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Part 1

AIRPORT PLANNING MANUAL

PART 1

MASTER PLANNING

SECOND EDITION — 1987

Approved by the Secretary General and published under his authority

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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AMENDMENTS

The issue of amendments is announced in the *ICAO Journal* and in the monthly supplements to the *Catalogue of ICAO Publications,* which holders of this publication should consult. These amendments are available free upon request.

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FOREWORD

The Council of ICAO on 10 March 1967 (EX-8) approved a proposal of the Secretary General that guidance material be prepared to assist States in planning the expansion of existing international airports and the construction of new ones.

This project was conceived in the realization of the major impact that expansion of air transport was having and would continue to have on facilities throughout the world, it being recognized that, in addition to the major problems of great expansion in absolute volume of passengers, cargo and air traffic, the introduction of very large-capacity aircraft was likely to cause special problems at an increasing number of airports. Existing programmes of ICAO did not provide airport authorities with guidance for the development of airport master plans in all their aspects, nor had it been intended that they should.

The first manual entitled *Manual on Airport Master Planning* was written by three professional airport planners recruited exclusively for this purpose. An advisory group composed of representatives of the following organizations provided invaluable assistance in defining the structure of the manual and reviewing material: Aéroport de Paris; Aerospace Industries Association of America, Inc.; Airport Operators Council International, Inc.; British Airports Authority; Dallas-Fort Worth Regional Airport Board; Department of Transport, Canada; International Air Transport Association; University of California. Additionally, a substantial amount of work was done on it by the regular Secretariat.

In 1976 a general revision of the manual was prepared by the Air Navigation Bureau, assisted under contract by the firm TCB/Morris International, and by the Air Transport Bureau which revised Chapters 3 and 4. The intent of this revision was to incorporate experience gained from use of the original Manual, experience from the introduction into service of large-capacity aircraft and new planning technology. This second edition incorporates changes and additions resulting from an over-all review made by the Secretariat.

It is important to note that the material contained in this manual does not necessarily reflect the views of ICAO nor those who have assisted in its development. It deals in many areas in which there is as yet no certainty or precision and it is planned to update the material in the future. Any suggestions which may assist in improving and updating this material would, therefore, be greatly appreciated. These should be directed to the Secretary General of ICAO.

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SECTION ONE — AIRPORT PLANNING PROCESS

INTRODUCTORY NOTES

The rapid growth of air transport is overtaxing the capacity of many airports and giving cause for reconsideration of concepts, processing methods and facilities. Increasing passenger and cargo traffic will make further demands on airports, although aircraft movements may increase more slowly owing to the introduction of larger aircraft.

The result is that the administrations responsible for the world's airports are faced with a heavy programme of improvement and construction to meet these needs in the most efficient manner possible.

This manual is intended to assist airport authorities in the complex task of preparing master plans for the expansion of existing airports and construction of new ones. The manual outlines the planning system and the development of long-term forecasts covering aviation operations, economic factors and other considerations involved in master planning. It explains the need for consultation and co-operative planning by all the agencies concerned, including aircraft operators, national and local government planners, government control authorities (customs, immigration, health, etc.), national and local transport authorities, aircraft and equipment manufacturers and international aviation agencies.

Guidance is given on deciding the type of airport which may be required to meet the needs of a community or region and on the selection and evaluation of airport sites. Stress is laid on the importance of making an economic appraisal when deciding on the provision of an airport and assessing its worth to the community in comparison with other projects.

The need for a systems approach to preparation of the master plan is demonstrated together with the method of preparing the plan, the disciplines needed and the elements to be taken into account. The importance of balancing the respective capacities of the many elements and of ensuring flexibility and expansibility to meet changing needs is shown, together with methods of achieving these objectives. Guidance is provided on assessing the capacity of individual facilities and on planning runway, taxiway and apron configurations, passenger buildings, ground transport links and internal roads, car parks and cargo areas, to permit phased development of the master plan.

An airport master plan should be the most effective framework within which the individual facilities can operate their separate functions at the highest possible levels of efficiency. As explained above, it is not always possible for the best plans for individual facilities to be fitted together in a total plan for the airports without some modifications to make them compatible with each other. This often means some loss of perfection in the individual plans but good planning strikes an optimum balance so that a total plan is produced which is more effective in its operation, and therefore has a higher capacity and efficiency, than would be the case if there were no reconciliation between the plans of the individual facilities. Care must be taken, however, to ensure that compromises do not adversely affect safety.

Planning Philosophy

The most efficient plan for the airport as a whole is that which provides the required capacity for aircraft, passenger, cargo and vehicle movements, with maximum passenger, operator and staff convenience and at lowest capital and operating costs.

Flexibility and expansibility should be considered in conjunction and are fundamental to all aspects of planning. Particular features of some sites may make it necessary to decide that expansibility is not possible but that the plan should still proceed. This is a matter for local judgement relative to local conditions. However, it is never necessary to abandon the requirement for flexibility. Most airports can be planned with inherent flexibility, even though expansibility may not be possible.

The Planning System

Planning of airports is complicated by the diversity of facilities and services which are necessary for the movement of aircraft, passengers and cargo and the ground vehicles associated with them, and the necessity to integrate their planning. These facilities include runways and taxiways, aircraft aprons, buildings where aircraft

operators deliver and receive passengers, where government control authorities undertake their inspections and amenities for passengers' comfort and assistance are provided. Additional requirements are buildings and parking areas for aircraft maintenance, roads and parks for vehicles used by passengers, visitors, aircraft operators and all occupants of the airport, and buildings for the dispatch and receipt of air cargo.

The operation of an airport essentially integrates the functions of many of these facilities and, therefore, they should not be planned as separate units. Aircraft apron areas have to be functionally integrated with the buildings with which they are associated. Similarly, vehicle parks need to be related to the activities of the people who use them and the buildings which those people occupy.

Airport planning is the evolution of a compromise between the conflicting features of the best plan for each of the individual facilities. The essential degree of precision and balance in the overall plan varies with the scale of activity which the airport is intended to support. As the rate of aircraft, vehicle and passenger movements increases it becomes more necessary for airport plans to be the optimum compromise, so that the planning of all the individual facilities contributes and combines into the most efficient total plan and provides the greatest degree of flexibility and expansibility for future development.

Purpose of a Master Plan

Definition and planning considerations

A generally accepted definition states that an airport master plan "presents the planner's conception of the ultimate development of a specific airport. It effectively presents the research and logic from which the plan was evolved and artfully displays the plan in a graphic and written report. Master plans are applied to the modernization and expansion of existing airports and to the construction of new airports, regardless of their size or functional role."

In the context of this definition the term "development" is taken to mean inclusion of the entire area of the airport — both aviation and non-aviation uses. It also includes suggested land use on land adjacent to the airport.

It is important to recognize that an airport master plan is only a *guide* for:

1) development of physical facilities of an airport — aviation and non-aviation use;

2) development of land uses for areas surrounding an airport;

3) determination of the environmental effects of airport construction and operation; and

4) establishment of access requirements of the airport.

Actual construction of each physical facility designated on the master plan should be undertaken only when traffic volumes and economics indicate that such facilities are required to meet the demand. Therefore, the master plan should establish a schedule of priorities and phasing for the various improvements described in the master plan. A further elaboration of what master planning is may be found below.

I. *General considerations*

A. An airport master plan is a guide for:
- — development of physical facilities on the airport
- — development of land uses for areas surrounding the airport
- — determination of environmental effects of aerodrome construction and operation
- — establishment of airport access requirements.

B. Among other things, an aerodrome master plan is used to:
- — provide short- and long-range policy/decision guidance
- — identify potential problems as well as opportunities
- — assist in securing financial aid
- — serve as a basis for negotiations between the aerodrome authority/concessionaire interests
- — generate local interest and support.

II. *Types of activity involved in the master plan process*

A. Policy/co-ordinative planning:
- — project goals and objectives
- — develop work programmes, schedules, and budgets
- — prepare an evaluation and decision format
- — establish co-ordination and monitoring procedures
- — establish data management and public information systems.

B. Economic planning:
- — prepare an analysis of aviation market characteristics and forecasts of aviation activity
- — determine representative benefits and costs associated with airport development alternatives
- — prepare an assessment of impact on area economy of various alternatives.