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AERODROME DESIGN MANUAL

PART 2. TAXIWAYS, APRONS AND HOLDING BAYS

FOURTH EDITION

AMENDMENT NO. 1

1. To incorporate this amendment, insert the following new and replacement pages in Doc 9157, Part 1, (Fourth Edition):

a) Pages (*v) to (vii*) — Table of Contents

b) Pages 1-1 to 1-58 — Chapter 1

c) Pages 2-1 to 2-8 — Chapter 2

d) Pages 3-1 to 3-18 — Chapter 3

2. Record the entry of this amendment on page (ii).

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Chapter 1

TAXIWAYS

1.1 TAXIWAY SYSTEMS

Functional requirements

1.1.1 Maximum capacity and efficiency of an aerodrome are realized only by obtaining the proper balance between the need for runways, passenger and cargo terminals, and aircraft storage and servicing areas. These separate and distinct aerodrome functional elements are linked by the taxiway system. The components of the taxiway system therefore serve to link the aerodrome functions and are necessary to develop optimum aerodrome utilization.

1.1.2 The taxiway system should be designed to minimize the restriction of aircraft movement to and from the runways and apron areas. A properly designed system should be capable of maintaining a smooth, continuous flow of aircraft ground traffic at the maximum practical speed with a minimum of acceleration or deceleration. This requirement ensures that the taxiway system will operate at the highest levels of both safety and efficiency.

1.1.3 For any given aerodrome, the taxiway system should be able to accommodate (without significant delay) the demands of aircraft arrivals and departures on the runway system. At low levels of runway utilization the taxiway system can accomplish this with a minimum number of components. However, as the runway acceptance rate increases, the taxiway system capacity must be sufficiently expanded to avoid becoming a factor which limits aerodrome capacity. In the extreme case of runway capacity saturation, when aircraft are arriving and departing at the minimum separation distances, the taxiway system should allow aircraft to exit the runway as soon as practical after landing and to enter the runway just before take-off. This enables aircraft movements on the runway to be maintained at the minimum separation distance.

Planning principles

1.1.4 Runways and taxiways are the least flexible of the aerodrome elements and must therefore be considered first when planning aerodrome development. Forecasts of future activity should identify changes in the rate of aircraft movements, the nature of the traffic, type of aircraft and any other factors affecting the layout and dimensioning of the runway and taxiway systems. Care should be taken not to place so much attention on the present needs of the system that later phases of development that have equal or greater importance are neglected. For example, if an aerodrome is forecast to serve a higher category of aircraft type in the future, the current taxiway system should be designed to accommodate the greatest separation distances that ultimately will be required (see Table 1-1).

1.1.5 In planning the general layout of the taxiway system, the following principles should be considered:

a) taxiway routes should connect the various aerodrome elements by the shortest distances, thus minimizing both taxiing time and cost;

b) taxiway routes should be as simple as possible in order to avoid pilot confusion and the need for complicated instructions;

c) straight runs of pavement should be used wherever possible. Where changes in direction are necessary, curves of adequate radii, as well as fillets or extra taxiway width, should be provided to permit taxiing at the maximum practical speed (see Section 1.4 and Appendix 1);

d) taxiway crossings of runways and other taxiways should be avoided whenever possible in the interests of safety and to reduce the potential for significant taxiing delays;

e) taxiway routings should have as many one-way segments as possible to minimize aircraft conflicts and delay. Taxiway segment flows should be analysed for each configuration under which runway(s) will be used;

f) the taxiway system should be planned to maximize the useful life of each component so that future phases of development incorporate sections from the current system; and

g) ultimately, a taxiway system will perform only as well as its least adequate component. Therefore, potential bottlenecks should be identified and eliminated in the planning phase.

1.1.6 Other important considerations when planning a taxiway system include the following:

a) taxiway routes should avoid areas where the public could have easy access to the aircraft. Security of taxiing aircraft from sabotage or armed aggression should be of primary importance in areas where this is of particular concern;

b) taxiway layouts should be planned to avoid interference with navigation aids by taxiing aircraft or ground vehicles using the taxiway;

c) all sections of the taxiway system should be visible from the aerodrome control tower. Remote cameras can be used to monitor sections of taxiways shadowed by terminal buildings or other aerodrome structures if such obstructions cannot be practically avoided;

d) the effects of jet blast on areas adjacent to the taxiways should be mitigated by stabilizing loose soils and erecting blast fences where necessary to protect people or structures (see Appendix 2); and

e) the location of taxiways may also be influenced by ILS installations due to interferences to ILS signals by a taxiing or stopped aircraft. Information on critical and sensitive areas surrounding ILS installations is contained in Annex 10, Volume I, Attachment C.

1.1.7 There should be a sufficient number of entrance and exit taxiways serving a specific runway to accommodate the current demand peaks for take-offs and landings. Additional entrances and exits should be designed and developed ahead of expected growth in runway utilization. The following principles apply to the planning of these taxiway system components:

a) the function of exit taxiways is to minimize the runway occupancy time of landing aircraft. In theory, exit taxiways can be located to best serve each type of aircraft expected to use the runway. In practice, the optimum number and spacing are determined by grouping the aircraft into a limited number of classes based upon landing speed and deceleration after touchdown;

b) the exit taxiway should allow an aircraft to move off the runway without restriction to a point clear of the runway, thus allowing another operation to take place on the runway as soon as possible;

Table 1-1. Design criteria for a taxiway

Physical characteristics	Code letter A	B	C	D	E	F
Minimum width of:						
taxiway pavement	7.5 m	10.5 m	18 m[a] 15 m[b]	23 m[c] 18 m[d]	23 m	25 m
taxiway pavement and shoulder	—	—	25 m	38 m	44 m	60 m
taxiway strip	31 m	40 m	52 m	74 m	87 m	102 m
graded portion of taxiway strip	22 m	25 m	25 m	38 m	44 m	60 m
Minimum clearance distance of outer main wheel to taxiway edge	1.5 m	2.25 m	4.5 m[a] 3 m[b]	4.5 m	4.5 m	4.5 m
Minimum separation distance between taxiway centre line and: centre line of instrument runway code						
number 1	82.5 m	87 m	—	—	—	—
number 2	82.5 m	87 m	—	—	—	—
number 3	—	—	168 m	176 m	—	—
number 4	—	—	—	176 m	182.5 m	190 m
centre line of non-instrument runway code						
number 1	37.5 m	42 m	—	—	—	—
number 2	47.5 m	52 m	—	—	—	—
number 3	—	—	93 m	101 m	—	—
number 4	—	—	—	101 m	107.5 m	115 m
taxiway centre line	23 m	32 m	44 m	63 m	76 m	91 m
object						
taxiway[e]	15.5 m	20 m	26 m	37 m	43.5 m	51 m
aircraft stand taxilane	12 m	16.5 m	22.5 m	33.5 m	40 m	47.5 m
Maximum longitudinal slope of taxiway:						
pavement	3%	3%	1.5%	1.5%	1.5%	1.5%
change in slope	1% per 25 m	1% per 25 m	1% per 30 m	1% per 30 m	1% per 30 m	1% per 30 m
Maximum transverse slope of:						
taxiway pavement	2%	2%	1.5%	1.5%	1.5%	1.5%
graded portion of taxiway strip upwards	3%	3%	2.5%	2.5%	2.5%	2.5%
graded portion of taxiway strip downwards	5%	5%	5%	5%	5%	5%
ungraded portion of strip upwards or downwards	5%	5%	5%	5%	5%	5%
Minimum radius of longitudinal vertical curve	2 500 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m
Minimum taxiway sight distance	150 m from 1.5 m above	200 m from 2 m above	300 m from 3 m above	300 m from 3 m above	300 m from 3 m above	300 m from 3 m above

a. Taxiway intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.
b. Taxiway intended to be used by aeroplanes with a wheel base less than 18 m.
c. Taxiway intended to be used by aeroplanes with an outer main gear wheel span equal to or greater than 9 m.
d. Taxiway intended to be used by aeroplanes with an outer main gear wheel span less than 9 m.
e. Taxiway other than an aircraft stand taxilane.