the size of the airport and types of passengers (e.g., domestic, international, transfer) in mind.
- BHS systems should be considered early in the design process as they require significant space and can be a major component of the overall capital and operating costs.
- The BHS should be efficient, reliable and flexible with in-line Hold Baggage Screening (HBS).
- The BHS should offer a high level of redundancy and resilience to cope with partial system failure and common user operations i.e., any input to any output.
- There should be flexibility to support baggage tracking as required.

Surface Access Systems

- Terminal frontage roads should be designed for one-way flows only and with load/unload lanes that allow through vehicle traffic to pass.
- There should be adequate local, regional and inter-state road connectivity and reasonably priced short and long-term parking options.
- For larger airports, an integrated multi-modal surface access strategy can promote the ease of transfer among various surface modes e.g., bus, private hire vehicle, rental car, rail (high speed, regional and local) while increasing the airport's catchment area and sustainability.
- Frequent and reliable transport links to city center (a rapid mass transit system is preferred, if economically viable) can support use of public transport.
- Consolidated rental car facilities can reduce vehicle congestion in the airport area.



Airport Support Elements

The types and sizes of airport support elements will vary by airport. The location of support facilities should not restrict the incremental expansion of passenger terminals, piers, satellites, and aprons.

There must be sufficient vehicular access control posts to support the timely movement of vehicles and staff from landside to airside.

Cargo, Express Freight Terminals

- Sufficient freighter parking positions, with tether pits, adjacent to cargo / express terminals. Cargo service roads should be separate from the apron taxiway.

Aircraft Maintenance and Catering

- Aircraft maintenance facilities to support level A and B checks, and AOG recovery, where agreed with users.
- Catering facilities should be separate from the terminal building but should have ready access to both airside and landside zones.

Fuel Facilities

- Sufficient aviation fuel supply and a minimum fuel reserve to support resilient operations and peak demand.
- Fuel farms located away from the primary operational areas.
- To support the on-airport ground service equipment (GSE), fuelling / recharging stations should be conveniently located on the airside.

Conclusions

It is a challenge for any airport to meet all the recommendations that are outlined in this paper. Every airport will need to take their own circumstances into account and determine what best practices can be used to achieve their own goals. Nevertheless, much can be achieved by airports working in partnership with their principal customers in the airline industry towards a set of common objectives.

Supporting Documents

- IATA Airport Development Reference Manual (ADRM) 12th edition
- IATA Airport Master Planning paper
- [IATA Infrastructure Investment – User Consultation paper](#)
- [IATA Passenger Terminal Design paper](#)
- ICAO Annex 14, Vol. 1 Aerodrome Design and Operation