APPENDIX 3

PHYSICAL REQUIREMENTS OF AN AERODROME MOVEMENT AREA

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PHYSICAL REQUIREMENTS OF AN AERODROME MOVEMENT AREA

1.0 INTRODUCTION

1.1 This appendix expands on the requirements of SD-Aerodrome chapter 2 section 2.15 pertaining to the physical requirements of an aerodrome movement area.

2.0 RUNWAYS

2.1 Number and orientation of runways

2.1.1 Many factors affect the determination of the orientation, siting and number of runways.

2.1.2 One important factor is the usability factor, as determined by the wind distribution, which is specified hereunder. Another important factor is the alignment of the runway to facilitate the provision of approaches conforming to the approach surface specifications of ICAO Annex 14 Attachment A, Section 1.

2.1.3 When a new instrument runway is being located, particular attention needs to be given to areas over which aeroplanes will be required to fly when following instrument approach and missed approach procedures, so as to ensure that obstacles in these areas or other factors will not restrict the operation of the aeroplanes for which the runway is intended.

2.1.4 The number and orientation of runways at an aerodrome should be such that the usability factor of the aerodrome is not less than 95 per cent for the aeroplanes that the aerodrome is intended to serve.

2.1.5 The siting and orientation of runways at an aerodrome should, where possible, be such that the arrival and departure tracks minimize interference with areas approved for residential use and other noise-sensitive areas close to the aerodrome in order to avoid future noise problems.

Note. — Guidance on how to address noise problems is provided in the ICAO Airport Planning Manual (Doc 9184), Part 2, and in ICAO's Guidance on the Balanced Approach to Aircraft Noise Management (Doc 9829).

2.2 Choice of maximum permissible crosswind components

2.2.1 In the application of 2.1.4 above, it should be assumed that landing or take-off of aeroplanes is, in normal circumstances, precluded when the crosswind component exceeds:

37km/h (20kt) in the case of aeroplanes whose reference field length is 1500m or over, except that when poor runway braking action owing to an insufficient longitudinal coefficient of friction is experienced with some frequency, a crosswind component not exceeding 24km/h (13kt) should be assumed.

24km/h (13kt) in the case of aeroplanes whose reference field length is 1200m or up to but not including 1500m.

19km/h (10kt) in the case of aeroplanes whose reference field length is less than 1200m.

Note - ICAO Annex 14 Attachment A, Section 1 provides guidance on factors affecting the calculation of the estimate of the usability factor and allowances which may have to be made to take account of the effect of unusual circumstances.

2.2.2 The selection of data to be used for the calculation of the usability factor should be based on reliable wind distribution statistics that extend over as long a period as possible, preferably of not less than five years. The observations used should be made at least eight times daily and spaced at equal intervals of time.

Note - These winds are mean winds. Reference to the need for some allowance for gusty conditions is made in ICAO Annex 14 Attachment A, Section 1.

2.3 Location of threshold

2.3.1 A threshold should normally be located at the extremity of a runway unless operational considerations justify the choice of another location.

Note - Guidance on the siting of the threshold is given in ICAO Annex 14 Attachment A, Section 11.

2.3.2 When it is necessary to displace a threshold, either permanently or temporarily, from its normal location, account should be taken of the various factors which may have a bearing on the location of the threshold. Where this displacement is due to an unserviceable runway condition, a cleared and graded area of at least 60 m in length should be available between the unserviceable area and the displaced threshold. Additional distance should also be provided to meet the requirements of the runway end safety area as appropriate.

Note. — Guidance on factors which may be considered in the determination of the location of a displaced threshold is given in ICAO Annex 14 Attachment A, Section 11.

2.4 Actual length of runways

2.4.1 For the primary runway, except as provided in 2.4.3, the actual runway length to be provided for a primary runway shall be adequate to meet the operational requirements of the aeroplanes for which the runway is intended and should be not less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aeroplanes.

Note 1. — Both take-off and landing requirements need to be considered when determining the length of runway to be provided and the need for operations to be conducted in both directions of the runway. Furthermore, local conditions that may need to be considered include elevation, temperature, runway slope, humidity and the runway surface characteristics.

Note 2.— When performance data on aeroplanes for which the runway is intended are not known, guidance on the determination of the actual length of a primary runway by application of general correction factors is given in the Aerodrome Design Manual (Doc 9157), Part 1.

2.4.2 The length of a secondary runway should be determined similarly to primary runways except that it needs only to be adequate for those aeroplanes which require to use that secondary runway in addition to the other runway or runways in order to obtain a usability factor of at least 95 per cent.

2.4.3 Where a runway is associated with a stopway or clearway, an actual runway length less than that resulting from application of 2.4.1 or 2.4.2, as appropriate, may be considered satisfactory, but in such a case any combination of runway, stopway and clearway provided shall permit compliance with the operational requirements for take-off and landing of the aeroplanes the runway is intended to serve.

Note. — Guidance on use of stopways and clearways is given in ICAO Annex 14 Attachment A, Section 2.

2.5 Width of runways

2.5.1 The width of a runway shall not be less than the appropriate dimension specified in the following tabulation:

Code Number	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5m	4.5m up to but not including 6m	6m up to but not including 9m	9m up to but not including 15m
1[a]	18m	18m	23m	-
2[a]	23m	23m	30m	-
3	30m	30m	30m	45m
4	-	-	45m	45m

[a] *The width of a precision approach runway should be not less than 30 m where the code number is 1 or 2.*

Note – the combinations of code numbers and OMGWS for which widths are specified have been developed for typical aeroplane characteristics. For factors affecting runway width refer to the ICAO Aerodrome Design Manual (Doc 9157), Part 1.

2.6 Minimum distance between parallel runways

2.6.1 Where parallel runways are intended for simultaneous use, the following minimum distance between their centre lines should be applied.

Parallel non-instrument runways	Parallel instrument runways
210m where the higher code number is 3 or 4	1035m for independent parallel approaches
150m where the higher code number is 2	915 m for dependent parallel approaches
120m where the higher code number is 1	760 m for independent parallel departures
	760 m for segregated parallel operations
	**Application of above is subject to conditions specified in the PANS-ATM (Doc 4444) and the PANS-OPS (Doc 8168), Volume I*

Note - Procedures for wake turbulence categorisation of aircraft and wake turbulence separation minima are contained in the SD-ATS

2.6.2 In the case of parallel instrument runways used for segregated parallel operations the specified minimum distance:

(1) may be decreased by 30m for each 150m that the arrival runway is staggered toward the arriving aircraft, to a minimum of 300 m; and

(2) should be increased by 30m for each 150m that the arrival runway is staggered away from the arriving aircraft.

2.6.3 In the case of parallel instrument runways used for independent parallel approaches, combinations of minimum distances and associated conditions other than those specified in the PANS-ATM (Doc 4444) may be applied when it is determined that such combinations would not adversely affect the safety of aircraft operations.

Note.— Procedures and facilities requirements for simultaneous operations on parallel or near-parallel instrument runways are contained in the PANS-ATM (Doc 4444), Chapter 6 and the PANS-OPS (Doc 8168), Volume I, Part III, Section 2, and Volume II, Part I, Section 3; Part II, Section 1; and Part III, Section 3, and relevant guidance is contained in the Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) (Doc 9643).

2.7 Slopes on runways

Longitudinal slopes

2.7.1 Longitudinal slopes shall be computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length and should not exceed:

Runway code	Longitudinal slope	Along the runway, no portion shall exceed
4	1 per cent	1.25 per cent except that for the first and last quarter of the length of the runway the longitudinal slope should not exceed 0.8 per cent
3	1 per cent	1.5 per cent where the code number is 3, except that for the first and last quarter of the length of a precision approach runway category II or III the longitudinal slope should not exceed 0.8 per cent
2	2 per cent	2 per cent
1	2 per cent	2 per cent

2.7.2 Where slope changes cannot be avoided, a slope change between two consecutive slopes should not exceed:

(a) 1.5 per cent where the code number is 3 or 4; and

(b) 2 per cent where the code number is 1 or 2.

Note. — Guidance on slope changes before a runway is given in ICAO Annex 14 Attachment A, Section 4.

2.7.3 The transition from one slope to another should be accomplished by a curved surface with a rate of change not exceeding:

(a) 0.1 per cent per 30 m (minimum radius of curvature of 30 000 m) where the code number is 4;
(b) 0.2 per cent per 30 m (minimum radius of curvature of 15 000 m) where the code number is 3; and
(c) 0.4 per cent per 30 m (minimum radius of curvature of 7 500 m) where the code number is 1 or 2.

2.7.4 *Sight distance*; where slope changes cannot be avoided, they should be such that there will be an unobstructed line of sight from:

(a) any point 3 m above a runway to all other points 3 m above the runway within a distance of at least half the length of the runway where the code letter is C, D, E or F;

(b) any point 2 m above a runway to all other points 2 m above the runway within a distance of at least half the length of the runway where the code letter is B; and

(c) any point 1.5 m above a runway to all other points 1.5 m above the runway within a distance of at least half the length of the runway where the code letter is A.

Note. — Consideration will have to be given to providing an unobstructed line of sight over the entire length of a single runway where a full-length parallel taxiway is not available. Where an aerodrome has intersecting runways, additional criteria on the line of sight of the intersection area would need to be considered for operational safety. Refer to the Aerodrome Design Manual (Doc 9157), Part 1.

2.7.5 *Distance between slope changes*: undulations or appreciable changes in slopes located close together along a runway should be avoided. The distance between the points of intersection of two successive curves should not be less than:

(a) the sum of the absolute numerical values of the corresponding slope changes multiplied by the appropriate value as follows:

- 30 000 m where the code number is 4;
- 15 000 m where the code number is 3; and
- 5 000 m where the code number is 1 or 2; or

(b) 45 m;

whichever is greater.

Note. — Guidance on implementing this specification is given in ICAO Annex 14 Attachment A, Section 4.

Transverse slopes

2.7.6 To promote the most rapid drainage of water, the runway surface should, if practicable, be cambered except where a single cross fall from high to low in the direction of the wind most frequently associated with rain would ensure rapid drainage. The transverse slope should ideally be:

Runway code letter	Longitudinal slope	
C, D, E, F	1.5 per cent	but in any event should not exceed 1.5 per cent or 2 per cent, as applicable, nor be less than 1 per cent except at runway or taxiway intersections where flatter slopes may be necessary.
B	2 per cent	
A	2 per cent	

2.7.7 For a cambered surface the transverse slope on each side of the centre line should be symmetrical.

Note. — On wet runways with crosswind conditions the problem of aquaplaning from poor drainage is apt to be accentuated. Additional guidance is included in the Aerodrome Design Manual (Doc 9157), Parts 1 and 3.

2.7.8 The transverse slope should be substantially the same throughout the length of a runway except at an intersection with another runway or a taxiway where an even transition should be provided taking account of the need for adequate drainage.

Note - Guidance on transverse slope is given in the Aerodrome Design Manual (Doc 9157), Part 3.

2.8 Strength of runways

2.8.1 A runway shall be capable of withstanding the traffic of aeroplanes the runway is intended to serve.

2.9 Surface of runways

2.9.1 The surface of a runway shall be constructed without irregularities that would impair the runway surface friction characteristics or otherwise adversely affect the take-off or landing of an aeroplane.

Note 1. - Surface irregularities may adversely affect the take-off or landing of an aeroplane by causing excessive bouncing, pitching, vibration, or other difficulties in the control of an aeroplane.

Note 2. — Guidance on design tolerances and other information is given in ICAO Annex 14 Attachment A, Section 5 and additional guidance in the Aerodrome Design Manual (Doc 9157), Part 3.

2.9.2 A paved runway shall be so constructed or resurfaced as to provide surface friction characteristics at or above the minimum friction level.

2.9.3 The surface of a paved runway shall be evaluated when constructed or resurfaced to determine that the surface friction characteristics achieve the design objectives.

2.9.4 Measurements of the surface friction characteristics of a new or resurfaced paved runway should be made with a continuous friction measuring device using self-wetting features.

Note. — Additional guidance is included in the Airport Services Manual (Doc 9137), Part 2

2.9.5 The average surface texture depth of a new surface should be not less than 1.0mm.

Note 1. — Macrotexture and micro texture are taken into consideration in order to provide the required surface friction characteristics. Guidance on surface design is given in ICAO Annex 14 Attachment A, Section 8.

Note 2. — Guidance on methods used to measure surface texture is given in the Airport Services Manual (Doc 9137), Part 2.

Note 3. — Guidance on design and methods for improving surface texture is given in the Aerodrome Design Manual (Doc 9157), Part 3.

2.9.6 When the surface is grooved or scored, the grooves or scorings should be either perpendicular to the runway centre line or parallel to non-perpendicular transverse joints, where applicable.

Note. — Guidance on methods for improving the runway surface texture is given in the Aerodrome Design Manual (Doc 9157), Part 3.

2.10 Runway shoulders

2.10.1 Runway shoulders shall be provided for a runway where the code letter is E or F.

2.10.2 Runway shoulders should be provided for a runway where the code letter is D.

Width

2.10.3 For aeroplanes with OMGWS from 9m up to but not including 15m, the runway shoulders shall extend symmetrically on each side of the runway so that the overall width of the runway and its shoulders is not less than:

Runway code letter	Overall width of runway plus shoulders
F	60m except for runways to be used by an aeroplane with four (or more) engines, this shall be 75m
E	60m

2.10.4 The runway shoulders should extend symmetrically on each side of the runway so that the overall width of the runway and its shoulders is not less than:

Runway code letter	Overall width of runway plus shoulders
D	60m

Slopes

2.10.5 The surface of the shoulder that abuts the runway should be flush with the surface of the runway and its transverse slope should not exceed 2.5 per cent.

Strength

2.10.6 The portion of a runway shoulder between the runway edge and a distance of 30m from the runway centreline should be prepared or constructed so as to be capable, in the event of an aeroplane running off the runway, of supporting the aeroplane without inducing structural damage to the aeroplane and of supporting ground vehicles which may operate on the shoulder.

Surface of runway shoulders

2.10.7 A runway shoulder should be prepared or constructed so as to resist erosion and the ingestion of the surface material by aeroplane engines.

2.10.8 Runway shoulders for code letter F aeroplanes should be paved to a minimum overall width of runway and shoulder of not less than 60 m.

Note. — Guidance on characteristics and treatment of runway shoulders is given in ICAO Annex 14 Attachment A, Section 9, and in the Aerodrome Design Manual (Doc 9157), Part 1. Guidance on strength and surface of runway shoulders is given in the Aerodrome Design Manual (Doc 9157), Part 1

2.11 Runway turn pads

2.11.1 Where the end of a runway is not served by a taxiway or a taxiway turnaround and where the code letter is D, E or F, a runway turn pad shall be provided to facilitate a 180-degree turn of aeroplanes (refer Figure 1).

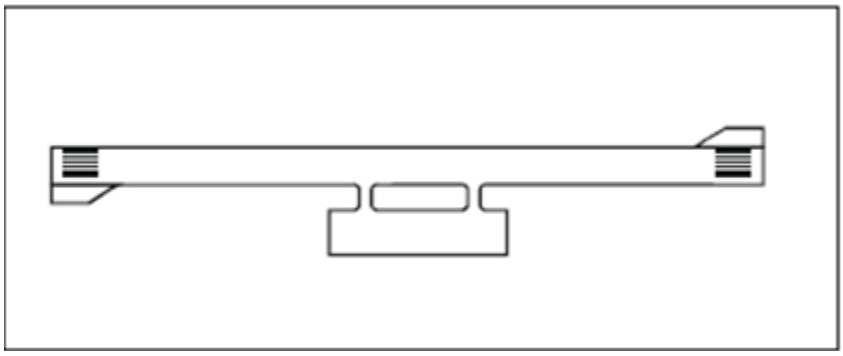

Figure 1 - Typical turn pad layout

2.11.2 Where the end of a runway is not served by a taxiway or a taxiway turnaround and where the code letter is A, B or C, a runway turn pad should be provided to facilitate a 180-degree turn of aeroplanes.

Note 1. — Such areas may also be useful if provided along a runway to reduce taxiing time and distance for aeroplanes which may not require the full length of the runway.

Note 2. — Guidance on the design of the runway turn pads is available in the Aerodrome Design Manual (Doc 9157), Part 1. Guidance on taxiway turnaround as an alternate facility is available in the Aerodrome Design Manual (Doc 9157), Part 2.

2.11.3 The runway turn pad may be located on either the left or right side of the runway and adjoining the runway pavement at both ends of the runway and at some intermediate locations where deemed necessary.

Note. — The initiation of the turn would be facilitated by locating the turn pad on the left side of the runway, since the left seat is the normal position of the pilot-in-command.

2.11.4 The intersection angle of the runway turn pad with the runway should not exceed 30 degrees.

2.11.5 The nose wheel steering angle to be used in the design of the runway turn pad should not exceed 45 degrees.

2.11.6 The design of a runway turn pad shall be such that, when the cockpit of the aeroplane for which the turn pad is intended remains over the turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the turn pad shall be not less than that given by the following tabulation:

	OMGWS			
	Up to but not including 4.5m	4.5m up to but not including 6m	6m up to but not including 9m	9m up to but not including 15m
Clearance	1.50m	2.25m	3m[a] or 4m[b]	4m

[a] If the turn pad is intended to be used by aeroplanes with a wheel base less than 18 m.
[b] If the turn pad is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m

Note. — Wheel base means; distance from the nose gear to the geometric centre of the main gear

Slopes

2.11.7 The longitudinal and transverse slopes on a runway turn pad should be sufficient to prevent the accumulation of water on the surface and facilitate rapid drainage of surface water. The slopes shall be the same as those on the adjacent runway pavement surface.

Strength

2.11.8 The strength of a runway turn pad should be at least equal to that of the adjoining runway which it serves, due consideration being given to the fact that the turn pad will be subjected to slow-moving traffic making hard turns and consequent higher stresses on the pavement.

Note. — Where a runway turn pad is provided with flexible pavement, the surface would need to be capable of withstanding the horizontal shear forces exerted by the main landing gear tires during turning manoeuvres.

Surface

2.11.9 The surface of a runway turn pad shall not have surface irregularities that may cause damage to an aeroplane using the turn pad. The surface of a runway turn pad should be so constructed or resurfaced as to provide surface friction characteristics at least equal to that of the adjoining runway.

Shoulders

2.11.10 The runway turn pads should be provided with shoulders of such width as is necessary to prevent surface erosion by the jet blast of the most demanding aeroplane for which the turn pad is intended, and any possible foreign object damage to the aeroplane engines and its strength should be capable of withstanding the occasional passage of the aeroplane it is designed to serve without inducing structural damage to the aeroplane and to the supporting ground vehicles that may operate on the shoulder.

Note. — As a minimum, the width of the shoulders would need to cover the outer engine of the most demanding aeroplane and thus may be wider than the associated runway shoulders.

3.0 RUNWAY STRIPS

Requirement

3.1 A runway and any associated stopways shall be included in a strip.

Runway strip length

3.2 A strip shall extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

Runway code number	Distance
4	60m
3	
2	
1 - instrument runway	
1 - non - instrument runway	30m

Runway strip width

3.3 A strip, including the runway shall, wherever practicable, extend laterally to a distance of at least:

	Runway code				
	1	**2**	**3**	**4**	
Precision approach runway	70m	70m	140m	140m	on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

3.4 A strip, including the runway should extend laterally to a distance of at least:

	Runway code				
	1	**2**	**3**	**4**	
Non-precision approach runway	70m	70m	140m	140m	on each side of the centre line of the runway and its extended centre line throughout the length of the strip.
Non-instrument runway	30m	40m	75m	75m	

Objects on runway strips

3.5 An object situated on a runway strip which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicable, be removed.

Note 1. — Consideration must be given to the location and design of drains on a runway strip to prevent damage to an aeroplane accidentally running off a runway. Suitably designed drain covers may be required. For further guidance, see the Aerodrome Design Manual (Doc 9157), Part 1.

Note 2. — Where open-air or covered storm water conveyances are installed, consideration must be given to ensure that their structure does not extend above the surrounding ground so as not to be considered an obstacle.

Note 3. — Particular attention must be given to the design and maintenance of an open-air storm water conveyance in order to prevent wildlife attraction, notably birds. If needed, it should be covered by a net. Guidance on wildlife control and reduction can be found in the Airport Services Manual (Doc 9137), Part 3.

3.6 No fixed object, other than visual aids required for air navigation or those required for aircraft safety purposes and which must be sited on the runway strip and satisfying the relevant frangibility requirements of this SD-AD, shall be permitted on a runway strip within the following distances from the runway centre line.

Runway code		
4F	Precision approach runway category I, II or III	77.5 m
3 or 4	Precision approach runway category I, II or III	60 m
1 or 2	Precision approach runway category I	45 m

3.7 No mobile object shall be permitted within the distances specified in 3.6 during the use of the runway for landing or take-off.

Note. — refer to SD-AD appendix 9 for information regarding siting of equipment and installations on runway strips.

Grading of runway strips

3.8 The portion of the runway strip within the distance specified in the table below should be graded for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

	Runway code				
	1	**2**	**3**	**4**	
Instrument runway	40m	40m	75m	75m	from the centre line of the runway and its extended centre line
Non-instrument runway	30m	40m	75m	75m	

Note. — Guidance on grading of a greater area of a strip including a precision approach runway where the code number is 3 or 4 is given in ICAO Annex 14 Attachment A, Section 9.

3.9 The surface of that portion of a strip that abuts a runway, shoulder or stopway shall be flush with the surface of the runway, shoulder or stopway.

3.10 That portion of a strip to at least 30 m before the start of a runway should be prepared against blast erosion in order to protect a landing aeroplane from the danger of an exposed edge. Where such areas have paved surfaces, they shall be able to withstand the occasional passage of the critical aeroplane for runway pavement design

Note 1. — The area provided to reduce the erosive effects of jet blast and propeller wash may be referred to as a blast pad.

Note 2. — Guidance on protection against aeroplane engine blast is available in the Aerodrome Design Manual (Doc 9157), Part 2.

Longitudinal slopes of runway strips

3.11 The longitudinal slope along that portion of a strip to be graded should not exceed:
a) 1.5 per cent where the code number is 4;
b) 1.75 per cent where the code number is 3; and
c) 2 per cent where the code number is 1 or 2.

3.12 *Longitudinal slope changes*; on that portion of a strip to be graded should be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided.

Transverse slopes of runway strips

3.13 Transverse slopes on that portion of a strip to be graded should be adequate to prevent the accumulation of water on the surface but should not exceed:

a) 2.5 per cent where the code number is 3 or 4; and
b) 3 per cent where the code number is 1 or 2;

except that to facilitate drainage the slope for the first 3m outward from the runway, shoulder or stopway edge should be negative as measured in the direction away from the runway and may be as great as 5 per cent.

3.14 The transverse slopes of any portion of a strip beyond that to be graded should not exceed an upward slope of 5 per cent as measured in the direction away from the runway.

Note 1. — Where deemed necessary for proper drainage, an open-air storm water conveyance may be allowed in the non-graded portion of a runway strip and would be placed as far as practicable from the runway.

Note 2. — The aerodrome rescue and firefighting (RFF) procedure would need to take into account the location of open- air water conveyances within the non-graded portion of a runway strip.

Strength of runway strips

3.15 The portion of a runway strip that should be so prepared or constructed as to minimize hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway:

	Runway code				
	1	**2**	**3**	**4**	
Instrument runway	40m	40m	75m	75m	from the centre line of the runway and its extended centre line
Non-instrument runway	30m	40m	75m	75m	

Note. — Guidance on preparation of runway strips is given in the Aerodrome Design Manual (Doc 9157), Part 1.

4.0 RUNWAY END SAFETY AREAS (RESA)

4.1 A runway end safety area shall be provided at each end of a runway strip where:

a) the code number is 3 or 4,
b) the code number is 1 or 2 and the runway is an instrument one, and
c) where the code number is 1 or 2 and the runway is a non-instrument one, this is recommended.

Note. — Guidance on runway end safety areas is given in ICAO Annex 14 Attachment A, Section 10.

Length of RESA

4.2 A runway end safety area shall extend from the end of a runway strip to a distance of at least:

	Runway code/type				
	1	**2**	**3**	**4**	
Mandatory	*Instrument runway*		*Instrument or non-instrument runway*		*where an arresting system is installed, this length may be reduced, based on the design specification of the system, subject to acceptance by the Authority*
	90m	90m	90m	90m	

Note. — Guidance on arresting systems is given in ICAO Annex 14 Attachment A, Section 10.

4.3 Notwithstanding 4.2, where an aerodrome operator is able to provide a greater area for RESA, this area should, as far as practicable, extend from the end of a runway strip to a distance of at least:

	Runway code/type				
	1	**2**	**3**	**4**	
Recommended	Instrument runway				
	120m*	120m*	240m*	240m*	**or a reduced length when an arresting system is installed.*
	Non-instrument runway				
	30m	30m			

Width of RESA

4.4 The width of a runway end safety area should, wherever practicable, be equal to that of the graded portion of the associated runway strip.

Objects of RESA

4.5 Objects on runway end safety areas; an object situated on a runway end safety area which may endanger aeroplanes should be regarded as an obstacle and should, as far as practicable, be removed.

Note. — See SD-AD appendix 9 for information regarding siting of equipment and installations on runway end safety areas.

Clearing and grading of RESA

4.6 A runway end safety area should provide a cleared and graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane undershooting or overrunning the runway. Although the surface of the ground in the runway end safety area does not need to be prepared to the same quality as the runway strip, 4.8 below should be met.

Slopes on RESA

4.7 The slopes of a runway end safety area should be such that no part of the runway end safety area penetrates the approach or take-off climb surface.

4.7.1 *Longitudinal slopes*; should not exceed a downward slope of 5 per cent. Longitudinal slope changes should be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided.

4.7.2 *Transverse slopes*; should not exceed an upward or downward slope of 5 per cent. Transitions between differing slopes should be as gradual as practicable.

Strength of RESA

4.8 A runway end safety area should be so prepared or constructed as to reduce the risk of damage to an aeroplane undershooting or overrunning the runway, enhance aeroplane deceleration and facilitate the movement of rescue and firefighting vehicles.

Note. — Guidance on the strength of a runway end safety area is given in the Aerodrome Design Manual (Doc 9157), Part 1.

5.0 CLEARWAYS

The inclusion of detailed specifications for clearways in this section is not intended to imply that a clearway has to be provided. ICAO Annex 14 Attachment A, Section 2, provides information on the use of clearways.

Location of clearways

5.1 The origin of a clearway, where provided, should be at the end of the take-off run available.

Length of clearways

5.2 The length of a clearway should not exceed half the length of the take-off run available.

Width of clearways

5.3 The width of a clearways should extend laterally to a distance of at least 75 m on each side of the extended centre line of the runway.

Slopes on clearways

5.4 The ground in a clearway should not project above a plane having an upward slope of 1.25 per cent, the lower limit of this plane being a horizontal line which:

a) is perpendicular to the vertical plane containing the runway centre line; and
b) passes through a point located on the runway centre line at the end of the take-off run available.

Note. — Because of transverse or longitudinal slopes on a runway, shoulder or strip, in certain cases the lower limit of the clearway plane specified above may be below the corresponding elevation of the runway, shoulder or strip. It is not intended that these surfaces be graded to conform with the lower limit of the clearway plane nor is it intended that terrain or objects which are above the clearway plane beyond the end of the strip but below the level of the strip be removed unless it is considered they may endanger aeroplanes.

5.4.1 Abrupt upward changes in slope should be avoided when the slope on the ground in a clearway is relatively small or when the mean slope is upward. In such situations, in

that portion of the clearway within a distance of 22.5 m or half the runway width whichever is greater on each side of the extended centre line, the slopes, slope changes and the transition from runway to clearway should generally conform with those of the runway with which the clearway is associated.

Objects on clearways

5.5 An object situated on a clearway which may endanger aeroplanes in the air should be regarded as an obstacle and should be removed.

Note. — See SD-AD appendix 9 for information regarding siting of equipment and installations on clearways.

6.0 STOPWAYS

The inclusion of detailed specifications for stopways in this section is not intended to imply that a stopway has to be provided. ICAO Annex 14 Attachment A, Section 2, provides information on the use of stopways and its support capability.

Width of stopways

6.1 Stopways, where provided, shall have the same width as the runway with which it is associated.

Slopes on stopways

6.2 Slopes and changes in slope on a stopway, and the transition from a runway to a stopway, should comply with the specifications of 2.7.1 for the runway with which the stopway is associated except that:

(a) the limitation in 2.7.1 of a 0.8 per cent slope for the first and last quarter of the length of a runway need not be applied to the stopway; and

(b) at the junction of the stopway and runway and along the stopway the maximum rate of slope change may be 0.3 per cent per 30 m (minimum radius of curvature of 10 000 m) for a runway where the code number is 3 or 4.

Strength of stopways

6.3 A stopway should be prepared or constructed so as to be capable, in the event of an abandoned take-off, of supporting the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.

Surface of stopways

6.4 The surface of a paved stopway should be so constructed or resurfaced as to provide surface friction characteristics at or above those of the associated runway.

7.0 RADIO ALTIMETER OPERATING AREA

7.1 A radio altimeter operating area should be established in the pre-threshold area of a precision approach runway.

7.2 *Length of the area;* a radio altimeter operating area should extend before the threshold for a distance of at least 300 m.

7.3 *Width of the area*; a radio altimeter operating area should extend laterally, on each side of the extended centre line of the runway, to a distance of 60 m, except that, when special circumstances so warrant, the distance may be reduced to no less than 30 m if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft.

7.4 *Longitudinal slope changes*; on a radio altimeter operating area, slope changes should be avoided or kept to a minimum. Where slope changes cannot be avoided, the slope changes should be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided. The rate of change between two consecutive slopes should not exceed 2per cent per 30 m.

Note. — Guidance on radio altimeter operating area is given in ICAO Annex 14 Attachment A, Section 4.3, and in the Manual of All- Weather Operations, *(Doc 9365), Section 5.2. Guidance on the use of radio altimeter is given in the PANS-OPS, Volume II, Part II, Section 1.*

8.0 TAXIWAYS

8.1 Taxiways should be provided to permit the safe and expeditious surface movement of aircraft.

8.2 Unless otherwise indicated the requirements in this section are applicable to all types of taxiways.

8.3 Sufficient entrance and exit taxiways for a runway should be provided to expedite the movement of aeroplanes to and from the runway and the provision of rapid exit taxiways considered when traffic volumes are high.

Note 1. — See ICAO Annex 14 Attachment A, Section 22, for specific taxiway design guidance which may assist in the prevention of runway incursions when developing a new taxiway or improving existing ones with known runway incursion safety risks.

Note 2. — Guidance on layout of taxiways is given in the Aerodrome Design Manual (Doc 9157), Part 2.

8.4 The design of a taxiway shall be such that, when the cockpit of the aeroplane for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aeroplane and the edge of the taxiway shall be not less than that given by the following tabulation:

	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5m	**4.5m up to but not including 6m**	**6m up to but not including 9m**	**9m up to but not including 15m**
Clearance	1.5m	2.25m	3m[a,b] or 4m[c]	4m

[a] On straight portions.
[b] On curved portions if the taxiway is intended to be used by aeroplanes with a wheel base of less than 18 m.
[c] On curved portions if the taxiway is intended to be used by aeroplanes with a wheel base equal to or greater than 18 m.

Note — Wheel base means the distance from the nose gear to the geometric centre of the main gear.

8.5 *Width of taxiways;* a straight portion of a taxiway should have a width of not less than that given by the following tabulation:

	Outer Main Gear Wheel Span (OMGWS)			
	Up to but not including 4.5m	**4.5m up to but not including 6m**	**6m up to but not including 9m**	**9m up to but not including 15m**
Taxiway width	7.5m	10.5m	15m	23m

Note. — Guidance on width of taxiways is given in the Aerodrome Design Manual (Doc 9157), Part 2.

8.6 *Taxiway curves*; changes in direction of taxiways should be as few and small as possible. The radii of the curves should be compatible with the manoeuvring capability and normal taxiing speeds of the aeroplanes for which the taxiway is intended. The design of the curve should be such that, when the cockpit of the aeroplane remains over the taxiway centre line markings, the clearance distance between the outer main wheels of the aeroplane and the edge of the taxiway should not be less than those specified in 8.4.

Note 1. — An example of widening taxiways to achieve the wheel clearance specified is illustrated in Figure 2. Guidance on the values of suitable dimensions is given in the Aerodrome Design Manual (Doc 9157), Part 2.

Note 2. — Compound curves may reduce or eliminate the need for extra taxiway width.

8.7 *Junctions and intersections*; to facilitate the movement of aeroplanes, fillets should be provided at junctions and intersections of taxiways with runways, aprons and other taxiways. The design of the fillets should ensure that the minimum wheel clearances specified in 8.4 are maintained when aeroplanes are manoeuvring through the junctions or intersections.

Note. — Consideration will have to be given to the aeroplane datum length when designing fillets. Guidance on the design of fillets and the definition of the term aeroplane datum length are given in the Aerodrome Design Manual (Doc 9157), Part 2.

8.8 *Taxiway minimum separation distances*; the separation distance between the centre line of a taxiway and the centre line of a runway, the centre line of a parallel taxiway or an object should not be less than the appropriate dimension specified in Table 1, except that it may be permissible to operate with lower separation distances at an existing aerodrome if an aeronautical study indicates that such lower separation distances would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

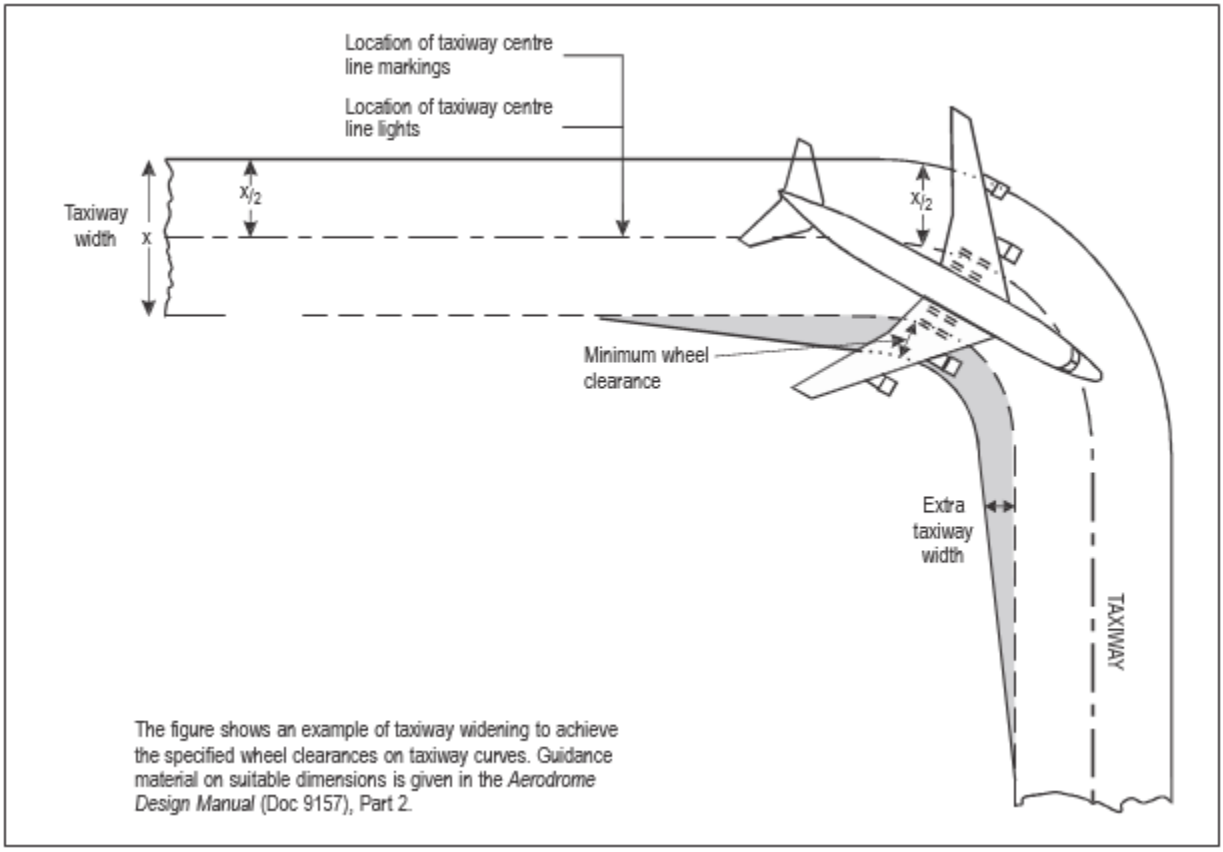

Figure 2 - Taxiway curve

Note 1. — Guidance on factors which may be considered in the aeronautical study is given in the Guidance Material – Aeronautical Studies.

Note 2. — ILS and MLS installations may also influence the location of taxiways due to interferences to ILS and MLS signals by a taxiing or stopped aircraft. Information on critical and sensitive areas surrounding ILS and MLS installations is contained in Annex 10 — Aeronautical Telecommunications, Volume I — Radio Navigation Aids, Attachments C and G (respectively).

Note 3. — The separation distances of Table 1, column 10, do not necessarily provide the capability of making a normal turn from one taxiway to another parallel taxiway. Guidance for this condition is given in the Aerodrome Design Manual (Doc 9157), Part 2.

Note 4. — The separation distance between the centre line of an aircraft stand taxi lane and an object shown in Table 1, column 13, may need to be increased when jet exhaust wake velocity may cause hazardous conditions for ground servicing.

Code letter	Distance between taxiway centre line and runway centre line (metres)								Taxiway centre line to taxiway centre line (m)	Taxiway, other than aircraft stand taxilane centre line to aircraft stand taxilane centre line (m)	Aircraft stand taxilane centre line to object (m)	Aircraft stand taxilane centre line to object (m)
	Instrument runways Code number				Non-instrument runways Code number							
	1	2	3	4	1	2	3	4				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A	77.5	77.5	-	-	37.5	47.5	-	-	23	15.5	19.5	12
B	82	82	152	-	42	52	87	-	32	20	28.5	16.5
C	88	88	158	158	48	58	93	93	44	26	40.5	22.5
D	-	-	166	166	-	-	101	101	63	37	59.5	33.5
E	-	-	172.5	172.5	-	-	107.5	107.5	76	43.5	72.5	40
F	-	-	180	180	-	-	115	115	91	51	87.5	47.5

Note 1. - The separation distances shown in columns (2) to (9) represent ordinary combinations of runways and taxiways. The basis for development of these distances is given in the Aerodrome Design Manual (Doc 9157), Part 2.

Note 2. - The distances in columns (2) to (9) do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane on a parallel taxiway. See the Aerodrome Design Manual (Doc 9157), Part 2.

Table 1 - Taxiway minimum separation distances

8.9 *Slopes on taxiways;* should meet the requirements of this section.

8.9.1 *Longitudinal slopes*; should not exceed:

a) 1.5 per cent where the code letter is C, D, E or F; and
b) 3 per cent where the code letter is A or B.

8.9.2 *Longitudinal slope changes*; where slope changes on a taxiway cannot be avoided, the transition from one slope to another slope should be accomplished by a curved surface with a rate of change not exceeding:

a) 1 per cent per 30m (minimum radius of curvature of 3 000 m) where the code letter is C, D, E or F; and
b) 1 per cent per 25m (minimum radius of curvature of 2 500 m) where the code letter is A or B.

8.9.3 *Sight distance*; where a change in slope on a taxiway cannot be avoided, the change should be such that, from any point:

a) 3m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 300m from that point, where the code letter is C, D, E or F;
b) 2m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 200m from that point, where the code letter is B; and
c) 1.5m above the taxiway, it will be possible to see the whole surface of the taxiway

for a distance of at least 150m from that point, where the code letter is A.

8.9.4 *Transverse slopes;* should be sufficient to prevent the accumulation of water on the surface of the taxiway but should not exceed:

a) 1.5 per cent where the code letter is C, D, E or F; and
b) 2 per cent where the code letter is A or B.

8.10 *Strength of taxiways*; should be at least equal to that of the runway it serves, due consideration being given to the fact that a taxiway will be subjected to a greater density of traffic and, as a result of slow moving and stationary aeroplanes, to higher stresses than the runway it serves.

Note. — Guidance on the relation of the strength of taxiways to the strength of runways is given in the Aerodrome Design Manual (Doc 9157), Part 3.

8.11 *Surface of taxiways*; should not have irregularities that cause damage to aeroplane structures.

8.11.1 The surface of a paved taxiway should be so constructed or resurfaced as to provide suitable surface friction characteristics.

Note. — Suitable surface friction characteristics are those surface properties required on taxiways that assure safe operation of aeroplanes.

8.12 *Rapid exit taxiways*; general requirements for taxiways also apply to this type of taxiway.

Note. – Further guidance on the provision, location and design of rapid exit taxiways is included in the Aerodrome Design Manual (Doc 9157), Part 2, in addition to different speed criteria.

8.12.1 A rapid exit taxiway should be designed with a radius of turn-off curve of at least:

(a) 550 m where the code number is 3 or 4; and
(b) 275 m where the code number is 1 or 2;

to enable exit speeds under wet conditions of:

(a) 93 km/h where the code number is 3 or 4; and
(b) 65 km/h where the code number is 1 or 2.

8.12.2 The radius of the fillet on the inside of the curve at a rapid exit taxiway should be sufficient to provide a widened taxiway throat in order to facilitate early recognition of the entrance and turn-off onto the taxiway.

8.12.3 A rapid exit taxiway should include a straight distance after the turn-off curve sufficient for an exiting aircraft to come to a full stop clear of any intersecting taxiway.

8.12.4 The intersection angle of a rapid exit taxiway with the runway should not be greater than 45° nor less than 25° and preferably should be 30°.

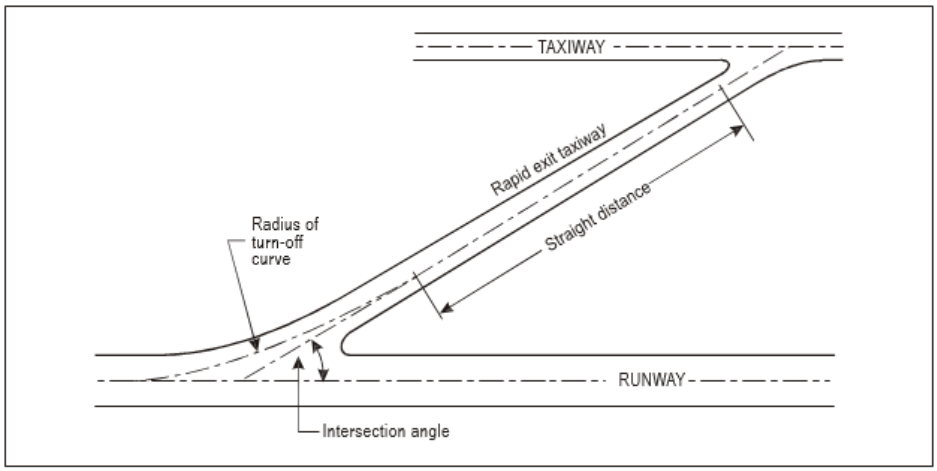

Figure 3 - Rapid exit taxiway

8.13 *Taxiways on bridges*; this section details the requirements particular to taxiways on bridges.

8.13.1 The width of that portion of a taxiway bridge capable of supporting aeroplanes, as measured perpendicularly to the taxiway centre line, shall not be less than the width of the graded area of the strip provided for that taxiway, unless a proven method of lateral restraint is provided which shall not be hazardous for aeroplanes for which the taxiway is intended.

8.13.2 Access should be provided to allow rescue and firefighting vehicles to intervene in both directions within the specified response time to the largest aeroplane for which the taxiway bridge is intended.

8.13.3 Where aeroplane engines would overhang the bridge structure, protection of adjacent areas below the bridge from engine blast may be required.

8.13.4 A bridge should be constructed on a straight section of the taxiway with a straight section on both ends of the bridge to facilitate the alignment of aeroplanes approaching the bridge.

8.14 *Taxiway shoulders*; straight portions of a taxiway where the code letter is *C, D, E or F* should be provided with shoulders which extend symmetrically on each side of the taxiway so that the overall width of the taxiway and its shoulders on straight portions is not less than:

(a) 44 m where the code letter is F;
(b) 38 m where the code letter is E;
(c) 34 m where the code letter is D; and
(d) 25 m where the code letter is C.

8.14.1 On taxiway curves and on junctions or intersections where increased pavement is provided, the shoulder width should be not less than that on the adjacent straight portions of the taxiway.

8.14.2 When a taxiway is intended to be used by turbine-engine aeroplanes, the surface of the taxiway shoulder should be so prepared as to resist erosion and the ingestion of the surface material by aeroplane engines.

Note. — Guidance on characteristics of taxiway shoulders and on shoulder treatment is given in the Aerodrome Design Manual (Doc 9157), Part 2.

9.0 TAXIWAY STRIPS

9.1 A taxiway, other than an aircraft stand taxilane, shall be included in a strip.

9.2 ***Width of taxiway strips****;* should extend symmetrically on each side of the centre line of the taxiway throughout the length of the taxiway to at least the distance from the centre line given in Table 1 column (11).

9.3 ***Objects on taxiway strips***; taxiway strips should provide an area clear of objects which may endanger taxiing aeroplanes.

Note 1. — Consideration will have to be given to the location and design of drains on a taxiway strip to prevent damage to an aeroplane accidentally running off a taxiway. Suitably designed drain covers may be required. Further guidance; Aerodrome Design Manual (Doc 9157), Part 2.

Note 2. — Where open-air or covered storm water conveyances are installed, consideration will have to be given to ensure that their structure does not extend above the surrounding ground so as not to be considered an obstacle.

Note 3. — Particular attention needs to be given to the design and maintenance of an open-air storm water conveyance in order to prevent wildlife attraction, notably birds. If needed, it can be covered by a net. Guidance on wildlife control and reduction can be found in the Airport Services Manual (Doc 9137), Part 3.

Note 4. — See SD-AD appendix 9 for information regarding siting of equipment and installations on taxiway strips.

9.4 ***Grading of taxiway strips****;* the centre portion of a taxiway strip should provide a graded area to a distance from the centre line of the taxiway of not less than that given by the following tabulation:

	OMWGS					
Graded area	up to but not including 4.5m	4.5m up to but not including 6m	6m up to but not including 9m	9m up to but not including 15m		
				Code D	Code E	Code F
	10.25 m	11 m	12.5 m	18.5m	19m	22m

9.5 ***Slopes on taxiway strips****;* the surface of the strip should be flush at the edge of the taxiway or shoulder, if provided, and the graded portion should not have an upward transverse slope exceeding:

a) 2.5 per cent for strips where the code letter is C, D, E or F; and
b) 3 per cent for strips of taxiways where the code letter is A or B;

the upward slope being measured with reference to the transverse slope of the adjacent taxiway surface and not the horizontal. The downward transverse slope should not exceed 5 per cent measured with reference to the horizontal.

9.6 The transverse slopes on any portion of a taxiway strip beyond that to be graded should not exceed an upward or downward slope of 5 per cent as measured in the direction away from the taxiway.

Note 1. — Where deemed necessary for proper drainage, an open-air storm water conveyance may be allowed in the non-graded portion of a taxiway strip and would be placed as far as practicable from the taxiway.

Note 2. — The aerodrome RFF procedure would need to take into account the location of open-air storm water conveyances within the non-graded portion of a taxiway strip.

Note 3. — Guidance on characteristics of taxiway strips, including the width of the graded portion of a taxiway, is given in the Aerodrome Design Manual (Doc 9157), Part 2.

10.0 HOLDING BAYS, RUNWAY-HOLDING POSITIONS, INTERMEDIATE HOLDING POSITIONS AND ROAD-HOLDING POSITIONS

10.1 Holding bay(s) should be provided when the traffic density is medium or heavy.

10.2 A runway-holding position or positions shall be established:

a) on the taxiway, at the intersection of a taxiway and a runway; and
b) at an intersection of a runway with another runway when the former runway is part of a standard taxi-route.

10.3 A runway-holding position shall be established on a taxiway if the location or alignment of the taxiway is such that a taxiing aircraft or vehicle can infringe an obstacle limitation surface or interfere with the operation of radio navigation aids.

10.4 An intermediate holding position should be established on a taxiway at any point other than a runway-holding position where it is desirable to define a specific holding limit.

10.5 A road-holding position shall be established at an intersection of a road with a runway.

10.6 ***Location*****;** the distance between a holding bay, runway-holding position established at a taxiway/runway intersection or road-holding position and the centre line of a runway shall be in accordance with Table 2 and, in the case of a precision approach runway, such that a holding aircraft or vehicle will not interfere with the operation of radio navigation aids.

10.7 At elevations greater than 700m (2 300ft) the distance of 90m specified in Table 2 for a precision approach runway code number 4 should be increased as follows:

a) up to an elevation of 2 000m (6 600ft); 1 m for every 100m (330ft) in excess of 700m (2 300ft);

b) elevation in excess of 2 000m (6 600ft) and up to 4 000m (13 320ft); 13 m plus 1.5 m for every 100m (330ft) in excess of 2 000m (6 600ft); and

c) elevation in excess of 4 000m (13 320ft) and up to 5 000m (16 650ft); 43m plus 2m for every 100m (330ft) in excess of 4 000m (13 320ft).

10.8 If a holding bay, runway-holding position or road-holding position for a precision approach runway code number 4 is at a greater elevation compared to the threshold, the distance of 90 m or 107.5 m, as appropriate, specified in Table 2 should be further increased 5 m for every metre the bay or position is higher than the threshold.

10.9 The location of a runway-holding position established in accordance with 9.3 shall be such that a holding aircraft or vehicle will not infringe the obstacle free zone, approach surface, take-off climb surface or ILS/MLS critical/ sensitive area or interfere with the operation of radio navigation aids.

Type of runway	**Code number**			
	1	2	3	4
Non-instrument	30m	40m	75m	75m
Non-precision approach	40m	40m	75m	75m
Precision approach category I	60m[b]	60m[b]	90m[a,b]	90m[a,b,c]
Precision approach categories II and II	-	-	90m[a,b]	90m[a,b,c]
Take-off runway	30m	40m	75m	75m

[a] *If a holding bay, runway-holding position or road-holding position is at a lower elevation compared to the threshold, the distance may be decreased 5 m for every metre the bay or holding position is lower than the threshold, contingent upon not infringing the inner transitional surface.*

[b] *This distance may need to be increased to avoid interference with radio navigation aids, particularly the glide path and localizer facilities. Information on critical and sensitive areas of ILS and MLS is contained in Annex 10, Volume I, Attachments C and G, respectively.*

Note 1. — The distance of 90 m for code number 3 or 4 is based on an aircraft with a tail height of 20 m, a distance from the nose to the highest part of the tail of 52.7 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle free zone and not accountable for the calculation of OCA/H.

Note 2. — The distance of 60 m for code number 2 is based on an aircraft with a tail height of 8 m, a distance from the nose to the highest part of the tail of 24.6 m and a nose height of 5.2 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle free zone.

[c] *Where the code letter is F, this distance should be 107.5 m.*

Note. — The distance of 107.5 m for code number 4 where the code letter is F is based on an aircraft with a tail height of 24 m, a distance from the nose to the highest part of the tail of 62.2 m and a nose height of 10 m holding at an angle of 45° or more with respect to the runway centre line, being clear of the obstacle free zone.

Table 2 - Minimum distance from the runway centre line to a holding bay, runway-holding position or road-holding position

11.0 APRONS

11.1 Aprons should be provided where necessary to permit the on and off-loading of passengers, cargo or mail as well as the servicing of aircraft without interfering with the aerodrome traffic.

11.2 ***Size of aprons***; The total apron area should be adequate to permit expeditious handling of the aerodrome traffic at its maximum anticipated density.

11.3 ***Strength of aprons****;* each part of an apron should be capable of withstanding the traffic of the aircraft it is intended to serve, due consideration being given to the fact that some portions of the apron will be subjected to a higher density of traffic and, as a result of slow moving or stationary aircraft, to higher stresses than a runway.

11.4 ***Slopes on aprons****;* slopes on an apron, including those on an aircraft stand taxilane, should be sufficient to prevent accumulation of water on the surface of the apron but should be kept as level as drainage requirements permit.

11.5 On an aircraft stand the maximum slope should not exceed 1 per cent.

11.6 *Clearance distances on aircraft stands;* an aircraft stand shall provide the following minimum clearances between an aircraft entering or exiting the stand and any adjacent building, aircraft on another stand and other objects:

Code letter	Clearance
A	3m
B	3m
C	4.5m
D	7.5m
E	7.5m
F	7.5m

11.7 When special circumstances so warrant, these clearances may be reduced at a nose-in aircraft stand, where the code letter is D, E or F:

(a) between the terminal, including any fixed passenger bridge, and the nose of an aircraft; and
(b) over any portion of the stand provided with azimuth guidance by a visual docking guidance system.

Note. — On aprons, consideration also has to be given to the provision of service roads and to manoeuvring and storage area for ground equipment (see the Aerodrome Design Manual (Doc 9157), Part 2, for guidance on storage of ground equipment).

12.0 ISOLATED AIRCRAFT PARKING POSITION

12.1 An isolated aircraft parking position shall be designated or the aerodrome control tower shall be advised of an area or areas suitable for the parking of an aircraft which is known or believed to be the subject of unlawful interference, or which for other reasons needs isolation from normal aerodrome activities.

12.2 The isolated aircraft parking position should be located at the maximum distance practicable and in any case never less than 100m from other parking positions, buildings or public areas, etc. Care shall be taken to ensure that the position is not located over underground utilities such as gas and aviation fuel and, to the extent feasible, electrical or communication cables.