NIGERIA CIVIL AVIATION AUTHORITY

REGULATIONS

PART 12 VOL I

AERODROME REGULATIONS

2023

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AERODROME REGULATIONS

APRIL 2023

Record of Amendment

Amendment Number	Date of Amendment	Affected sections	Description
4	April,2023	All	Updated to latest amendment of applicable ICAO annexes as per the status stated in Part 1 of this regulations and the introduction to this Part

Made this 17 day of May 2023.

Captain Musa Shuaibu Nuhu

Director General of Civil Aviation

INTRODUCTION

Part 12 Volume I provides for the certification of Aerodromes, issuance of Operational Permit as well as other Aerodrome Operational provisions.

Part 12 Volume I is presented in four (4) subparts as follows:

Subpart 1: General– contains provisions for Aerodrome Certification, Aerodrome Manual, Obligations of an Aerodrome Operator, Aerodrome Operational Permit and Joint Use Civil and Military Aerodromes.

Subpart 2: Aerodrome Design and Operations

Subpart 3: Aerodrome Work Safety, Accident/Incident Reporting and Investigation Procedures, Critical Data Related to Safety Occurrences and Aerodrome Safety Coordination

Subpart 4: Aerodrome Development and Safeguarding

This Regulation incorporates the Standards and Recommended Practices (SARPs) in Annex 14 Volume I, Ninth Edition, Amendment 17.

SUBPART 1

GENERAL

CONTENTS

SUBPART 1

IMPLEMENTING STANDARDS (IS)

12.1 GENERAL

12.1.1 GENERAL

12.1.1.1 APPLICABILITY

(a) Sections 12.1.1 to 12.1.6 shall apply to Civil aerodromes;

(b) Sections 12.1.1 to 12.1.6 shall not apply to:

(1) military aerodromes serving Civil aircraft operations; and

(2) those portions of joint-use or shared-use aerodromes under the control of an individual or Civil entity and serving Civil aircraft operations of any class or category.

12.1.1.2 DEFINITIONS

Accident	An occurrence associated with the operation of an aircraft which in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down in which: **(a)** a person is fatally or seriously injured as a result of: — being in the aircraft, or — direct contact with any part of the aircraft, including parts which have become detached from the aircraft, or — direct exposure to jet blast, except when the injuries are from natural causes, self-inflicted or inflicted by other persons, or when the injuries are to stowaways hiding outside the areas normally available to the passengers and crew; or **(b)** the aircraft sustains damage or structural failure which: —adversely affects the structural strength, performance or flight characteristics of the aircraft, and —would normally require major repair or replacement of the affected component, except for engine failure or damage, when the damage is limited to a single engine, (including its cowlings or accessories), to propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreens, the aircraft skin (such as small dents or puncture holes), or for minor damages to

	main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike (including holes in the aerodrome); or **(c)** the aircraft is missing or is completelyinaccessible.
Accuracy	A degree of conformance between the estimated or measured value and the true value. Note — For measured positional data the accuracy is normally expressed in terms of a distance from a stated position within which there is a defined confidence of the true position falling.
Aerodrome	A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.
Aerodrome Beacon	Aeronautical beacon used to indicate the location of an aerodrome from the air.
Aerodrome Certificate	The certificate to operate an aerodrome issued by the Authority subsequent to the acceptance/approval of the aerodrome manual and compliance with other requirements of this part.
Aerodrome Elevation	The elevation of the highest point of the landing area.
Aerodrome Facilities and Equipment	Facilities and equipment, inside or outside the boundaries of an aerodrome, that are constructed or installed and maintained for the arrival, departure, and surface movement of aircraft.
Aerodrome identification sign.	A sign placed on an aerodrome to aid in identifying the aerodrome from the air.
Aerodrome incident.	An incident involving an aircraft operation and: a) an obstruction either on the aerodrome operational area or protruding into the aerodrome obstacle limitation surfaces; or b) a defective visual aid; or c) a defective surface of a manoeuvring area; or d) any other hazardous or potentially hazardous situation
Aerodrome Manual	The Manual that forms part of the application for an aerodrome certificate pursuant to these Regulations, including any amendments thereto accepted/ approved by the Authority.
Aerodrome mapping data (AMD)	Data collected for the purpose of compiling aerodrome mapping information for aeronautical uses. Note.— Aerodrome mapping data are collected for purposes that include the improvement of the user's situational awareness, surface navigation operations, training, charting and planning.
Aerodrome mapping database (AMDB)	A collection of aerodrome mapping data organized and arranged as a structured data set.

Aerodrome Operator	In relation to a certificated aerodrome means the aerodrome certificate holder.
Aerodrome Operational Permit	The permit to operate domestic or private use aerodromes and airstrips issued by the Authority subsequent to compliance with the applicable requirements of this Part.
Aerodrome Reference Point	The designated geographical location of an aerodrome.
Aerodrome and Airspace Standards Directorate	Refers to the Director, Aerodrome & Airspace Standards or appointed officers of the Aerodrome & Airspace Standards Departments under the Nigeria Civil Aviation Authority, or any person authorised to act on their behalf.
Aerodrome traffic Density	a) Light: Where the number of movements in the mean busy hour is not greater than 15 per runway or typically less than 20 total aerodrome movements. b) Medium: Where the number of movements in the mean busy hour is of the order of 16 to 25 per runway or typically between 20 to 35 total aerodrome movements. c) Heavy: Where the number of movements in the mean busy hour is of the order of 26 or more per runway or typically more than 35 total aerodrome movements. Note 1 — The number of movements in the mean busy hour is the arithmetic mean over the year of the number of movements in the daily busiest hour Note 2 — Either a take-off or landing constitutes a movement.
Aeronautical beacon	An aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth.
Aeronautical ground light	Any light specially provided as an aid to air navigation, other than a light displayed on an aircraft.
Aeronautical information circular	A notice containing information which relates to flight safety, air navigation, technical, administrative or legislative matters.
Aeronautical information publication	A publication issued by and with the authority of the Aeronautical Information Services and containing aeronautical information of a lasting character essential to air navigation
Aeronautical information services	The services established within the defined area of coverage responsible for the provision of aeronautical information and data necessary for the safety, regularity and efficiency of air navigation and, where appropriate, includes the personnel and facilities employed to provide information pertaining to the availability of air navigation services and their associated procedures necessary for the safety, regularity and efficiency of air navigation.
Aeronautical Study	A study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety.
Aeroplane	A power driven heavier-than-air aircraft deriving its lift in flight chiefly from

	aerodynamic reactions on surfaces which remain fixed under given conditions of flight.
Aeroplane reference field length	The minimum field length required for take-off at maximum certificated take- off mass, sea-level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases. *Note– Advisory Circular "Supplementary Guidance Material to Aerodrome Regulations (NCAA-AC-ARD036) Section 2 provides information on the concept of balanced field length and the ICAO Airworthiness Manual (Doc 9760) contains detailed guidance on matters related to take-off distance.*
Aircraft	Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth's surface.
Aircraft Classification Number (ACN).†	A number expressing the relative effect of an aircraft on a pavement for a specified standard sub grade category. *Note.—The aircraft classification number is calculated with respect to the centre of gravity (CG) position which yields the critical loading on the critical gear. Normally the aft most CG position appropriate to the maximum gross apron(ramp) mass is used to calculate the ACN. In exceptional cases the forward most CG position may result in the nose gear loading being more critical.*
Aircraft classification rating (ACR).††	A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.
Aircraft Stand	A designated area on an apron intended to be used for parking an aircraft.
Approach Surface	An inclined plane or a combination of planes sloping upwards from the end of the safety area, centered on a line passing through the centre and through which no obstacle may penetrate.
Apron	A defined area, on a land aerodrome, intended to accommodate aircraft for purposes of loading or unloading passengers, mail or cargo, fuelling, parking or maintenance.
Apron management Service	A service provided to regulate the activities and the movement of aircraft and vehicles on an apron.
Arresting System	A system designed to decelerate an aeroplane overrunning the runway.
Autonomous runway incursion warning system (ARIWS)	A system which provides autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or a vehicle operator.
Authority	The Civil Aviation Authority responsible for the oversight of Civil aviation in Nigeria. (Nigeria Civil Aviation Authority)
Balked landing	A landing manoeuvre that is unexpectedly discontinued at any point below the obstacle clearance altitude/height (OCA/H).
Barrette	Three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.
Bird incident.	An incident where:

	a) there is a collision between an aircraft and one or more birds; b) where one or more birds pass sufficiently close to an aircraft in flight to cause alarm to the pilot.
Calendar	Discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day (ISO 19108*)
Certified aerodrome	An aerodrome whose operator has been granted an Aerodrome Certificate.
Clearway	A defined rectangular area on the ground or water under the control of the aerodrome operator, selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.
Controlled aerodrome	An aerodrome provided with air traffic control services.
Crane	A specially made machine with a long arm that is used by workers for lifting and moving heavy objects.
Cyclic redundancy check (CRC)	A mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data.
Data accuracy	A degree of conformance between the estimated or measured value and the true value.
Data quality	A degree or level of confidence that the data provided meet the requirements of the data user in terms of accuracy, resolution and integrity (or equivalent assurance level), traceability, timeliness, completeness and format.
Datum	Any quantity or set of quantities that may serve as reference or basis for the calculation of other quantities (ISO 19104**).
Declared distances	a) Take-off run available (TORA). The length of runway declared available and suitable for the ground run of an aeroplane taking off. b) Take-off distance available (TODA). The length of the take-off run available plus the length of the clearway, if provided. c) Accelerate-stop distance available (ASDA). The length of the take-off run available plus the length of the stop way, if provided. d) Landing distance available (LDA). The length of runway which is declared available and suitable for the ground run of an aeroplane landing.
Dependent parallel approaches	Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed.
Director-General Civil Aviation	The chief executive and accounting officer of the Nigeria Civil Aviation Authority.
Displaced threshold	A threshold not located at the extremity of a runway.
Effective intensity	The effective intensity of a flashing light is equal to the intensity of a fixed light of the same colour which will produce the same visual range under identical conditions of observation.
Ellipsoid height	The height related to the reference ellipsoid, measured along the (Geodetic height)

	ellipsoid outer normal through the point in question.
Emergency Operations Centre	A designated area on the aerodrome used in supporting and co-ordinating operations at aerodrome emergencies.
Fatal injury	Any injury which results in death within 30 days of the accident.
Facility malfunction	An incident that involves an unserviceability of a visual/non-visual aid, electrical system, aeronautical telecommunications facility and/or other equipment needed for aircraft operation.
Fixed light	A light having constant luminous intensity when observed from a fixed point.
Foreign Object Debris (FOD)	An inanimate object within the movement area which has no operational or aeronautical function and which has the potential to be a hazard to aircraft operations.
Frangible object	An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft.
	Note — Guidance on design for frangibility is contained in the Aerodrome Design Manual (DOC 9157), Part 6
Full-scale emergency exercise	Assembling and utilisation of all the resources that would be available and used in a real emergency.
Geodetic datum	A minimum set of parameters required to define location and orientation of the local reference system with respect to the global reference system/frame.
Geoid	The equipotential surface in the gravity field of the Earth which coincides with the undisturbed mean sea Level (MSL) extended continuously through the continents
	Note — The geoid is irregular in shape because of Local gravitational disturbances (wind tides, salinity, current, etc.) and the direction of gravity is perpendicular to the geoid at every point
Geoid undulation	The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid.
	Note.—In respect to the World Geodetic System- 1984 (WGS-84) defined ellipsoid, the difference between the WGS-84 ellipsoidal height and orthometric height represents WGS-84 geoid undulation.
Gregorian calendar	Calendar in general use; first introduced in 1582 to define a year that more closely approximates the tropical year than the Julian calendar (ISO 19108***).
Hangar	A shelter, specifically, built for housing or repairing aircraft
Heliport	An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movements of helicopters
Hazard beacon	An aeronautical beacon used to designate a danger to air navigation.
High Rise Structure	Any building, mast, tower, hills, trees, crane, hangar, etc. (natural or man- made, permanent or temporary) considered to be of prominent height above ground level.
Holding bay.	A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.
Hot spot	A location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.
Human factors principle	Principles which apply to aeronautical design, certification, training, operations and

	maintenance and which seek safe interface between the human and other system components by proper consideration to human performance.
Human performance	Human capabilities and limitations which have an impact on the safety and efficiency of aeronautical operations.
Identification beacon	An aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified.
Incident	An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation.
Independent parallel approaches.	Simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are not prescribed.
Independent parallel departures.	Simultaneous departures from parallel or near parallel instrument Departures runways.
Inner Horizontal Surface	A circular surface located in a horizontal plane above the Final Approach And Take-Off area (FATO) and its environs and designated to allow safe visual maneuvering by helicopters.
Instrument runway.	a) *Non-precision approach runway*. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type A and a visibility not less than 1 000 m. b) *Precision approach runway, category I*. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) not lower than 60 m (200 ft) and either a visibility not less than 800 m or a runway visual range not less than 550 m. c) *Precision approach runway, category II*. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) lower than 60 m (200 ft) but not lower than 30 m (100 ft) and a runway visual range not less than 300 m. d) *Precision approach runway, category III*. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation type B with a decision height (DH) lower than 30 m (100 ft), or no decision height and a runway visual range less than 300 m or: no runway visual range limitations. *Note 1.— Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids is the conditions in which operations are intended to be conducted.* *Note 2.— Refer to Annex 6— Operation of Aircraft for instrument approach operation types.*

Integrity (aeronautical data)	A degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorised amendment.
Integrity classification (aeronautical data)	Classification based upon the potential risk resulting from the use of corrupted data. Aeronautical data is classified as: a) routine data: there is a very low probability when using corrupted routine data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; b) essential data: there is a low probability when using corrupted essential data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe; and c) critical data: there is a high probability when using corrupted critical data that the continued safe flight and landing of an aircraft would be severely at risk with the potential for catastrophe.
Intermediate holding position	A designated position intended for traffic control at which taxiing aircraft and vehicles shall stop and hold until further cleared to proceed, when so instructed by the aerodrome control tower.
Investigation	A process conducted for the purpose of accident prevention which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations.
Joint Use Aerodrome	Any aerodrome jointly used for both Civil and military aircraft operations.
Landing area	That part of a movement area intended for the landing or take-off of aircraft.
Landing direction indicator	A device to indicate visually the direction currently designated for landing and take-off.
Laser-beam free flight zone (LFFZ)	Airspace in the immediate proximity to the aerodrome where the irradiance zone is restricted to a level unlikely to cause any visual disruption.
Laser-beam critical flight zone (LCFZ)	Airspace in the proximity to the aerodrome but beyond the LFFZ where the irradiance is restricted to a level unlikely to cause glare effects.
Laser-beam sensitive flight zone (LSFZ)	Airspace outside, and not necessarily contiguous with, the LFFZ and LCFZ where the irradiance is restricted to a level unlikely to cause flash-blindness or after-image effects.
Lighting system reliability	The probability that the complete installation operates within the specified tolerances and that the system is operationally usable.
Manoeuvring area	That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.
Marker	An object displayed above ground level in order to indicate an obstacle or delineate a boundary
Marking	A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.

Mast	A tall structure designed to support antennas/aerials for telecommunications and broadcasting; including electricity pylons and poles for wind turbines.
Minister	The Minister of the Government of the Federation responsible for Civil Aviation
Movement area	That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the aprons.
Near-parallel runways	Non-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less.
Non-instrument runway	A runway intended for the operation of aircraft using visual approach procedures or an instrument approach procedure to a point beyond which the approach may continue in visual meteorological conditions. Note.— Visual meteorological conditions (VMC) are described in Section3 of Annex 2— Rules of the Air.
Normal flight zone (NFZ).	Airspace not defined as LFFZ, LCFZ, or LSFZ, but which must be protected from laser radiation capable of causing biological damage to the eye.
NOTAM or Notice to Airmen.	A notice distributed by means of telecommunication containing information concerning the establishment, condition or change in any aeronautical facility, service or procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations
Obstacle.	All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that: a) are located on an area intended for the surface movement of aircraft; or b) extend above a defined surface intended to protect aircraft in flight; or c) stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.
Obstacle free zone (OFZ).	The airspace above the inner approach surface, inner transitional surfaces, and balked landing surface and that portion of the strip bounded by these surfaces, which is not penetrated by any fixed obstacle other than a low mass and frangible mounted one required for air navigation purposes.
Obstacle limitation Surfaces.	A series of surfaces that define the Volume of airspace at and around an aerodrome to be kept free of obstacles in order to permit the intended aircraft operations to be conducted safely and to prevent the aerodrome from becoming unusable by the growth of obstacles around the aerodrome.
Occurrence	An accident or incident.
On–scene Commander	Persons designated to take charge of the overall emergency operation.
Organisation	Any type of group or association of individuals who are joined together either formally or legally. The term organization includes a corporation, government, partnership, and any type of Civil or political association of people.
Orthometric height.	Height of a point related to the geoid, generally presented as an MSL elevation.
Outer main gear wheel span (OMWGS)	The distance between the outside edges of the main gear wheels.
Pavement classification number (PCN)	A number expressing the bearing strength of a pavement for unrestricted operations.

Pavement classification rating (PCR)†† †† Applicable as of 28 November 2024.	A number expressing the bearing strength of a pavement.
Person	Any individual, firm, partnership, corporation, company, association, joint-stock association, or body politic, and includes any trustee, receiver, assignee, or other similar representative of these entities.
Permitted aerodrome	An aerodrome whose operator has been granted an Aerodrome Permit
Precision approach runway.	See 'Instrument runway'.
Pre-flight information Bulletin.	A presentation of current NOTAM information of operational significance, prepared prior to flight.
Primary runway(s).	Runway(s) used in preference to others whenever conditions permit.
Promulgated information incident.	An incident that involves significantly incorrect, inadequate, or misleading information promulgated in any aeronautical information publication, map or chart.
Protected flight zones.	Airspace specifically designated to mitigate the hazardous effects of laser radiation.
Road	An established surface route on the movement area meant for the exclusive use of vehicles.
Road-holding position	A designated position at which vehicles may be required to hold.
Runway	A defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft.
Runway condition assessment matrix (RCAM)	A matrix allowing the assessment of the runway condition code, using associated procedures, from a set of observed runway surface condition(s) and pilot report of braking action.
Runway condition code (RWYCC)	A number describing the runway surface condition to be used in the runway condition report. Note.— The purpose of the runway condition code is to permit an operational aeroplane performance calculation by the flight crew. Procedures for the determination of the runway condition code are described in the PANS-Aerodromes NCAA-AC-ARD 036
Runway condition report (RCR)	A comprehensive standardized report relating to runway surface conditions and its effect on the aeroplane landing and take-off performance.
Runway end safety area (RESA)	An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.
Runway guard lights	A light system intended to caution pilots or vehicle drivers that they are about to enter an active runway.
Runway-holding position.	A designated position intended to protect a runway, an obstacle limitation surface, or an ILS/MLS Critical/sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorised by the aerodrome control tower. Note – In radiotelephony phraseologies, the expression "holding point" is used to

	designate the runway holding position.
Runway surface condition(s)	A description of the condition(s) of the runway surface used in the runway condition report which establishes the basis for the determination of the runway condition code for aeroplane performance purposes. Note 1.— The runway surface conditions used in the runway condition report establish the performance requirements between the aerodrome operator, aeroplane manufacturer and aeroplane operator. Note 2.— Aircraft de-icing chemicals and other contaminants are also reported but are not included in the list of runway surface condition descriptors because their effect on runway surface friction characteristics and the runway condition code cannot be evaluated in a standardized manner. Note 3.— Procedures on determining runway surface conditions are available in the PANS- *Aerodromes NCAA-AC-ARD 036* a) Dry runway. A runway is considered dry if its surface is free of visible moisture and not contaminated within the area intended to be used. b) Wet runway. The runway surface is covered by any visible dampness or water up to and including 3 mm deep within the intended area of use. c) Slippery wet runway. A wet runway where the surface friction characteristics of a significant portion of the runway has been determined to be degraded. d) Contaminated runway. A runway is contaminated when a significant portion of the runway surface area (whether in isolated areas or not) within the length and width being used is covered by one or more of the substances listed in the runway surface condition descriptors. *Note.— Procedures on determination of contaminant coverage on runway is available in the PANS-Aerodromes NCAA-AC-ARD 036* e) Runway surface condition descriptors. One of the following elements on the surface of the runway: *Note.— The descriptions for e) i) to e) vi), below, are used solely in the context of the runway condition report and are not intended to supersede or replace any existing WMO definitions.* i) *Compacted snow*. Snow that has been compacted into a solid mass such that aeroplane tires, at operating pressures and loadings, will run on the

	surface without significant further compaction or rutting of the surface. ii) *Dry snow.* Snow from which a snowball cannot readily be made. iii) *Frost.* Frost consists of ice crystals formed from airborne moisture on a surface whose temperature is below freezing. Frost differs from ice in that the frost crystals grow independently and therefore have a more granular texture. *Note 1.— Below freezing refers to air temperature equal to or less than the freezing point of water (0 degree Celcius).* *Note 2.— Under certain conditions frost can cause the surface to become very slippery and it is then reported appropriately as reduced braking action.* iv) *Ice*. Water that has frozen or compacted snow that has transitioned into ice, in cold and dry conditions. v) *Slush*. Snow that is so water saturated that water will drain from it when a handful is picked up or will splatter if stepped on forcefully. vi) *Standing water*. Water of depth greater than 3 mm. *Note.— Running water of depth greater than 3 mm is reported as standing water by convention.*
Runway strip.	A defined area including the runway and stopway, if provided, that is intended: a) to reduce the risk of damage to aircraft running off a runway; and b) to protect aircraft flying over the area during take-off or landing operations.
Runway turn pad.	A defined area on a land aerodrome adjacent to a runway for the purpose of completing a 180-degree turn on a runway.
Runway visual range (RVR).	The range over which the pilot of an aircraft on the centerline of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.
Safety Area	A defined area made up of either a runway or taxiway and the surrounding surfaces that are prepared or suitable for reducing the risk of damage to aircraft in the event of an undershoot, overshoot, or excursion from a runway or the unintentional departure from a taxiway.
Safety Management System (SMS).	A system for the managing safety including the necessary organisational structure, responsibilities, accountabilities, policies and procedures.
Security incident.	An incident that involves unlawful interference.
Segregated parallel operations	Simultaneous operations on parallel or near-parallel instrument runways in which one runway is used exclusively for approaches and the other runway is used exclusively for departures.
Serious incident.	An incident involving circumstances indicating that there was a high probability of an

	accident and associated with the operation of an aircraft which, in the case of a manned aircraft, takes place between the time any person boards the aircraft with the intention of flight until such time as all such persons have disembarked, or in the case of an unmanned aircraft, takes place between the time the aircraft is ready to move with the purpose of flight until such time as it comes to rest at the end of the flight and the primary propulsion system is shut down.
Serious injury.	Any injury that is sustained by a person in an accident and which : a) requires hospitalisation for more than 48 hours, commencing within seven days from the date the injury was received; or b) results in a fracture of any bone, except simple fractures of fingers, toes or nose; or c) involves lacerations which cause severe haemorrhoid nerve, muscle, or tendon damage; or d) involves any injury to any internal organ; or e) involves second or third-degree burns, or any burns affecting more than 5% of the body surface; or f) involves verified exposure to infectious substances or injurious radiation
Shared Use Aerodrome	An aerodrome owned and operated by the (Ministry of Defence or other owner as appropriate) a portion of which is leased to a person or Civilian entity for the provision of Civil aircraft operations
Shoulder.	An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface.
Sign	a) *Fixed message sign*: A sign presenting only one message. b) *variable message sign*: A sign capable of presenting several pre- determined messages or no message, as applicable.
Signal area	An area on an aerodrome used for the display of ground signals.
State Safety Programme.	An integrated set of regulations and activities aimed at improving safety.
Station declination.	An alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated.
Stop way.	A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.
Switch-over time (light)	The time required for the actual intensity of a light measured in a given direction to fall from 50 per cent and recover to 50 per cent during a power supply change-over, when the light is being operated at intensities of 25 per cent or above.
Take-off runway.	A runway intended for take-off only.
Taxiway.	A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including: a) *Aircraft stand taxi lane*: A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only. b) *Apron taxiway*: A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron.

	c) *Rapid exit taxiway:* A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimizing runway occupancy times.
Taxiway intersection.	A junction of two or more taxiways.
Taxiway strip.	An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.
Threshold.	The beginning of that portion of the runway usable for landing.
Touchdown zone	The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.
Tower	A self-supporting mast of massive dimensions in terms of base size and height designed to support antennaes/aerials for telecommunications and broadcasting.
Usability factor.	The percentage of time during which the use of a runway or system of runways is not restricted because of the crosswind component. *Note — Cross wind component means the surface wind component at right angles to the runway centre line*
Unserviceable area	A part of the movement area that is unfit and unavailable for use by aircraft.
Work area.	A part of an aerodrome in which maintenance or construction works are in progress.
Wildlife Hazard	A potential for a damaging aircraft collision with birds or animals on or near an aerodrome.

12.1.1.3 ABBREVIATIONS AND SYMBOLS

(a) Abbreviations

AAE	Above aerodrome elevation
AAS	Airport advisory service
ACN*	Aircraft classification number
ACR**	Aircraft classification rating
ADP	Airside Driver Permit
AEP	Aerodrome Emergency Plan
ATC	Air Traffic Control
ATS	Air Traffic Services
AT-VASIS	Visual Approach Slope Indicator System (Abridged)
AHC	Aviation Height Clearance
AIP	Aerodrome Information Publication
AIS	Aeronautical Information Services
ALR	Aircraft loading rating
AMSL	Above Mean Sea Level
ANSI	American national standards institute
ANSP	Air Navigation Service Provider
APAPI	Abbreviated precision approach path indicator
APRX	Approximately
ARP	Aerodrome reference point
ASDA	Accelerate stop distance available
ATF	Aerodrome traffic frequency
ATS	Air traffic services
AT-VASIS	Abbreviated T visual Approach Slope Indicator System
BRS	Baggage Reconciliation System
°C	Degrees Celsius

CAT I	Category I
CAT II	Category II
CAT III	Category III
Cd	Candela
Cm	Centimetre
DGCA	Director-General Civil Aviation
DME	Distance Measuring Equipment
E	East
(E)	Modulus of Elasticity
ECCAIRS	European Coordinating Centre for Accident & Incident Reporting system
ELT	Emergency Locator Transmitter
EWH	Eye to Wheel Height
FATO	Final Approach and Take-Off Area
FIDS	Flight Information Display System
FOD	Foreign Object Debris
Ft	Foot/Feet
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GS	Glide slope
HAA	Height Above Aerodrome
HAPI	Helicopter Approach Path Indicator
HIAL	High Intensity Approach Lighting
IBIS	ICAO Birdstrike Information System
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
K	Degree Kelvin

Kg	Kilogram
Km/h	Kilometre per hour
Km	Kilometre
Kt	Knot
L	Litre
LDA	Landing Distance Available
m	Metre
M	Magnetic
MALSR	Medium intensity approach lighting system with runway alignment indicator lights
max	Maximum
MF	Mandatory frequency
min	Minimum
MLS	Microwave Landing System
mm	Millimetre
MN	Mega-Newton
MPa	Megapascal
MSL	Mean Sea Level
N	North
NM	Nautical mile
NOTAM	Notices to airmen
NU	Not Usable
OCA/H	Obstacle Clearance Altitude/Height
ODALS	Omni-directional lighting system
OFZ	Obstacle Free Zone
OLS	Obstacle Limitation Surface
OMGWS	Outer Main Gear Wheel Span
PAPI	Precision Approach Path Indicator

PCN*	Pavement Classification Number
PCR**	Pavement Classification Rating
PLR	Pavement Load Rating
RCR	Runway Condition Report
RESA	Runway End Safety Area
RILS	Runway Identification Lights
RSC	Runway Surface Condition
R/T	Radio Telephony
RVR	Runway Visual Range
S	South
secs	Seconds
SIRO	Simultaneous intersecting runway operations
SMGCS	Surface Movement Guidance and Control Systems
NCAA	Nigeria Civil Aviation Authority
Nig.CARs	Nigeria Civil Aviation Regulations
T	True
TDZ	Touchdown zone
TDZE	Touchdown zone elevation
TDZL	Touchdown zone lighting
TODA	Take-off distance available
TORA	Take-off run available
T-VASIS	T visual Approach Slope Indicator System
VFR	Visual Flight Rules
VMC	visual meteorological conditions
VOR	Very High Frequency Omni-directional Radio range
W	West
WHMP	Wildlife Hazard Management Programme
WIP	Work In Progress

(b) Symbols

°	Degrees
>	Greater than
<	Less than
-	Minus
′	Minute of arc
μ	Friction coefficient
%	Percentage
±	Plus or minus
+	Plus
′′	Seconds of arc

12.1.1.4 ESTABLISHMENT AND OPERATION OF AERODROME

(a) The Minister may approve the establishment and development of aerodromes anywhere in Nigeria;

(b) Roads, approaches, apparatus, equipment, buildings and other accommodations in connection to such aerodromes shall be maintained by the owners in conformity with these regulations and any other requirements as may be prescribed by the Authority from time to time.

12.1.1.5 DESIGN /OPERATION OF AERODROMES

(a) No person or corporate entity shall commence construction or reconstruction of an aerodrome without approval of the Authority

(b) Pursuant to 12.1.1.5(a) above, an applicant for the establishment of an aerodrome shall in accordance with the requirements and procedures prescribed in subpart 4, process and obtain the Authority's acceptance of the aerodrome layout plans.

(c) An aircraft shall not take-off or land at a place in Nigeria other than —

(1) an aerodrome certified or for which a permit has been issued under this Part, pursuant to the requirements of section 12.1.2 and 12.1.5 for the take-off and landing of such aircraft;

(2) a State aerodrome, notified as available for the take-off and landing of such aircraft, in respect of which authorization has been granted by the Authority

(3) any other aerodrome, other than an aerodrome referred to in paragraph 12.1.1.5(c)(1) and (2) in respect of which the Authority is of the opinion that meeting the requirements necessary for the issuance of an aerodrome certificate or permit would be in the public interest and would further the safe operation of the aerodrome.

12.1.1.6 APPROVALS OR AUTHORIZATION

(a) The Authority will issue an authorisation referred to in subsection 12.1.1.5 (c)(2) where it is possible to specify conditions in the authorization that will ensure a level of safety established by this Part, and in any such authorization, the Authority will specify those conditions.

(b) The approval or authorisation referred to in (a) above may be granted under such condition and for such period, which the Authority may determine, if the Authority is satisfied that the provisions of this Regulation have been met and the use of such Aerodrome by such operator will not jeopardize aviation safety.

12.1.1.7 RESTRICTIONS

(a) The Authority will restrict or prohibit flights by night from, or at any aerodrome at which adequate facilities for night flights are lacking; or where the terrain or other objects in the vicinity of the aerodrome could cause a hazard to the operation of aeroplanes or helicopters used in night flights.

(b) The Authority will restrict or prohibit operation at an aerodrome either absolutely or subject to any exceptions or conditions that the Authority will specify, if the restriction is necessary for aviation safety and or in the public interest.

12.1.1.8 PROHIBITIONS

(a) Except with the approval of the aerodrome operator, no aircraft operator may park or abandon used or unused aircraft on the airside of the aerodrome.

(b) Except with the approval of the certified aerodrome operator, no person may:

(1) drive a vehicle into restricted areas of the aerodrome, or the terminal building; or

(2) obstruct an entrance to or passage in the terminal building in such a manner as to inconvenience other aerodrome users.

(c) No person may, on an aerodrome:

(1) obstruct or interfere with the authorised use of the aerodrome;

(2) obstruct any employee of the aerodrome operator acting in the execution of his or her duty in relation to the aerodrome;

(3) throw, leave, or drop anything capable of causing injury to any person or damage to property;

(4) dump any waste matter whatsoever elsewhere other than a place designated and approved for the purpose by aerodrome operator;

(5) commit any nuisance, disorderly, or indecent act, write, draw or affix any profane, obscene or abusive materials on aerodrome;

(6) spill or release substances capable of causing air, water, or soil pollution.

(d) Except with permission of the aerodrome operator, no person may:

(1) interfere or tamper with any part of the aerodrome or any equipment associated with the operation of the aerodrome;

(2) gain access through restricted structures;

(3) carry out trade of any level and magnitude including foreign exchange;

(4) advertise in the aerodrome;

(5) handle passengers and baggage, or confront passengers and aerodrome users for unsolicited service.

(e) Except with the approval of the aerodrome operator, no person shall supply any fuel to any aircraft except at a place and in a manner approved by the aerodrome operator.

(f) The aerodrome operator shall subject any approval granted under this subsection to compliance with such conditions as the aerodrome operator may impose in order to safeguard the safety of persons and property on the aerodrome.

12.1.1.9 LEFT BLANK INTENTIONALLY

12.1.1.10 REGISTER OF AERODROME CERTIFICATES

(a) The Authority will maintain: a register of all aerodrome certificates issued under these Regulations.

(b) The registers shall contain the following particulars:

(1) the full name, and if any, the trade name of the holder of the certificate;

(2) the postal address of the holder of the certificate or owner of the aerodrome;

(3) the name and the location of the aerodrome;

(4) the number of the certificate issued (for certified aerodrome);

(5) file reference number of the initial and each subsequent safety inspection record and audit report in respect of each aerodrome certified; and

(6) the nationality of the holder of the certificate or owner of the aerodrome.

(c) The particulars referred to in subsection 12.1.1.10(b) shall be recorded in the register within seven (7) days from the date on which the certificate was issued by the Authority.

(d) The register shall be kept at a designated place within the Authority.

(e) A copy of the register shall be furnished by the Authority, on payment of the appropriate fee as prescribed, to any person who requests the copy.

(f) The Authority will amend the information recorded in the aerodrome register if that information is not up to date.

(g) The Authority will correct the information in the aerodrome register if there is an error in that information

12.1.1.11 EXEMPTIONS

(a) The Authority may exempt, in writing, an aerodrome operator from complying with specific provisions of these Regulations.

(b) An Aerodrome operator requesting exemptions shall comply with requirements set out in Part 1.4 of these Regulations.

(c) Deviation from these Regulations and the conditions and procedures referred to in Sections 12.1.2 and 12.1.5 shall be set out in an endorsement on the Aerodrome Certificate, permit or authorization and published in the AIP.

12.1.2 AERODROME CERTIFICATION AND ADMINISTRATION

12.1.2.1 APPLICABILITY

(a) This section shall apply to all aerodromes in Nigeria used for International operations.

12.1.2.2 REQUIREMENT FOR AN AERODROME CERTIFICATE

(a) All aerodromes in Nigeria used for International operations shall be certified in accordance with these Regulations.

(b) A person shall not operate an aerodrome which is not certified if the aerodrome is intended for International Operations.

(c) The operator of an aerodrome for which an aerodrome certificate is not required may nevertheless apply for an aerodrome certificate for which a fee may be charged.

12.1.2.3 APPLICATION FOR AN AERODROME CERTIFICATE

(a) An application for the issuance of an aerodrome certificate shall be made to the Authority in the form and manner prescribed by the Authority. The application shall include:

(1) the Aerodrome Manual and statement of compliance demonstrating that the aerodrome operator's Aerodrome Manual is in compliance with the relevant provisions of this Part;

(2) the plans of the Aerodrome as specified in subpart 4 including obstacle chart Type A;

(3) security clearance from the State (this shall not apply to State-owned aerodromes) ;

(4) written approval from the town planning authority;

(5) Approval by appropriate National Environmental Authority for Environmental impact Assessment for Aerodrome under construction and Environmental management Plan for existing Aerodrome respectively.

(6) proof of payment of the appropriate fee as prescribed by the Authority;

(7) adequate insurance cover;

(8) particulars of non-compliance with or deviation from the standards prescribed in this part;

(9) Proof of applicant's level of resources and financial capabilities for operating and maintaining the aerodrome.

12.1.2.4 GRANT OF AN AERODROME CERTIFICATE

(a) Subject to the provisions in subsection 12.1.2.3 and section 12.1.3, the Authority may approve the application and accept/approve the aerodrome manual submitted under subsection 12.1.2.2 and grant an aerodrome certificate to the applicant.

(b) Before granting an aerodrome certificate, the Authority will be satisfied that:

(1) the applicant and his/her staff have the necessary competence and experience to operate the aerodrome properly;

(2) the aerodrome manual prepared for the applicant's aerodrome and submitted with the application contain all the relevant information;

(3) the aerodrome facilities, services and equipment are in accordance with the requirements specified in this Part;

(4) the aerodrome operating procedures make satisfactory provision for the safety of aircraft; and

(5) an acceptable safety management system is in place at the aerodrome.

12.1.2.5 REFUSAL TO GRANT AN AERODROME CERTIFICATE

(a) If the Authority refuses to grant an Aerodrome Certificate to an applicant, the Authority will give the applicant a written notice stating the reasons for the refusal, not later than 14 days after the date of refusal.

12.1.2.6 DURATION OF AN AERODROME CERTIFICATE

(a) An Aerodrome Certificate remains in force for a period of three (3) years, unless it is suspended or revoked by the Authority.

12.1.2.7 CONTINUING VALIDATION OF AN AERODROME CERTIFICATE

(a) The Authority will carry out regular surveillance inspection of an aerodrome to validate the certificate

(b) Annual aerodrome validation fee shall be paid to the Authority as stipulated in the NCAA Schedule of Fees. The Authority may review the fees from time to time

12.1.2.8 RENEWAL OF AN AERODROME CERTIFICATE

(a) An aerodrome operator shall ensure that renewal of the Aerodrome Certificate is commenced not later than 90 days prior to the date of expiration of the certificate.

(b) The date of renewal of the Aerodrome Certificate shall be effective from the expiry date of the initial certificate.

(c) The applicant shall submit proof of payment of appropriate renewal fees as prescribed by the Authority.

12.1.2.9 RESERVED

12.1.2.10 VOLUNTARY SURRENDER OF AN AERODROME CERTIFICATE

(a) The holder of an Aerodrome Certificate shall give the Authority not less than 30 days written notice of the date on which the certificate is to be surrendered in order that suitable promulgation action can be taken.

(b) The Authority will cancel the certificate on the date specified in the notice.

(c) A change in ownership of the holder of an aerodrome certificate shall be deemed to be a change of significance that shall require a certification process of the Aerodrome by the Authority in accordance with the provisions of subsection 12.1.2.3.

12.1.2.11 ENDORSEMENT OF CONDITIONS OF AN AERODROME CERTIFICATE

(a) The Authority, when granting the Aerodrome Certificate shall endorse the Conditions for the type of use of the aerodrome and other details in the Aerodrome Certificate;

(b) The general and specific conditions to be endorsed on the aerodrome certificate are as contained in the appendix of subpart 1.

12.1.2.12 AMENDMENT OF AN AERODROME CERTIFICATE

Provided that the requirements of Paragraph 12.1.2.4(b) have been met, the Authority will amend an Aerodrome Certificate when:

(a) there is a change in the ownership or management of the aerodrome;

(b) there is a change in the use or operation of the aerodrome;

(c) there is a change in the boundaries of the aerodromes; or

(d) the holder of the Aerodrome Certificate requests amendment.

12.1.2.13 INTERIM AERODROME CERTIFICATE

(a) The Authority will issue an Interim Aerodrome Certificate to the applicant referred to in these Regulations authorizing the applicant to operate an Aerodrome if the Authority is satisfied that

(1) an Aerodrome Certificate in respect of the aerodrome shall be issued to the applicant as soon as the application procedure for the grant of an Aerodrome Certificate has been completed; and

(2) the grant of the Interim Certificate is in the public interest and is not detrimental to aviation safety.

(b) An Interim Aerodrome Certificate issued pursuant to Paragraph 12.1.2.12(a) shall expire on:

(1) the date on which the Aerodrome Certificate is issued, or

(2) the expiry date specified in the interim Aerodrome Certificate; whichever is earlier.

(c) These Regulations apply to an Interim Aerodrome Certificate in the same manner as they apply to an Aerodrome Certificate.

12.1.2.14 SUSPENSION OR REVOCATION OF AN AERODROME CERTIFICATE

(a) The Authority will, by written notice given to the holder of an aerodrome certificate, suspend an aerodrome certificate for any of the following reasons:

(1) The breach of a condition to which the certificate is subject ;

(2) the aerodrome facilities, operations or maintenance are not of the standards required in the interests of the safety of air navigation;

(3) the aerodrome operator's safety management system is found to be inadequate;

(4) In the interest of public safety ;

(5) all other means for timely correction of the unsafe condition or ensuring safe aircraft operations have not yielded the required results;

(6) the technical proficiency or qualifications of the aerodrome operators personnel to perform the duties to meet the critical safety requirements in accordance with the Regulations are found inadequate;

(7) the operator resists or is unwilling to take action to correct or mitigate the condition affecting aviation safety;

(8) the operator willfully fails to perform an already agreed upon corrective action and suspension of the certificate is the last resort to avoid unsafe operations in the aerodrome movement area.

(b) The Authority will, by written notice given to the holder of an aerodrome certificate, revoke an aerodrome certificate for any of the following reasons :

(1) the aerodrome operator is incapable or unwilling to carry out corrective action or has committed/repeated serious violations;

(2) the aerodrome operator has demonstrated a lack of responsibility, such as deliberate and flagrant acts of non-compliance or falsification of records

jeopardizing aviation safety;

(3) the aerodrome operator has made it convincingly clear that the continued operation of the aerodrome will be detrimental to the public interest.

(c) Before suspending or revoking an aerodrome certificate, the Authority will give to the holder a show cause notice that:

(1) sets out the facts and circumstances that, in the opinion of the Authority, would justify the suspension or revocation;

(2) invites the holder to show cause, in writing, within 14 days, after the date of the notice, why the certificate should not be revoked;

(3) the Authority will take into account any written submission that the holder makes to the Authority within the time allowed.

12.1.2.15 KEY MANAGEMENT PERSONNEL REQUIRED FOR AERODROME OPERATIONS AND MAINTENANCE.

(a) The Accountable manager is appointed subject to the applicable laws.

(b) The Accountable manager shall ensure that all necessary resources are available for operations and maintenance of the aerodromes in accordance with this regulation.

(c) The Accountable manager shall appoint an Airport manager that is acceptable to the Authority.

(d) The Airport manager shall represent the management structure of the Aerodrome, and be responsible for all functions specified in this part.

(e) The Airport manager shall demonstrate relevant knowledge, background and satisfactory experience related to aerodrome operations and maintenance and demonstrate a working knowledge of this Part.

(f) The Accountable manager shall provide an alternate Airport Manager who shall deputize for the Airport manager in his / her absence.

(g) The Accountable manager shall ensure there are qualified personnel, with proven competency in civil aviation, available and serving full-time in the following positions or their equivalent:

(1) Airport Manager.

(2) Operations Manager

(3) Safety Manager

(4) Maintenance Manager

(5) Aerodrome Rescue and Fire Chief

Note: "Competency in Civil aviation" means that an individual shall have a technical qualification and management experience acceptable to the Authority for the position served.

(h) Approval of persons to occupy the positions specified in 12.1.2.15(g)(1-5) shall be made by the Aerodrome Operator using the requirement established in this part and other approved guidance.

(i) The individuals who serve in the positions required or approved under this section and anyone in a position to exercise control over operations conducted under the Aerodrome Certificate must—

(1) Be qualified through training, experience, and expertise;

(2) Discharge their duties to meet applicable legal requirements and to maintain safe operations; and

(3) To the extent of their responsibilities, have a full understanding of the following materials with respect of the Certificate holder's operation:

(i) Aviation safety standards and safe operating practices;

(ii) These Regulations;

(iii) The Aerodrome Certificate holder's certificate schedule;

(iv) All appropriate operations and maintenance requirements of this Part;

(v) The manuals requirements of this Part.

(j) The Aerodrome Certificate holder must notify the Authority within 7 days of any change in personnel or any vacancy in any position listed in paragraph 12.1.2.15(f)

(k) The Aerodrome Certificate holder shall make arrangements to ensure continuity of supervision if operations are conducted in the absence of any required management personnel.

(l) The minimum initial qualifications for Airport Manager are—

(1) A degree or appropriate qualifications in Civil aviation field, with training in airport management field.

(2) A minimum of 10 years working experience in a medium sized public use airport, which include at least 5 years' experience in airport administration

(m) The minimum initial qualifications for Operations Manager are—

(1) A degree or appropriate qualification in Civil aviation field with training in airport operations

(2) A minimum of 8 years working experience in a public use airport which includes

(i) at least 3 years experience in airport operations

(ii) At least 3 years supervisory level

(n) The minimum initial qualifications for Safety Manager are—

(1) A university degree in aviation systems safety, engineering or physical science

(2) A minimum of 8 years working experience in a public use airport which includes

(i) at least 3 years experience in application of safety management concepts and tools

(ii) at least 3 years supervisory experience

(o) The minimum initial qualifications for Aerodrome Rescue and Fire Chief are—

(1) A minimum of 8 years working experience, in an airport rescue and

firefighting department which includes

(i) At least 3 years supervisory experience and considerable first-hand practical experience

(p) The minimum initial qualifications for Maintenance Manager are—

(1) A university degree in either civil engineering, mechanical engineering, electrical engineering or equivalent qualification

(2) A minimum of 8 years working experience in an airfield lighting or Civil/building departments of a public use airport which includes:

(i) at least 3 years supervisory experience

12.1.3 AERODROME MANUAL

12.1.3.1 PREPARATION OF THE AERODROME MANUAL

(a) The operator of a certified aerodrome /Aerodrome with an Operational permit shall have a manual to be known as the Aerodrome Manual for the aerodrome.

(b) The Aerodrome Manual shall:

(1) be typewritten or printed, and signed by the aerodrome operator;

(2) be in a format that is easy to revise;

(3) have a system for recording the accuracy of pages or amendments thereto, including a page for logging revisions; and

(4) be organised in a manner that will facilitate the preparation, review and acceptance/approval process.

12.1.3.2 INFORMATION TO BE INCLUDED IN THE AERODROME MANUAL

(a) The operator of the aerodrome shall include the following particulars in an aerodrome manual as provided in the Implementing Standards (IS) of these Regulations, to the extent that they are applicable to the aerodrome, under the following parts, preceded by:

(1) Approval page;

(2) a list of the corrigenda/amendments: this section should log the updates and/or corrections made to the aerodrome manual;

(3) List of effective pages;

(4) a distribution list;

(5) Forward;

(6) Abbreviations; and

(7) a table of contents;

Part 1. General information set out in Part 1 of Implementing Standards (IS) of these Regulations on the purpose and scope of the aerodrome; the legal requirement for an aerodrome certificate and a manual as prescribed in the national regulations; conditions for use of the aerodrome; the aeronautical information services available and the procedures for their promulgation; the system for recording aircraft movements, the obligations of the aerodrome operator and Co-ordination Policy or Letters of Agreement between AIS and Aerodrome operator. All deviations from the regulatory provisions authorized by the Authority must be listed together with their validity and references to the related documents (including any safety assessments)

Part 2. Particulars of the aerodrome site as set out in Part 2 of Implementing Standards (IS) of these Regulations including, a description of the intended operations, including:

(1) the critical aeroplanes the aerodrome is intended to serve;

(2) the category of runway(s) provided (non-instrument, instrument including non- precision and precision);

(3) the different runways and their associated levels of service;

(4) the nature of aviation activities (commercial, passenger, air transport,

cargo, aerial work, general aviation);

(5) the type of traffic permitted to use the aerodrome (international/national, IFR/VFR, scheduled/nonscheduled); and

(6) the minimum RVR that aerodrome operations can be permitted;

Part 3. Particulars of the aerodrome required to be reported to the aeronautical information service as set out in Part 3 of Implementing Standards (IS) of these Regulations;

Part 4. The aerodrome operating procedures and safety measures as set out in Part 4 of Implementing Standards (IS) of these Regulations. These shall include references to air traffic procedures such as those relevant to low visibility operations. Air traffic management procedures are normally published in the air traffic services manual with a cross-reference to the aerodrome manual; For each procedure:

(1) the responsibilities of the aerodrome operator are clearly described;

(2) the tasks that are to be achieved by the aerodrome operator or its subcontractors are listed; and

(3) the means and procedures required to complete these tasks are described or appended, together with the necessary details such as the frequency of application and operating modes; and

Part 5. Details of the aerodrome administration and the safety management system as set out in Part 5 of Implementing Standards (IS) of these Regulations.

(a) If the Authority exempts the aerodrome operator from complying with any requirement set out in the Regulations, the aerodrome manual shall show the identifying number given to that exemption by the Authority and the date the exemption came into effect and any conditions or procedures subject to which the exemption was granted.

(b) If a particular is not included in the aerodrome manual because it is not applicable to the aerodrome, the aerodrome operator shall state in the manual the reasons for the non-applicability of the particular.

(c) The operator of an aerodrome shall operate the aerodrome in accordance with the aerodrome manual.

12.1.3.3 LOCATION OF THE AERODROME MANUAL

(a) The aerodrome operator shall provide the Authority with a complete and current copy of the Aerodrome Manual.

(b) The aerodrome operator shall keep at least one complete and current copy of the Aerodrome Manual at the aerodrome and one copy at the operator's principal place of business if other than the aerodrome.

(c) The aerodrome operator shall make a copy of the Aerodrome Manual available for inspection by authorised officers of the Authority.

12.1.3.4 AMENDMENT OF THE AERODROME MANUAL

(a) To maintain the accuracy of the Aerodrome Manual, the Authority will issue a written directive to an aerodrome operator requiring the operator to alter or amend the manual in accordance with that directive.

(b) The aerodrome operator shall alter or amend the Aerodrome Manual when there is an introduction of any new facilities, equipment, change management, change in procedures and whenever necessary, in order to maintain the accuracy of the information in the manual.

(c) The aerodrome operator shall submit in writing a proposed amendment to its Aerodrome Manual to the Authority at least 30 days before the proposed effective date of the amendment or alteration, unless a shorter filing period is allowed by the Authority.

(d) At any time within 30 days after receiving a notice of refusal to approve the application for amendment, the holder of an aerodrome certificate / permit may petition the Authority, to reconsider the refusal to amend.

(e) In the case of amendments initiated by the Authority, the Authority will notify the operator of the certified aerodrome / Aerodrome with Operational permit of the proposed amendment, in writing, fixing a reasonable period within which the operator may submit written information, views, and arguments on the amendment. After considering all relevant materials presented, the Authority will notify the operator within 30 days of any amendment adopted, or rescind the notice. The amendment becomes effective not less than 30 days after the operator receives notice of it.

(f) Notwithstanding the provisions of paragraph (d) of this subsection, if the Authority finds there is an emergency requiring immediate action with respect to the safety of air transportation, the Authority will issue amendment, effective without stay on the date the operator receive notice of it. In such a case, the Authority will incorporate the findings of the amendment and a brief statement of the reasons for the finding in the notice of the amendment. Within 30 days after the issuance of such an amendment, the certificate / permit holder may petition the Authority to reconsider either the finding, the amendment bill or both. This petition stay the effectiveness of the emergency amendment.

(g) Manuscript amendments to the Aerodrome Manual are not acceptable. Changes or additions shall be subject of an additional or replacement page suitably dated. If the amendment affects the action of external parties, an acknowledgment slip shall be requested from each external party concerned when amendments are circulated so as to document that each party concerned has received and taken notice of the amendment.

(h) The aerodrome operator shall make prompt amendments to the Aerodrome Manual when there are updates to any part of the contents of the Aerodrome Manual or, when required by the Authority upon review of the Aerodrome Manual or any proposed updates or amendments. Such amendments required by Authority shall be binding on the aerodrome operator.

12.1.3.5 THE AUTHORITY'S ACCEPTANCE/APPROVAL OF THE AERODROME MANUAL

(a) The Authority will accept/approve the Aerodrome Manual and any amendments thereto, provided they meet the requirement of this Part.

12.1.3.6 MAINTENANCE AND CONTROL OF AERODROME MANUAL

(a) The Aerodrome Manual shall be a controlled document and aerodrome operator shall appoint a person to be the aerodrome manual controller, whose functions shall include:

(1) Updating and distributing its Aerodrome Manual. Each copy of the Aerodrome Manual shall be numbered and a list of their holders maintained by the document controller. Amendments shall be recorded on the amendment page in front of each copy.

(2) Each holder of the Aerodrome Manual shall be responsible for ensuring that his copy is kept up to date. For copies intended for common use, a person shall be designated to look after their amendment.

(b) An aerodrome operator shall:

(1) produce an Aerodrome Manual for his aerodrome and provide the Authority with a copy thereof which is kept complete and current;

(2) keep at least one complete and current copy of the Aerodrome Manual at the aerodrome and, if the aerodrome is not his principal place of business, keep another such copy of the Aerodrome Manual at his principal place of business;

(3) make the copy of the Aerodrome Manual available for inspection by the Aerodrome inspector or any authorised person;

(4) maintain the Aerodrome Manual and make such amendments as may be necessary to maintain the accuracy of the information in the Aerodrome Manual and to keep its contents up to date;

(5) notify the Authority, as soon as practicable, of any amendment made to the Aerodrome;

(6) make such amendment or addition to the Aerodrome Manual as the Authority may require for:

(i) maintaining the accuracy of the Aerodrome Manual;

(ii) ensuring the safe and efficient operation of aircraft at the aerodrome;or

(iii) ensuring the safety of air navigation.

12.1.3.7 AERODROME DESIGN REQUIREMENTS

(a) An applicant for or a holder of an aerodrome certificate/Operational permit shall provide the Authority with documents on the proposed aerodrome detailing the following particulars of the aerodrome :

(1) aerodrome data;

(2) physical characteristics;

(3) obstacle limitation surfaces;

(4) visual aids for navigation;

(5) aerodrome equipment and installation;

(6) electrical systems and aerodrome maintenance;

(7) an airspace classification appropriate to the characteristics of the aircraft it Intends to serve, the lowest meteorological minima for each runway, and the ambient light conditions expected during the operation of aircraft.

(b) The physical characteristics, obstacle limitation surfaces, visual aids, equipment and installation mentioned above in (1), (2), (3), (4) and (5) shall comply with the aerodrome design requirements provided in this Part.

12.1.3.8 DISTRIBUTION OF AN AERODROME MANUAL

(a) The Aerodrome Manual is an important document and must be issued under the authority of the aerodrome operator and signed by a senior executive of the organization. Any amendments to the Aerodrome Manual shall be approved by person(s) authorised by the aerodrome operator to do so.

(b) Copies of relevant sections of the Aerodrome Manual shall be made available to each supervisory member of the aerodrome operating staff including those employed by the operator’s contractors or agents, where relevant, so that the aerodrome operating staff:

(1) is aware of the contents of every part of the aerodrome manual relevant to his duties; and

(2) undertakes his duties in conformity with the relevant provisions of the Aerodrome Manual.

(c) For this purpose, aerodrome operating staff shall mean all persons, whether employed by the aerodrome operator, who in the course of their duties are:

(1) concerned with ensuring that the aerodrome is safe for use by aircraft; or

(2) required to have access to the aerodrome maneuvering area or apron.

(d) In addition, sufficient copies of the Aerodrome Manual shall be placed at the aerodrome operator's library and at the workplace of other relevant operating staff concerned.

(e) Apart from submission of the Aerodrome Manual to the Authority and internal distribution of copies to relevant operating staff, copies of the Aerodrome Manual shall also be made available to other external parties with a part to play in the aerodrome's safety process. In particular, the airport emergency section of the Aerodrome Manual shall also be extended to all external parties (e.g. State Police, Fire services Department or health agencies) involved in the aerodrome's emergency alert and response.

12.1.4 OBLIGATIONS OF THE AERODROME OPERATOR

12.1.4.1 GENERAL

(a) The grant of an aerodrome certificate and operational permit obliges the aerodrome operator to ensure the safety, regularity and efficiency of operations at the aerodrome, to allow authorised officers of the Authority access to the aerodrome to carry out safety audits, inspections and testing (including factory acceptance test of equipment prior to importation/ installation) and to be responsible for notifying and reporting to the Authority as prescribed in these Regulations.

(b) The Aerodrome Operator shall comply with the provisions of these Regulations and with any conditions endorsed in the Aerodrome Certificate.

12.1.4.2 COMPETENCE OF OPERATIONAL AND MAINTENANCE PERSONNEL

(a) The aerodrome operator shall employ adequate numbers of qualified and skilled personnel as required to perform all critical activities for aerodrome operation and maintenance.

(b) The operator shall train all personnel who access movement and safety areas and perform duties in compliance with the Requirements of this Regulations prior to the initial performance of such duties and retrain such personnel once every 3 years.

(c) The curriculum for initial and recurrent training shall include at least the following areas:

(1) aerodrome familiarization, including aerodrome marking, lighting and sign systems;

(2) procedures for access to, and operation in, movement areas and safety areas;

(3) aerodrome communications, including radio communication between the air traffic control tower and personnel, use of the common traffic advisory frequency if there is no air traffic control tower or the tower is not in operation, and procedures for reporting unsafe aerodrome conditions;

(4) duties required under the Aerodrome Operations Manual and the requirements of these Regulations; and

(5) any additional subject areas required under this Part.

(d) In respect of aerodrome maintenance, the training of personnel shall include the following areas as appropriate:

(1) maintenance of runway, taxiway and apron (paved and unpaved);

(2) runway and taxiway strips and shoulders and runway end safety areas;

(3) aerodrome drainage and fencing;

(4) aerodrome visual aids and electrical systems; passenger and Cargo building facilities.

(5) Concept of Runway surface condition reporting using GRF principles and methodology.

(e) The aerodrome operator shall make a record of all training completed by each individual in compliance with this section that includes, at a minimum, a description and d a t e s of training received and provides the Authority with a copy of this record, if requested.

(f) The operator shall comply with the following training requirements of these Regulations as appropriate.

(1) aircraft rescue and firefighting operational requirements;

(2) aerodrome vehicle Operations;

(3) aerodrome Inspection Programme;

(4) wildlife Hazard management.

(5) Aerodrome Operations and management;

(6) Aviation Security etc.

(g) Notwithstanding the requirements of 12.1.4.2(b)-(f), the operator shall develop and implement a training programme for personnel that will demonstrate compliance with this Regulation. The Aerodrome Operator shall ensure that all personnel are trained in Approved / Certified institution acceptable by the Authority.

(h) The aerodrome operator shall implement a programme to upgrade the competency of the personnel referred to in 12.1.4.2(b)-(f),

(i) The Aerodrome Operator shall submit to the Authority for evaluation and acceptance of an operation and maintenance training programme and the Authority will monitor the implementation of the programme.

(j) Key Management personnel Required For Aerodrome Operations and Maintenance in accordance with the Regulations in 12.1.2.15 & 12.1.5.23.

12.1.4.3 AERODROME OPERATIONS AND MAINTENANCE

(a) The aerodrome Operator shall develop a maintenance programme for all aerodrome facilities and equipment at the aerodrome to ensure serviceability.

(b) The aerodrome operator shall operate and maintain the aerodrome in accordance with the procedures set out in the Aerodrome Manual, subject to any directives that the Authority may issue.

(c) The Authority will give written directives to an aerodrome operator to alter the procedures set out in the Aerodrome Manual, to ensure safety of aircraft.

(d) To ensure the safety and maintenance of the aerodrome facilities, the aerodrome operator shall:

(1) provide and maintain navigation aids which include: wind direction indicators, airfield lighting, markings, markers and signs on the movement area in accordance with the requirements of this Part.

(2) maintain the movement areas, safety areas, strips, aerodrome drainage and airfield electrical power generators and electrical systems in accordance with the requirements of this Part.

(3) Submit /implement a corrective action plan for mitigating the safety concerns at an aerodrome.

(e) An aerodrome operator shall notify the ATC that a runway or portion thereof may be slippery when wet. A runway or portion thereof shall be determined as being slippery when wet when the friction measurements show that the runway surface friction characteristics as measured by a continuous friction measuring device are below the minimum friction level specified in this Part.

(f) The Aerodrome operator shall coordinate with the ATS provider in order to be satisfied that appropriate air traffic services are available to ensure the safety of aircraft in the airspace associated with the aerodrome. The coordination shall cover other areas related to safety such as aeronautical information services, air traffic services, designated meteorological authorities and security.

(g) The aerodrome operator shall provide suitable and easily accessible space to be used for the purpose of crew briefing at the aerodrome.

(h) The Aerodrome Operator shall ensure that any person accessing the airside, whether for work or inspection purpose, shall wear a reflective jacket.

12.1.4.4 AERODROME OPERATOR'S SAFETY MANAGEMENT SYSTEM

(a) The aerodrome operator shall comply with the safety management systems requirement in Part 20.

(b) The aerodrome operator shall oblige all users of the aerodrome, including fixed-base operators, ground handling agencies and other organizations that perform activities independently at the aerodrome in relation to flight or aircraft handling, to comply with the requirements laid down by the aerodrome operator with regard to safety at the aerodrome. The aerodrome operator shall monitor such compliance.

(c) The aerodrome operator shall require all users of the aerodrome, including fixed-base operators and other organisations referred to in paragraph 12.1.4.4(b) to cooperate in the programme to promote safety at, and the safe use of, the aerodrome by immediately informing it of any accidents, incidents, defects and faults which have a bearing on safety.

(d) The aerodrome operator may also arrange for an external audit and inspection programme for evaluating other users, including fixed-based operators, ground handling agencies and other organisations working at the Aerodrome.

12.1.4.5 AERODROME OPERATOR'S INTERNAL SAFETY AUDITS AND REPORTING

(a) The aerodrome operator shall arrange for audits of the safety management system, including inspections of the aerodrome facilities and equipment.

(b) The audits referred to in paragraph (a) above shall be carried out every 12 months, or less, as agreed with the Authority.

(c) The aerodrome operator shall ensure that the audit reports, including the report on the aerodrome facilities, services and equipment, are prepared by suitably qualified safety personnel.

(d) The aerodrome operator shall retain a copy of the report(s) referred to in paragraph
(c) above for a period to be agreed with the Authority. The Authority will request a copy of the report(s) for its review and reference.

(e) The report(s) referred to in paragraph (c) above shall be prepared and signed by the persons who carried out the audits and inspections.

12.1.4.6 ACCESS TO THE AERODROME BY AUTHORISED INSPECTORS

(a) Personnel so authorised by the Authority will inspect and carry out tests, on the aerodrome facilities, services and equipment, inspect the aerodrome operator's documents and records and verify the aerodrome operator's safety management system before the Aerodrome Certificate is granted or renewed and, subsequently, at any other time, for the purpose of ensuring safety at the aerodrome.

(b) The Authority will carry out periodic inspections and audits on aerodrome facilities, services and equipment in order to meet its continuing surveillance obligation and ensure safety of aerodrome operations.

(c) An aerodrome operator shall, at the request of the person referred to in paragraph (a) above allow access to any part of the aerodrome or any aerodrome facility, including equipment, records, documents and operational personnel, for the purpose referred to in paragraph (a) above

(d) The aerodrome operator shall cooperate in conducting the activities referred to in paragraph (a) and (b) above.

(e) The aerodrome operator shall permit the Authority to carry out validation inspection of equipment prior to installation and participate in the conduct of Factory Acceptance Test (FAT).

12.1.4.7 REMOVAL OF OBSTRUCTIONS FROM THE AERODROME SURFACE

An aerodrome operator shall remove from the aerodrome surface any vehicle or other obstruction that is likely to be hazardous.

12.1.4.8 WARNING NOTICES

(a) When low flying aircraft, at or near aerodrome or taxiing aircraft are likely to be hazardous to people or vehicular traffic, the aerodrome operator shall:

(1) post hazard warning notices on any public way that is adjacent to the maneuvering area ; or

(2) if such a public way is not controlled by the aerodrome operator, inform the authority responsible for posting the notices on the public way that there is a hazard.

12.1.4.9 MAINTENANCE OF DOCUMENTS AND RECORDS

(a) The aerodrome operator shall establish and retain personnel training records as prescribed under 12.1.4.2 and safety inspection records as prescribed in the IS 12.1.4.9 of these Regulations.

(b) The Aerodrome Operator shall maintain reference materials of the kinds specified in IS 12.1.4.9 of these Regulations

(c) The Aerodrome Operator shall keep the reference materials up-to-date and in a readily accessible form.

(d) Each technical personnel of the Aerodrome Operator shall have ready access to the reference materials.

(e) The Aerodrome Operator shall, at the Authority's request, make the documents and records, or copies of them or extracts from them, available for inspection by the Authority.

(f) The Aerodrome Operator shall establish, and put into effect, a system for controlling documents and records

(g) The Aerodrome Operator shall ensure that:

(1) the documentation is reviewed and authorised by appropriate personnel before issue;

(2) current issues of relevant documentation are available to personnel;

(3) obsolete documentation is removed from all points of issue or use;

changes to documentation are reviewed and approved by appropriate personnel.

12.1.4.10 NOTIFYING AND REPORTING

(a) Notification of inaccuracies in Aeronautical Information Service (AIS) publications—An Aerodrome operator shall review all Aeronautical Information Publications (AIPs), AIP Supplements, AIP Amendments, Notices to Airmen (NOTAMs), Pre-flight Information Bulletins and Aeronautical Information Circulars issued by the AIS on receipt thereof and immediately after such reviews shall notify the Authority of any inaccurate information contained therein that pertains to the Aerodrome;

(b) Notification of changes to the Aerodrome facilities, equipment and level of service planned in advance:—An Aerodrome operator shall notify the Authority, in writing, at least 60 days before effecting any change to the Aerodrome facility or equipment or the level of service at the Aerodrome that has been planned in advance and which is likely to affect the accuracy of the information contained in any AIS publication referred to in paragraph (a) above;

(c) Issues requiring immediate notification—Subject to the paragraph (d), An Aerodrome operator shall arrange for air traffic control and the Authority to receive immediate notice detailing any of the following circumstances of which the operator has knowledge:

(1) Obstacles, Obstructions and Hazards:

(i) any projections by an object through an obstacle limitation surface relating to the Aerodrome; and

(ii) the existence of any obstruction or hazardous condition affecting aviation safety at or near the Aerodrome;

(2) level of service:— Reduction in the level of service at the Aerodrome as set out in any of the AIS publications referred to in paragraph (a) above.

(3) Movement area:—Closure of any part of the movement area of the Aerodrome; and

(4) Any other condition that could affect aviation safety at the Aerodrome and against which precautions are warranted.

(d) Immediate notification to pilots:—When it is not feasible for an Aerodrome operator to arrange for the air traffic control unit and the Authority to receive notice of a circumstance referred to in (c) above in accordance with that Regulation, the operator shall give immediate notice direct to the pilots who may be affected by that circumstance.

(e) Mandatory Occurrence Report:—An Aerodrome Operator shall submit to the Authority within seventy two (72) hours, mandatory occurrence report of any of the accident or incident at the aerodrome enumerated in subpart 3.

12.1.4.11 AERODROME INSPECTION PROGRAMME

(a) The aerodrome operator shall:

(1) carry out special inspections:

(i) as soon as practicable after an aircraft accident or incident within the meaning of the requirements specified in Nigerian Safety Investigation Bureau Act 2022 and any regulations issued thereafter;

(ii) during any period of construction or repair of the Aerodrome facilities or equipment that is critical to the safety of aircraft operations;

(iii) at any time when there are conditions at Aerodrome such as strong winds and rain, that could affect aviation safety;

(iv) after construction, repair, or maintenance works have been carried out on Aerodrome facilities and equipment.

(2) carry out daily serviceability inspections.

(3) provide initial and recurrent training once in every three (3) years for any person who has duties in respect of the aerodrome inspection programme in at least the following areas:

(i) Aerodrome familiarisation, including aerodrome signs, marking and lighting;

(ii) Aerodrome Emergency Plan;

(iii) Notice to Airmen (NOTAM) notification procedures;

(iv) Procedures for pedestrians and ground vehicles in movement areas and safety areas; and

(v) Procedures for reporting changes in movement area condition using the Global Reporting Format (GRF);

(4) Maintain a reporting system to ensure prompt correction of unsafe aerodrome conditions noted during the inspection, including wildlife strikes.

(5) maintain a record of each person's training for a period of five (5) years after the person is no longer in the employment of the operator and provide the Authority with a copy of any record, if requested.

12.1.4.12 AERODROME EMERGENCY PLAN

General

(a) The aerodrome operator shall establish an Aerodrome Emergency Plan to ensure that all aerodrome personnel having duties and Aerodrome emergency responsibilities under the operator’s Aerodrome emergency plan are familiar with their assignments and are properly trained.

(b) The aerodrome operator’s emergency plan shall address all pertinent requirements pertaining to the plan, including content of the aerodrome emergency plan, emergency operations centre and mobile command post, on-scene commander, aircraft crash charts and aerodrome grid map, testing of the plan. Requirements in these respects are contained in subsection 12.2.9.1 and IS 12.2.9.1

12.1.4.13 RESCUE AND FIRE FIGHTING

(a) The aerodrome operator shall provide the aircraft fire-fighting vehicles and the personnel that correspond to the critical category for fire-fighting and published in the Aeronautical Information Publications (AIP) to respond to an aircraft emergency at the aerodrome.

(b) Relevant elements to be addressed by the aerodrome operator in the provision of rescue and firefighting service shall include aerodrome category for rescue and firefighting, extinguishing agents, rescue equipment, response time, emergency access road, communication and alerting systems, personnel, firefighting qualification Requirements in these respects are contained in subsection 12.2.9.2 and IS 12.2.9.2.

(c) The aerodrome operator shall ensure that all personnel assigned to aircraft fire-fighting duties are trained in accordance with appropriate aircraft fire-fighting standards.

(d) The aerodrome operator shall ensure that training of ARFF personnel are conducted at approved Aerodrome Fire-fighting Training Organizations by the Authority.

12.1.4.14 WILDLIFE HAZARD PLANNING AND MANAGEMENT

(a) The aerodrome operator shall establish methods for the control and management of wildlife on and around the vicinity of the aerodrome which shall cover:

(1) Observation, detection and monitoring of the presence of wildlife within and around the aerodrome

(2) The conduct of wildlife hazard assessment,

(3) The development and implementation of wildlife hazard management plan

(4) Collection of data on wildlife strike hazards and reporting

(e) Detailed requirement in respect of (1) – (4) above are in subsection 12.2.9.4 and IS 12.2.9.4

12.1.4.15 AERONAUTICAL STUDIES—

(a) The applicant for or holder of aerodrome certificate shall:

(1) Carry out an aeronautical study when aerodrome requirements as set out in Subpart 2 cannot be met as a result of development, such study shall be undertaken during the planning of a new airport or during the certification of an existing aerodrome.

(2) Carry out an aeronautical study to assess the impact of deviations from the Aerodrome requirements in order to:

(i) provide justification for a deviation from aerodrome requirements on the grounds that an equivalent level of safety shall be attained by other means;

(ii) present alternative means of ensuring the safety of aircraft operations;

(iii) estimate the effectiveness of each alternative; and

(iv) recommend procedures to compensate for the deviation;

(3) seek and obtain approval of the Authority in respect of paragraph 12.1.4.15(a) publish approval of any deviation in AIP and ensure the publication of the deviation in the AIP

(4) engage specialist with sufficient experience and knowledge in relevant areas in the conduct of technical analysis;

(5) promptly notify AIS and the Authority, in compliance with the Regulations, where the only reasonable means of providing an equivalent level of safety is to adopt suitable procedures with cautionary advice;

(6) carry out aeronautical studies as prescribed in the subpart 2 and in accordance with guidance contained in the Advisory Circulars on "Aeronautical Studies" (NCAA- AC-ARD036) issued by the Authority

12.1.4.16 AERODROME DATA

(a) The aerodrome operator, in determining and reporting Aerodrome data shall:

(1) Ensure adherence to accuracy, integrity and protection requirements set forth in subpart 2;

(2) Maintain the integrity of aeronautical data and avoidance and corruption of data at all times;

(3) Ensure that data are measured or described appropriately as prescribed in subpart 2.

12.1.4.17 VISUAL AIDS FOR NAVIGATION

(a) The aerodrome operator shall:

(1) establish procedures to ensure that a system of preventive maintenance and checking of the aerodrome visual aids for navigation (Wind direction indicators, Markings, lights, Markers and Signs) are in place;

(2) ensure that each visual aid for navigation provides reliable and accurate guidance to the user;

(3) establish a percentage of allowable serviceable lights that will ensure continuity of guidance to the user;

(4) restore any unserviceable or deteriorated items back into service without undue delay;

(5) Provide and maintain visual aids at the aerodrome as prescribed in subpart 2.

12.1.4.18 WORKS ON AERODROME

(a) The Aerodrome operator shall:

(1) establish procedures and take precautions to ensure that works carried out on the Aerodrome do not endanger aircraft operations;

(2) appoint one or more trained works safety officers to ensure full compliance with the procedures and precautions in paragraph (a) above;

(3) provide liaison between any maintenance team or contractor, ATC and safety works officer so as to ensure compliance with safety rules ;

(4) coordinate work and ensure compliance with safety requirements for routine maintenance, minor or major construction or maintenance works at its Aerodrome, as prescribed in subpart 3 and the Advisory Circular on “Plan of Construction Operation” (Or Work Safety Plan (NCAA-AC-ARD 006)) issued by the Authority.

12.1.4.19 APRON CONTROL AND MANAGEMENT SERVICE

(a) The aerodrome operator shall:

(1) ensure that the Aerodrome control service and the apron control service work in harmony to facilitate safe transition of aircraft between apron control and Aerodrome control;

(2) ensure close liaison and co-operation between the Apron Control Unit and ATS unit through radio communication and monitoring devices;

(3) keep an accurate record of movement information including aircraft arrival times, landings and take-offs;

(4) provide marshalling and leader van services and aircraft stand allocation;

(5) provide serviceable avio-bridges and docking devices where passenger loading is done through bridges;

(6) control movements by ground vehicles using the Aerodrome operator's apron safety rules as stipulated in approved Aerodrome Manual;

(7) provide blast fences to protect personnel and vehicles from jet blast and propeller slipstreams;

(8) ensure that aircraft operators and fuel companies adhere strictly to the approved operator's procedures during the fuelling of aircraft;

(9) keep the apron swept clean and de-greased regularly and necessary and as specified in the approved aerodrome manual.

(10) keep records activities and dissemination of same to appropriate establishments when necessary;

(11) provide apron control and management services as specified in the approved aerodrome manual.

12.1.4.20 GROUND VEHICLES AND PEDESTRIANS

(a) The aerodrome operator shall:

(1) limit access to movement areas and safety areas only to those ground vehicles and pedestrians necessary for Aerodrome and aircraft operations;

(2) provide adequate procedures for the safe and orderly access to, and operation on the Aerodrome operational areas, by ground vehicles and pedestrians;

(3) establish and implement provisions identifying the consequences of non-compliance with the procedures in (b) by an employee, tenant, or contractor.

(4) when an air traffic control service is in operation, ensure that each ground vehicle or pedestrian in movement areas or safety areas is controlled by:

(i) two-way radio communications between each ground vehicle or pedestrian and the control tower;

(ii) an escort vehicle with two-way communication with the control tower; or

(iii) adequate measures authorized by the Authority for controlling ground vehicles and pedestrians, such as markings, signs, signals or guards, when it is not operationally practicable to have two-way radio communications between the tower and the ground vehicle, escort or pedestrian.

(5) ensure that each employee, tenant, or contractor is trained on the procedures required in this Part and in the 'Aerodrome Traffic Directives' issued by the Authority, prior to moving on foot, or in a ground vehicle, in the movement areas or safety areas of the Aerodrome.

(6) maintain the following records:

(i) a description and date of training for personnel and use of ground vehicles on movement areas and safety areas;

(ii) a record for each vehicle and individual access to movement areas;

(iii) a description and date of any accident or incident in the movement areas involving aircraft and ground vehicle, or aircraft and aircraft, or aircraft and pedestrians;

(7) ensure pedestrian and ground vehicle movement in the airside is as prescribed in the subpart 2 and in the Aerodrome Traffic Directives issued by the Authority.

12.1.4.21 PROTECTION OF NAVIGATION/LANDING AIDS—

(a) The aerodrome operator shall:

(1) prevent the construction of facilities on the Aerodrome that would adversely affect the operation of any electronic or visual navigation aid or air traffic service;

(2) prevent, as far as it is within the aerodrome operator's authority, an interruption of the visual or electronic signals of navigation aids;

(3) provide protection of navigation / landing aids as prescribed in subpart 2.

12.1.4.22 PUBLIC PROTECTION AND AVIATION SECURITY—

(a) The aerodrome operator, shall:

(1) provide aerodrome perimeter fence, road, barriers and doors with controlled access to prevent inadvertent and unauthorised entry of animals and human beings;

(2) affix signs and prohibition notices at the perimeter of security areas within the Aerodrome;

(3) designate an isolated aircraft parking position with adequate lighting facility in his or her Aerodrome for the parking of an aircraft that is known or believed to be the subject of unlawful interference, or which for other security reason needs isolation from normal Aerodrome activities;

(4) provide aerodrome security in accordance with existing laws and Regulations.

12.1.4.23 REMOVAL OF DISABLED AIRCRAFT

(a) The aerodrome operator shall:

(1) designate an experienced and competent officer representing the Aerodrome operator to co-ordinate and liaise with ATS, the (Accident Investigation body), the Authority, the Aircraft operator, Customs and Immigration Departments if the aircraft is involved in international operation, and note the task of moving the aircraft is the responsibility of the Aircraft operator or owner;

(2) provide the capability of removing the disabled aircraft by following his or her plan for supplying of equipment, for dealing with nominated agents acting on behalf of each operator at the Aerodrome and local contractors capable of facilitating the aircraft removal operations;

(3) make available a mobile office for the aircraft removal operation with communication links with ATS;

(4) secure the scene of the incident or accident with security personnel

(5) keep records of all events, and photographs of the scene;

(6) establish and implement a disabled aircraft removal plan as prescribed in subpart 2.

12.1.4.24 PAVEMENT STRENGTH AND OVERLOAD OPERATIONS —

(b) The aerodrome operator shall not permit overloading of pavements beyond the design capacity particularly when it is observed that the pavements are exhibiting signs of distress or failure. However occasional minor overload on serviceable pavements is acceptable provided the following specifications are adhered to:

(1) for flexible pavements, occasional movements by aircraft with Aircraft Classification Number (ACN) not exceeding 10 percent above the reported Pavement Classification Number (PCN) should not adversely affect the pavement;

(2) for rigid and composite pavements, in which a rigid pavement layer provides a primary element of the structure, occasional movements by aircraft with ACN not exceeding 5 per cent above the reported PCN should not adversely affect the pavement;

(3) if the pavement structure is unknown, the 5 percent limitation should apply; and

(4) the annual number of overload movements should not exceed

approximately 5 per cent of the total annual aircraft movements.

12.1.4.25 HANDLING AND STORAGE OF AVIATION FUEL

(a) The aerodrome operator shall maintain requirements prescribed in subpart 2 for protecting against fire and explosions in storing, dispensing, and otherwise handling fuel on the aerodrome. These requirements shall cover facilities, procedures, and personnel training and shall address at least the following:

(1) Bonding;

(2) Public protection;

(3) Control of access to storage areas;

(4) Fire safety in fuel farm and storage areas;

(5) Fire safety in mobile fuelers, fueling pits, and fueling cabinets;

(6) Training of fueling personnel in fire safety;

(7) The fire code of the public body having jurisdiction over the aerodrome.

(b) The aerodrome operator shall require all fueling agents operating on the aerodrome to comply with, the requirements established under IS 12.1.4.25 and shall perform reasonable surveillance of all fueling activities on the aerodrome with respect to those requirements.

(c) Each aerodrome operator shall inspect the physical facilities of each aerodrome tenant fueling agent at least once every 3 consecutive months for compliance with IS 12.1.4.25 of this section and maintain a record of that inspection for at least 12 consecutive calendar months.

(d) Unless otherwise authorised by the Authority, the aerodrome operator shall require each fueling agent to take immediate corrective action whenever the aerodrome operator becomes aware of noncompliance with a requirement of IS 12.1.4.25 of this section. The certificate holder shall notify the Authority immediately when non-compliance is discovered.

(e) During aircraft refueling operations while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

(1) The use of a sufficient number of aircraft exit for expeditious evacuation; and

(2) A ready escape route from each of the exits to be used in an emergency

(f) The training required in paragraph 12.1.4.25(a)(6) of this section shall include at least the following:

(1) At least one supervisor with each fueling agent shall have completed an aviation fuel training course in fire safety that is authorized by the Authority. Such an individual shall be trained prior to initial performance of duties, or enrolled in an authorized aviation fuel training course that should be completed within 90 days of initiating duties, and receive recurrent instruction at least every 24 consecutive calendar months.

(2) All other employees who fuel aircraft, accept fuel shipments, or otherwise handle fuel shall receive at least initial on-the-job training and recurrent instruction every 24 consecutive calendar months in fire safety from the supervisor trained in accordance with 12.1.4.25(f)(1)

(3) Each aerodrome operator shall obtain a written confirmation once every 12 consecutive calendar months from each fueling agent that the training required by paragraph 12.1.4.25(a) has been accomplished. This written confirmation shall be maintained for 12 consecutive calendar months and when requested, made available to the Authority for inspection.

(4) Unless otherwise authorised by the Authority, each aerodrome operator shall require each fueling agent to take immediate corrective action whenever the aerodrome operator becomes aware of non-compliance with a requirement of this subsection. The certificate holder shall notify the Authority immediately when non-compliance is discovered.

12.1.4.26 AERODROME ENVIRONMENTAL MANAGEMENT

(a) The Aerodrome operator shall ensure the implementation of its approved Environmental Management Plan. The Plan shall include :

(1) measures of handling of all types of wastes : oil and grease spills, air, noise and water pollution;

(2) regular environmental audit by independent qualified experts to ensure the appropriateness and compliance with the environmental management plan ; and

(3) records showing compliance with extant environmental protection laws, regulations, guidelines and directives of relevant government agencies. The Aerodrome Operator shall make such records available to the Authority whenever requested.

12.1.4.27 QUALITY CONTROL PROGRAMME

(a) The aerodrome operator shall implement a quality control programme as prescribed in IS 12.1.4.27

(b) The quality control programme shall include methods for

(1) The maintenance of Aerodrome installation, equipment and terminal building facilities ;

(2) The delivery of quality service to passengers and aircraft operators; and

(3) Measurement of the quality service

(c) The aerodrome operator shall pay attention to :

(1) The maintenance of Aerodrome installation, equipment and terminal building facilities ;

(2) Departing and arriving passengers and baggage clearing time ;

(3) Provision of flight information to aerodrome users

(4) Sanitation ;

(5) Directional signs ;

(6) Lighting and ambient temperature conditions

12.1.4.28 APPROVED AERODROME TRAINING ORGANISATION (ATO)

(a) An approved Aerodrome training Organization shall perform all training pertaining to specific training (Aerodrome Operations, Maintenance and Rescue & Fire fighting etc).

(b) No training organization in Nigeria shall advertise as Aerodrome approved training organization, unless an approved training permit has been issued to that organization.

(c) The application for approval of an Aerodrome training Organization shall be submitted to the Authority at least 90 days before commencement of any proposed training.

(d) The payment of appropriate fee shall be as approved by the Authority

(e) Duration of permit shall be for a period of 24 months and continued validity shall be in accordance with the Regulations.

(f) The Authority may suspend or revoke the Aerodrome training organization permit if it is established that a permit holder has not met, or no longer meets the requirements of this Regulations

12.1.4.29 FAMILY ASSISTANCE PLAN

(a) The holder of an Aerodrome certificate shall implement a family assistance program in the event of an accident involving substantial loss of life.

(b) The holder of an Aerodrome certificate in coordination with appropriate entities shall:

(1) identify facilities at or near the airport where family members and friends shall gather (often referred to as a family and friends reception centre), where non-injured survivors may be brought and where the media may gather.

(2) assist those gathering at the airport by providing check-in counter security, and transportation to the family and friends reception centre if it is located off airport grounds.

(3) Following an accident, all aerodrome associated with the operation shall be involved in the provision of family assistance, including the airport of departure, destination airport and alternate airports.

(4) liase with the airline operators and local disaster response agencies to assist in the response.

(c) The holder of an Aerodrome certificate should incorporate the family assistance plan into the Aerodrome Emergency Plan

(d) The holder of an Aerodrome certificate shall conduct periodic review and exercise (simulation) of the Family Assistance Plan to ensure its efficacy.

12.1.5 AERODROME OPERATIONAL PERMIT

12.1.5.1 APPLICABILITY

(a) This section applies in respect of all domestic aerodromes including airstrips

Note: Details of the permission process is same as contained in the advisory circular, NCAA-AC-ARD002, on certification of aerodrome.

12.1.5.2 REQUIREMENT FOR AN AERODROME OPERATIONAL PERMIT.

(a) An aerodrome is required to be granted operational permit if it is an aerodrome other than that to which section 12.1.2 applies.

(b) Aerodromes in Nigeria used for domestic operations shall be granted a permit in accordance with these Regulations.

(c) The operator of an aerodrome designated for domestic and for private use shall be in possession of an aerodrome permit.

12.1.5.3 APPLICATION FOR AN AERODROME OPERATIONAL PERMIT

(a) An application for the issuance of an Aerodrome Operational Permit shall be made to the Authority in the form and manner prescribed by the Authority. The application shall include:

(1) For aerodromes intended for commercial or corporate operations, the Aerodrome manual prepared in accordance with the requirements of IS 12.1.3.2 and Statement of Compliance demonstrating that the aerodrome operator's Aerodrome Manual is in compliance with the relevant provisions of these Regulations;

(2) For aerodromes intended for private non commercial excluding corporate operations, the aerodrome manual should be prepared in accordance with the requirements prescribed in 12.1.5.6)

(3) the plans of the Aerodrome prepared in accordance with the requirements

of subpart 4;

(4) security clearance from the Federal Government;

(5) written approval from the town planning authority;

(6) Approval by the appropriate National Environmental Authority for Environmental impact Assessment for Aerodrome under construction and Environmental management Plan for existing Aerodrome respectively.

(7) the proof of payment of appropriate fee as prescribed by the Authority;

(8) adequate insurance cover.

(9) particulars of non-compliance with, or deviations from the standards prescribed in Part 12 Vol. I.

12.1.5.4 GRANT OF AN AERODROME OPERATIONAL PERMIT

(a) Subject to the provisions in paragraphs 12.1.5.4 (b) and (c), the Authority may approve the application and the aerodrome manual submitted under section 12.1.5.3 and grant an aerodrome operational permit to the applicant.

(b) Before granting an aerodrome operational permit the Authority will be satisfied that:

(1) the applicant and his or her staff have the necessary competence and experience to operate and maintain the aerodrome properly;

(2) the aerodrome manual prepared for the applicant's aerodrome accurately describes the facilities, services and equipment at the aerodrome;

(3) the aerodrome facilities, services and equipment mentioned in (2) conforms with the requirements specified by these Regulations;

(c) In granting permit to an aerodrome, the Authority will:

(1) enter the following information about the aerodrome in the aerodrome register.

(i) the name of the aerodrome;

(ii) the details of the location of the aerodrome;

(iii) the name and address of the operator; and

(2) inform the operator, in writing, that the aerodrome is registered; and

(3) direct AIS to publish in Aeronautical Information Publication details of the permit and the information about the aerodrome required by subsection 12.1.5.2.

12.1.5.5 REFUSAL TO GRANT AN AERODROME OPERATIONAL PERMIT

(a) If the Authority refuses to grant an Aerodrome Permit to an applicant, the Authority will give the applicant a written notice stating the reasons for the refusal, not later than 14 days after the date of refusal.

12.1.5.6 DIAGRAMS AND INFORMATION TO BE INCLUDED IN APPLICATION FOR OPERATIONAL PERMIT OF AERODROME FOR AERODROME INTENDED FOR PRIVATE NON COMMERCIAL OPERATIONS

(a) The Aerodrome Obstacle Chart and diagram of the aerodrome showing the following:

(1) the layout of runways, their designations (runway numbers) and length in metres;

(2) the layout of taxiways and aprons;

(3) the location of the aerodrome reference point;

(4) the location of all wind direction indicators;

(5) the elevation of the aerodrome at the highest point of the landing

(6) the magnetic bearing and distance to the nearest population centre, and what that centre is.

(b) The information about the aerodrome shall include:

(1) Aerodrome administration

(i) the following information about the aerodrome and its administration:

(A) the name of the aerodrome;

(B) the name of the aerodrome operator and the address and telephone numbers at which the aerodrome operator may be contacted at all times;

(C) the State or Territory in which the aerodrome is located and the latitude and longitude for the location;

(D) the name and contact details for the person or persons to be the reporting officer(s) for the aerodrome; and

(2) Runways

(i) the following information for each runway at the aerodrome:

(A) the runway reference code number for the approach and take-off areas that have been surveyed;

(B) runway width and slope;

(C) runway strip width (grade and overall)

(D) declared distances and supplementary take-off distances;

(E) pavement strength rating; and

(3) Aerodrome lighting

(i) the following information for each runway at the aerodrome that may be used at night

(A) whether the runway edge lights are low, medium or high intensity lights;

(B) whether approach lighting is provided;

(C) whether pilot-activated lighting is provided and, if pilot- activated lighting is provided, its frequency;

(D) whether VASIS lighting systems are provided;

(E) whether there is an aerodrome beacon;

(F) whether there is stand-by power or portable lighting;

(G) information about any other lighting provided; and

(4) Ground services

(i) the following information about ground services available to visiting pilots:

(A) the types of aviation fuel available and contact details for fuel suppliers;

(B) contact details for local weather information;

(C) details of the universal communication system; and

(5) Special procedures

(i) information about any special procedures that pilots need to observe or follow; and

(6) Notices

(i) the following local safety information:

(A) the presence of obstacles or other hazards (including animals or birds);

(B) restrictions on the use of taxiways or aprons;

(C) Other activities at the aerodrome (for example, sport aviation activities).

12.1.5.7 DURATION OF AN AERODROME OPERATIONAL PERMIT

An Aerodrome Operations Permit remains in force for a period of three (3) years, unless it is suspended or revoked by the Authority.

12.1.5.8 CONTINUING VALIDATION OF AERODROME PERMIT

The Authority will carry out surveillance inspection of an aerodrome to validate the Operational Permit.

12.1.5.9 RENEWAL OF AN AERODROME PERMIT.

(a) An aerodrome operator shall ensure that renewal of his or her Aerodrome Operational Permit is commenced not less than 90 days to the date of expiration of his or her Permit.

(b) The renewal of the aerodrome permit shall be effective from the expiry date of the initial Aerodrome Permit.

(c) The applicant shall submit proof of payment of the appropriate renewal fee as prescribed by the Authority.

12.1.5.10 CANCELLATION OF AERODROME PERMIT ON REQUEST

(a) If the aerodrome operator requests cancellation of the operating permit, the operator shall give the Authority not less than 30 days' written notice from the intended date of the cancellation specified in the notice.

(b) The Authority will cancel the permit on the date specified in the notice and arrange for:

(1) the cancellation to be notified in NOTAMS; and

(2) details of the permit and any other information about the aerodrome to be removed from AIP.

12.1.5.11 SUSPENSION OF AN AERODROME OPERATIONAL PERMIT

(a) The Authority will, by written notice to the holder of an aerodrome permit ; suspend an aerodrome permit if :

(1) a condition to which the permit is issued has been breached ; or

(2) the aerodrome facilities, operations or maintenance are not of the standard required in the interests of the safety of air navigation ; or

(3) the aerodrome operator's safety management system is found to be inadequate;

(4) it is in the interest of operational safety ;

(5) all other means for timely correction of the unsafe condition or ensuring safe aircraft operations have not yielded the required results ;

(6) the technical proficiency or qualifications of the aerodrome operator to perform the duties to meet the critical safety requirements in accordance with the regulations are found inadequate ;

(7) the operator resists or is unwilling to take action to correct or mitigate the condition affecting aviation safety ; or

(8) the operator willfully fails to perform an already agreed upon corrective action and suspension of the permit is the last resort to avoid unsafe operations in the aerodrome movement area ;

(b) Before suspending an Aerodrome Operational Permit, the Authority will give to the holder a "show cause notice" that :

(1) sets out the facts and circumstances that, in the opinion of the Authority, would justify the suspension ; and

(2) invite the holder to show cause, in writing within 14 days after the date of the notice, why the permit should not be suspended.

(3) The Authority will take into account any written submission that the holder

makes to the Authority within the time allowed.

12.1.5.12 REVOCATION OF AN AERODROME OPERATIONAL PERMIT

(a) The Authority will, by written notice given to the holder of an aerodrome permit, revoke an aerodrome permit if :

(1) the aerodrome operator is incapable or unwilling to carry out corrective action or has committed or repeated serious violations ;

(2) the aerodrome operator has demonstrated a lack of responsibility, such as deliberate and flagrant acts of non-compliance or falsification of records jeopardizing aviation safety ; or

(3) the aerodrome operator has made it convincingly clear that the continued operation of the aerodrome will be detrimental to the public interest ;

(b) Before revoking an Aerodrome Operational Permit, the Authority will give to the holder a “show cause notice” that:

(1) sets out the facts and circumstances that, in the opinion of the Authority, would justify the revocation;

(2) invites the holder to show cause, in writing, within 14 days after the date of the notice, why the permit should not be revoked ; and

(3) Notwithstanding the provisions of paragraph 12.1.5.12(b)(2), if the Authority finds that immediate revocation is required for the safety of air transportation, the Authority may revoke the Aerodrome Permit, without stay on the date stipulated by the Authority.

(c) The Authority will take into account any written submission that the holder makes to the Authority within the time allowed.

12.1.5.13 RESERVED

12.1.5.14 VOLUNTARY SURRENDER OF AN AERODROME OPERATIONAL PERMIT.

(a) The holder of an Aerodrome Operational Permit shall give the Authority not less than 30 days written notice of the date on which the permit is to be surrendered in order that suitable action can be taken.

(b) The Authority will cancel the permit on the date specified in the notice and arrange for:

(1) the surrender status to be notified in NOTAM; and

(2) details of the permit and any other information about the aerodrome to be removed from AIP.

12.1.5.15 ENDORSEMENT OF CONDITIONS OF AN AERODROME OPERATIONAL PERMIT

(a) The Authority, when granting the Aerodrome Operational Permit will endorse the Conditions for the type and use of the aerodrome and other details in the Aerodrome Operational Permit ;

(b) The general and specific conditions to be endorsed on the aerodrome permit are as contained in these Regulations.

12.1.5.16 AMENDMENT OF AN AERODROME OPERATIONAL PERMIT

(a) Provided that the requirements of subsection 12.1.5.2 have been met, the Authority will amend an Aerodrome Operational Permit when:

(1) there is a change in the ownership or management of the aerodrome;

(2) there is a change in the use or operation of the aerodrome ;

(3) there is a change in the boundaries of the aerodromes; or

(4) the holder of the Aerodrome Permit requests amendment.

12.1.5.17 INTERIM AERODROME OPERATIONAL PERMIT

(a) The Authority will issue an Interim Aerodrome Operational Permit to the applicant referred to in subsection 12.1.5.2 authorising the applicant to operate an Aerodrome if the Authority is satisfied that:

(1) an Aerodrome Permit in respect of the aerodrome will be issued to the applicant as soon as the application procedure for the grant or transfer of

an Aerodrome Permit has been completed; and

(2) the grant of the Interim Operational Permit is in the public interest and is not detrimental to aviation safety.

(3) the aerodrome operator has carried out a comprehensive risk assessment and provided evidence of implementation of risk control measures acceptable to the Authority.

(b) An Interim Aerodrome Operational Permit issued pursuant to paragraph 12.1.5.17(a) shall expire on ;

(1) the date on which the Aerodrome Operational Permit is issued, or

(2) the expiry date specified in the interim Aerodrome Operational Permit; whichever is earlier.

(c) These regulations apply to an Interim Aerodrome Operational Permit in the same manner as they apply to an Aerodrome Operational Permit.

12.1.5.18 STANDARDS METHODS AND PROCEDURES FOR COMPLIANCE

(a) The requirements applicable to aerodromes with operational permit for public use, and aerodrome intended for aerial works, corporate and business aviation operations shall be the requirements set out in subpart 2 volume I .

(b) The requirements applicable to aerodromes with operational permit for purposes other than that prescribed in Paragraph 12.1.5.18 (a) , shall include the following requirements set out in subpart 2 volume I in relation to the following matters:

(1) physical characteristics of the movement area;
(2) obstacle limitation surfaces;
(3) aerodrome markings;
(4) lighting;
(5) wind direction indicators;
(6) visual aids denoting restricted use areas; and

(c) Methods and procedures for compliance with the process for the issuance of operational permit that are acceptable to the Authority are contained in Advisory circular on Certification of Aerodrome (NCAA-AC-ARD 002) issued by the Authority.

12.1.5.19 REPORTING OFFICER

(a) The operator of an aerodrome with operational permit shall appoint one (1) or more reporting officers for the aerodrome.

(b) The functions of a reporting officer are:

(1) to monitor the serviceability of the aerodrome in accordance with subpart 2; and

(2) to report to the NOTAM Office and air traffic control any changes in conditions, or any other occurrences, at the aerodrome that shall be reported under paragraph 12.1.5.19(b)(1).

(c) The operator shall not appoint a person as a reporting officer if the person has not been trained, in accordance with subpart 2, to perform the reporting officer's functions.

12.1.5.20 NOTICE OF CHANGES IN PHYSICAL CONDITION OF AERODROME

(a) The operator of a permitted aerodrome shall as soon as practicable, give notice to the NOTAM Office of:

(1) any temporary or permanent change in the physical condition of the aerodrome that may affect the safety of aircraft; or

(2) any other occurrence relating to the operation or maintenance of the aerodrome that may affect the safety of aircraft.

(3) If the aerodrome is a controlled aerodrome, the notice shall also be given to air traffic control.

12.1.5.21 NOTICE OF CHANGES IN INFORMATION PUBLISHED IN AIP

(a) To maintain the accuracy of the information published in AIP in relation to a permitted aerodrome, the operator of the aerodrome shall inform AIS, in writing, as soon as practicable of any change required to that information (other than a change that is published in NOTAMs).

12.1.5.22 REGISTER OF AERODROME OPERATIONAL PERMIT

(a) The Authority will establish and keep, in the approved form, a register of aerodromes issued with operational permit under this subpart.

(b) The particulars referred to in paragraph 12.1.5.4.(c)(1) will be recorded in the register within seven (7) working days from the date on which the certificate was issued by the Authority.

(c) The register will be kept at a designated place within the Authority.

(d) A copy of the register will be furnished by the Authority, on payment of the appropriate fee as prescribed, to any person who requests the copy.

(e) The Authority will amend the information recorded in the aerodrome register if that information is not up to date.

(f) The Authority will correct the information in the aerodrome register if there is an error in that information.

12.1.5.23 KEY MANAGEMENT PERSONNEL REQUIRED FOR AERODROME OPERATIONS AND MAINTENANCE FOR AN AERODROME WITH OPERATIONAL PERMIT.

(a) The holder of an Aerodrome operational permit shall appoint an Airport manager and ensure availability of sufficient financial and necessary resources to effectively and efficiently manage the operations and maintenance of the Airports to meet the Authority's regulatory standards.

(b) The Airport manager shall:

(1) ensure that all necessary resources are available to operations and maintenance of the aerodromes in accordance with this regulation;

(2) establish and promote the safety;

(3) demonstrate a basic understanding of these regulations.

(c) The Airport manager shall represent the management structure of the Aerodrome, and be responsible for all functions specified in this part.

(d) The Airport manager shall demonstrate relevant knowledge, background and satisfactory experience related to aerodrome operations and maintenance and demonstrate a working knowledge of this Part.

(e) The holder of an Aerodrome Operational Permit shall provide an alternate Airport Manager who shall deputize for the Airport manager in his / her absence.

(f) The holder of an Aerodrome Operational Permit shall have qualified personnel, with proven competency in Civil aviation, available and serving full-time in the following positions or their equivalent:

(1) Airport Manager
(2) Operations Manager
(3) Safety Manager
(4) Maintenance Manager
(5) Aerodrome Rescue and Fire Chief

Note: "Competency in Civil aviation" means that an individual shall have a technical qualification and management experience acceptable to the Authority for the position served.

(g) Approval of persons to occupy the positions specified in 12.1.2.23(f)(1-5) should be made by the Aerodrome Operator using the requirement established in this part and other approved guidance.

(h) The individuals who serve in the positions required or approved under this section and anyone in a position to exercise control over operations conducted under the Aerodrome Operational Permit must—

(1) Be qualified through training, experience, and expertise;

(2) Discharge their duties to meet applicable legal requirements and to maintain safe operations; and

(3) To the extent of their responsibilities, have a full understanding of the following materials with respect of the Aerodrome Operational Permit holder's operation:

(i) Aviation safety standards and safe operating practices;

(ii) These Regulations;

(iii) The Aerodrome Certificate holder's certificate schedule;

(iv) All appropriate operations and maintenance requirements of this Part;

(v) The manuals requirements of this Part.

(i) The Aerodrome Operational Permit holder must notify the Authority within 7 days of any change in personnel or any vacancy in any position listed in paragraph 12.1.2.23(f)

(j) The Aerodrome Operational Permit holder shall make arrangements to ensure continuity of supervision if operations are conducted in the absence of any required management personnel.

(k) The minimum initial qualifications for Airport Manager are—

(1) A degree or appropriate qualifications in Civil aviation field, with training in airport management field.

(2) A minimum of 10 years working experience in a medium sized public use airport, which include at least 5 years' experience in airport administration

(l) The minimum initial qualifications for Operations Manager are—

(1) A degree or appropriate qualification in Civil aviation field with training in airport operations

(2) A minimum of 8 years working experience in a public use airport which includes

(i) at least 3 years experience in airport operations

(ii) At least 3 years supervisory level

(m) The minimum initial qualifications for Safety Manager are—

(1) A university degree in aviation systems safety, engineering or physical science

(2) A minimum of 8 years working experience in a public use airport which includes

(i) at least 3 years experience in application of safety management concepts and tools

(ii) at least 3 years supervisory experience

(n) The minimum initial qualifications for Aerodrome Rescue and Fire Chief are—

(1) A minimum of 8 years working experience, in an airport rescue and firefighting department which includes

(i) At least 3 years supervisory experience and considerable first-hand practical experience

(o) The minimum initial qualifications for Maintenance Manager are—

(1) A university degree in either civil engineering, mechanical engineering, electrical engineering or equivalent qualification

(2) A minimum of 8 years working experience in an airfield lighting or Civil/building departments of a public use airport which includes:

(i) at least 3 years supervisory experience

12.1.6 JOINT USE CIVIL AND MILITARY AERODROMES

12.1.6.1 APPLICABILITY

(a) This Subsection applies to military aerodromes, a portion which is either jointly used for civil-military aircraft operations or is exclusively used for civil aircraft operations;

(b) This Subsection does not apply to the conduct of international civil aircraft operations in a military aerodrome under a Joint or Share Use Arrangement.

12.1.6.2 REQUIREMENT FOR AUTHORISATION

(a) No military aerodrome may be used for civil aircraft operations under a joint use arrangement without prior authorization by the Authority.

(b) The Authority will issue an authorization to an applicant who qualifies for it under the provisions of this Subpart.

12.1.6.3 APPLICATION FOR AUTHORISATION

(a) An application for the issuance of an authorization to operate a joint use or a portion of a military aerodrome exclusively for domestic civil aircraft operations shall be made by the responsible Military Authority in the form and manner prescribed by the Authority.

(b) The application referred to in paragraph a) above shall include:

(1) the Aerodrome Manual and statement of compliance demonstrating that the Manual is in compliance with the relevant provisions of this subpart ;

(2) justification by the responsible Military Authority as to how the use of the aerodrome for civil operations will be in the public interest including any comparative advantage its use offers over operations to the nearest civil aerodrome;

(3) a written statement by the responsible Military Authority indicating that the intended operation will not compromise national security, readiness, and effectiveness of military operations;

(4) A written statement by the intending civil operator accepting that Military use of facilities will take precedence over all civil aircraft operations, whether they were previously authorized or not.

(5) the detailed plans covering the civil and joint use portion of the aerodrome prepared in accordance with the requirements in subpart 4 including obstacle chart Type A;

(6) proof of payment of the appropriate fee as prescribed by the Authority;

(7) Environmental Management Plan approved from the appropriate national Environmental Authority.

(8) Where major aerodrome related development has been proposed on the civil portion of the aerodrome prior to commencement of operation, environmental impact assessment approval, The appropriate National Environmental Authority.

(9) Joint Use Agreement between the responsible Military Authority and the Civilian entity (sponsor) detailing the various roles and responsibilities in the operation of the civil portion, particularly with regards to areas where coordination between both parties will be required

(10) particulars of non-compliance with or deviation from the requirements prescribed in this section.

REQUIRED CONDITIONS FOR AUTHORIZATION TO OPERATE JOINT USE MILITARY AERODROME

12.1.6.4 ACCESS TO MOVEMENT AREA BY AUTHORISED INSPECTORS

(a) Personnel so authorised by the Authority will inspect and carry out tests on the joint use aerodrome facilities, services and equipment, inspect the related documents and records and verify the safety management system before the Authorization is granted or renewed and, subsequently, at any other time, for the purpose of ensuring safety at the joint use or civil portion of the aerodrome.

(b) The Authority will carry out inspections and audits on the facilities, services and equipment at the joint use and civil portion of the aerodrome in order to meet its continuing surveillance obligation and ensure safety of civil operations.

(c) An operator shall, at the request of the person referred to in paragraph (a) allow access to any part of the joint use and civil portion of the aerodrome or any facility thereof, including equipment, records, documents and operational personnel, for the purpose referred to in paragraph a) and b) above.

(d) The operator of the joint use and civil portion shall cooperate in conducting the activities referred to in paragraph a) and b).

12.1.6.5 PERSONNEL AND TRAINING REQUIREMENT

(a) PERSONNEL REQUIREMENT

(1) The operator of a joint use military aerodrome shall have a person responsible for the allocation of resources and overall management of the joint use military aerodrome.

(2) The operator of a joint use military aerodrome shall employ an adequate number of qualified and skilled personnel to perform aerodrome operations and maintenance activities with proven competency in civil aviation, available and serving in the following capacities:

(i) person responsible for overseeing the day-to-day operations at the civil portion

(ii) person overseeing and managing RFF services

(iii) person overseeing and managing the maintenance of infrastructure and airfield lighting facilities

(iv) person overseeing and coordinating safety risk management activities

(3) The operator shall furnish details regarding the qualification and experience of these persons, prior to initial appointment.

(b) TRAINING PROGRAMME

(1) The operator of a joint use military aerodrome shall establish and implement a training programme for the following personnel:

(i) Aerodrome Rescue and Fire Fighting Personnel

(ii) Wildlife Hazard Management Personnel

(iii) Aerodrome Vehicle operators

(iv) Aerodrome Operations Personnel

(v) Aerodrome Maintenance Personnel (Infrastructure)

(vi) Aerodrome Maintenance Personnel (Airfield Lighting)

(2) The training programme shall comprise initial and recurrent training. Recurrent training shall be undertaken at least once every three (3) years.

(3) The subject areas for initial training shall be in accordance with subsection 12.1.4.2 and other relevant requirement prescribed in these regulations.

(4) The records of initial and recurrent training shall be retained for a period at least of three years from the date of completion

12.1.6.6 OPERATING REQUIREMENTS

(a) The operator of a joint use military aerodrome shall establish procedures in respect of the following to meet the requirements of subpart 2:

(1) Aerodrome Rescue and Fire Fighting ;

(2) Wildlife hazard management ;

(3) Aerodrome inspection programme ;

(4) Aerodrome maintenance programme ;

(5) Aerodrome condition reporting ;

(6) Aerodrome Emergency planning ;

(7) Obstacle control;

(8) Surface movement guidance and control system;

(9) Apron management;

(10) Disable aircraft removal;

(11) Aerodrome works safety;

(b) The operator of a joint use military aerodrome shall establish procedures in respect of the Aerodrome vehicle operations in accordance with Advisory Circular on Ground vehicle operations (NCAA-AC-ARD-009) and Aerodrome safety management in accordance with Part 20

12.1.6.7 MANUAL REQUIREMENTS

(a) The Aerodrome Manual shall serve as a legal reference between the operator and the Authority, with respect to the standards, conditions and levels of service to be maintained for the issuance of authorization;

(1) PREPARATION AND MAINTENANCE OF THE AERODROME MANUAL

(i) The Aerodrome Manual shall be prepared and maintained in accordance with requirements prescribed in subsections 12.1.3.1, 12.1.3.4,12.1.3.5, and 12.1.3.6 of this Regulation

(2) CONTENT OF THE AERODROME MANUAL

(i) The Aerodrome Manual shall have particulars as provided in the schedules of these regulations, under the following parts. These parts shall be preceded by a table of contents; a list of the corrigenda/amendments and a distribution list;

(ii) The information required under this part shall be to the extent applicable and relevant, taking into account the nature and scope of operations at the aerodrome.

(A) Part 1. General information set out in (a) of IS 12.1.3.2

(B) Part 2. Particulars of the aerodrome site as set out in (b) of IS 12.1.3.2.

(C) Part 3. Particulars of the aerodrome required to be reported to the aeronautical information service as set out in (c) of IS 12.1.3.2.

(D) Part 4. The aerodrome operating procedures and safety measures as set out in (d) of IS 12.1.3.2.

(E) Part 5. Details of the aerodrome administration and the safety management system as set out in (e) of IS 12.1.3.2

12.1.6.8 AGREEMENT REQUIREMENT

(a) A Joint Use Agreement shall be contracted between the responsible Military Authority and the civilian sponsor to govern the conduct of civil aircraft operations at a joint use military aerodrome.

(a) The Agreement shall detail the various roles and responsibilities in the operation of the civil portion of the aerodrome including the following:

(1) identify the focal point for civil and military counterpart and key management personnel;

(2) the scheduling of aircraft taking into account military aircraft activities;

(3) arrangement for passenger and baggage processing and boarding;

(4) maintenance of pavement and safety areas, visual aids and airfield lighting system;

(5) arrangement for the provision of aviation security;

(6) arrangement for the provision of ARFF and training of personnel;

(7) provision of air traffic services and supporting navigation aids;

(8) relevant liability and indemnification clauses particularly as they relate to risks that may be associated with the operation and use of aerodrome facilities equipment and services;

(9) planning and construction of new structure and alterations to existing structures; and

(10) procedures for resolutions of safety and security concerns.

12.1.6.9 CIVIL AIRCRAFT LANDING PERMIT

(a) No civil airline may operate flights into a military aerodrome or a joint-use aerodrome without carrying a valid landing permit issued by the Authority in collaboration with the responsible Military Authority for operations at the aerodrome,

(b) The Authority will issue a landing permit to a civil airline operator who qualifies for it under the provisions of this Subpart,

(c) Use of the aerodrome is limited to the listed aircraft, period indicated, purpose stated, and conditions given in the permit, and is not transferable,

(d) An approved copy of this permit must be aboard each aircraft using the military aerodrome.

12.1.6.10 APPLICATION FOR PERMIT

(a) An application for the issuance of a landing permit shall be made to the Authority in the form and manner prescribed by the Authority. The application shall include:

(1) Evidence of a valid airline operating Certificate;

(2) Justification as to why the operation to and from the airport is necessary;

(3) Valid certificate of airworthiness for aircraft to be operated at the aerodrome;

(4) A copy of the hold harmless agreement signed between the airline and the military authorities; and

(5) A copy of the civil aircraft certificate of insurance

SUBPART 2
AERODROME DESIGN AND OPERATIONS

12.2.1 GENERAL

12.2.1.1 APPLICABILITY

(a) The interpretation of some of the specifications in this regulation expressly requires the exercising of discretion, the taking of a decision or the performance of a function by the appropriate authority. In other specifications, the expression appropriate authority does not actually appear although its inclusion is implied. In both cases, the responsibility for whatever determination or action is necessary shall rest with the Authority.

(b) The specifications unless otherwise indicated in a particular context, shall apply to all aerodromes certified in accordance with Nigeria Civil Aviation Authority Part 12 Vol. I regulations and to the extent determined by the Authority to other aerodromes required to be certified in accordance with Nig.CARs Part 12 **Vol. I Subpart 1.** The specifications of section 12.2.3 of this regulation shall apply only to land aerodromes.

(c) Wherever a colour is referred to in this Document, the specifications for that colour given in IS 12.2.1.2 shall apply.

12.2.1.2 COMMON REFERENCE SYSTEMS

(a) Horizontal reference system–

World Geodetic System 1984 (WGS-84) shall be used as the horizontal (geodetic) reference system. Reported aeronautical geographical coordinates (indicating latitude and longitude) shall be expressed in terms of the WGS-84 geodetic reference datum.

Note. — Comprehensive guidance material concerning WGS-84 is contained in the World Geodetic System — 1984 (WGS-84) Manual (Doc 9674).

(b) Vertical reference system–

Mean sea level (MSL) datum, which gives the relationship of gravity-related height (elevation) to a surface known as the geoid, shall be used as the vertical reference system.

Note 1. — The geoid globally most closely approximates MSL. It is defined as the equipotential surface in the gravity field of the Earth which coincides with the undisturbed MSL extended continuously through the continents.

Note 2. — Gravity-related heights (elevations) are also referred to as orthometric heights while distances of points above the ellipsoid are referred to as ellipsoidal heights.

(c) Temporal reference system–

(1) The Gregorian calendar and Coordinated Universal Time (UTC) shall be used as the temporal reference system.

(2) When a different temporal reference system is used, this shall be indicated in GEN 2.1.2 of the Nigeria Aeronautical Information Publication (AIP).

Note: See PANS AIM (Doc 10066) Appendix 2

12.2.1.3 CERTIFICATION OF AERODROMES

See **Subpart 1** of the Nigeria Civil Aviation Regulations (Nig.CARs) Part 12 Vol.I.

12.2.1.4 AIRPORT DESIGN AND MASTER PLAN

Introductory Note. — A master plan for the long-term development of an aerodrome conveys the ultimate development in a phased manner and reports the data and logic upon which the plan is based. Master plans are prepared to support modernization of existing aerodromes and creation of new aerodromes, regardless of size, complexity or role. It is important to note that a master plan does not constitute a confirmed implementation programme. It provides information on the types of improvements to be undertaken in a phased manner. Guidance on all aspects of the planning of aerodromes is contained in the Airport Planning Manual *(Doc 9184), Part 1.*

(a) A master plan containing detailed plans for the development of aerodrome infrastructure shall be established for aerodromes deemed relevant by the Authority.

Note 1. — A master plan represents the development plan of a specific aerodrome. It is developed by the aerodrome operator based on economic feasibility, traffic forecasts, and current and future requirements provided by, among others, aircraft operators (see c).

Note 2. — A master plan may be required when the lack of capacity at an airport, due to conditions such as, but not limited to expected traffic growth, changing weather and climatic conditions or major works to address safety or environmental concerns, would put the connectivity of a geographical area at risk or cause severe disruption to the air transport network.

(b) The master plan shall:

(1) contain a schedule of priorities including a phased implementation plan; and

(2) be reviewed periodically to take into account current and future aerodrome traffic.

(c) Aerodrome stakeholders, particularly aircraft operators, shall be consulted in order to facilitate the master planning process using a consultative and collaborative approach.

Note 1. — Provision of advanced planning data to facilitate the planning process includes future aircraft types, characteristics and numbers of aircraft expected to be used, anticipated growth of aircraft movements, and number of passengers and amount of cargo projected to be handled.

Note 2. — See Annex 9, Chapter 6 on the need for aircraft operators to inform aerodrome operators concerning the former’s service, schedule and fleet plans to enable rational planning of facilities and services in relation to the traffic anticipated.

Note 3. — See ICAO's Policies on Charges for Airports and Air Navigation Services (Doc 9082), Section 1, regarding consultation with users concerning provision of advance planning data and protection of commercially sensitive data.

(d) Architectural and infrastructure-related requirements for the optimum implementation of international civil aviation security measures shall be integrated into the design and construction of new facilities and alterations to existing facilities at an aerodrome.

(e) The design of aerodromes shall take into account, where appropriate, land-use and environmental control measures.

Note. — Guidance on land-use planning and environmental control measures is contained in the Airport Planning Manual, (Doc 9184) Part 2.

12.2.1.5 AERODROME REFERENCE CODE

Note. — The intent of the reference code is to provide a simple method for interrelating the numerous specifications concerning the characteristics of aerodromes so as to provide a series of aerodrome facilities that are suitable for the aeroplanes that are intended to operate at the aerodrome. The code is not intended to be used for determining runway length or pavement strength requirements. The code is composed of two elements which are related to the aeroplane performance characteristics and dimensions. Element 1 is a number based on the aeroplane reference field length and element 2 is a letter based on the aeroplane wing span. The code letter or number within an element selected for design proposes is related to the critical aeroplane characteristics for which the facility is provided. When applying this Manual, first identify the aeroplanes which the aerodrome is intended to serve and then determine the two elements of the code.

(a) An aerodrome reference code (code number and letter) which is selected for aerodrome planning purposes shall be determined in accordance with the characteristics of the aeroplane for which an aerodrome facility is intended.

(b) The aerodrome reference code numbers and letters shall have the meanings assigned to them in Table1-1.

(c) The code number for element 1 shall be determined from Table 1-1, column 1, selecting the code number corresponding to the highest value of the aeroplane reference field lengths of the aeroplanes for which the runway is intended.

Note1. — The determination of the aeroplane reference field length is solely for the selection of a code number and is not intended to influence the actual runway length provided.

Note 2. — Guidance on determining the runway length is given in the ICAO Aerodrome Design Manual, *(Doc 9157), Part 1* — Runways.

(d) The code letter for element 2 shall be determined from Table 1-1, by selecting the code letter which corresponds to the greatest wing span, of the aeroplanes for which the facility is intended.

Note. — Guidance on determining the aerodrome reference code is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 1 and 2.

Table 1-1. Aerodrome reference code
(see 12.2.1.6(b) to 12.2.1.6(d))

Code element 1	
Code number	Aeroplane reference field length
1	Less than 800 m
2	800 m up to but not including 1 200 m
3	1 200 m up to but not including 1 800 m
4	1 800 m and over
Code element 2	
Code letter	Wingspan
A	Up to but not including 15 m
B	15 m up to but not including 24 m
C	24 m up to but not including 36 m
D	36 m up to but not including 52 m
E	52 m up to but not including 65 m
F	65 m up to but not including 80 m

Note 1. — Guidance on planning for aeroplanes with wingspans greater than 80 m is given in the Aerodrome Design Manual (Doc 9157), Parts 1 and 2.

Note 2. — Procedures on conducting an aerodrome compatibility study to accommodate aeroplanes with folding wing tips spanning two code letters are given in the PANS-Aerodromes NCAA-AC-ARD 036. Futher guidance can be found in manufacturer's manual on aircraft characteristics for airport planning.

12.2.1.6 SPECIFIC PROCEDURES FOR AERODROMES OPERATIONS

Introductory Note. — This section introduces the manual on aerodrome certification issued by the Authority for use by an aerodrome undertaking an assessment of its compatibility with the type of traffic or operation it is intending to accommodate. The material in the manual on aerodrome certification addresses operational issues faced by existing aerodromes and provides the necessary procedures to ensure the continued safety of operations. Where alternative measures, operational procedures and operating restrictions have been developed, these are detailed in the aerodrome manual and reviewed periodically to assess their continued validity. The manual on aerodrome certification does not substitute nor circumvent the provisions contained in this Regulation. It is expected that infrastructure on an existing aerodrome or a new aerodrome will fully comply with the requirements in this Regulation. See ICAO Annex 15, 5.2.2(c)on a State's responsibilities for the listing of its differences to the related ICAO Procedures in its Aeronautical Information Publication.

(a) When the aerodrome accommodates an aeroplane that exceeds the certificated characteristics of the aerodrome, the compatibility between the operation of the aeroplane and aerodrome infrastructure and operations shall be assessed and appropriate measures developed and implemented in order to maintain an acceptable level of safety during operations.

Note. — Procedures to assess the compatibility of the operation of a new aeroplane with an existing aerodrome can be found in the manual on aerodrome certification.

(b) Information concerning alternative measures, operational procedures and operating restrictions implemented at an aerodrome arising from 12.2.1.7(a) shall be promulgated.

Note 1. — See PANS-AIM (Doc 10066), Appendix 2, AD 2.20, on the provision of a detailed description of local traffic regulations.

Note 2. — See PANS-Aerodromes NCAA-AC-ARD 036, section 3, section 3.6, on promulgation of safety information.

12.2.2 AERODROME DATA

Note. — This section contains specifications relating to the provision of data about aerodromes to be determined and recorded in the Aerodrome Operation Manual and where specified, reported to the regional Aeronautical Information Service.

12.2.2.1 AERONAUTICAL DATA

(a) Determination and reporting of aerodrome related aeronautical data shall be in accordance with the accuracy and integrity classification required to meet the needs of the end-users of aeronautical data.

Note. — Specifications concerning the accuracy and integrity classification related to aerodrome-related aeronautical data are contained in PANS-AIM (Doc 10066), Appendix 1.

(b) Aerodrome mapping data shall be made available to the aeronautical information services for aerodromes deemed relevant by the Authority where safety and/or performance-based operations suggest possible benefits.

Note. — Aerodrome mapping databases related provisions are contained in Nig.CARs Part 14.4, Section 5, and PANS-AIM (Doc 10066), Section5.

(c) Where made available in accordance with 12.2.2.1(b), the selection of the aerodrome mapping data features to be collected shall be made with consideration of the intended applications.

Note 1— It is intended that the selection of the features to be collected match a defined operational need.

Note 2. — Aerodrome mapping databases can be provided at one of two levels of quality — fine or medium. These levels and the corresponding numerical requirements are defined in RTCA Document DO-272B and European Organization for Civil Aviation Equipment (EUROCAE) Document ED-99C — User Requirements for Aerodrome Mapping Information.

(d) Digital data error detection techniques shall be used during the transmission and/or storage of aeronautical data and digital datasets.

Note. — Detailed specifications concerning digital data error detection techniques are contained in PANS-AIM (Doc 10066)

12.2.2.2 AERODROME REFERENCE POINT

(a) An aerodrome reference point shall be established for an aerodrome.

(b) The aerodrome reference point shall be located near the initial or planned geometric centre of the aerodrome and shall normally remain where first established.

(c) The position of the aerodrome reference point shall be measured and reported to the Aeronautical Information Services in degrees, minutes and seconds.

12.2.2.3 AERODROME AND RUNWAY ELEVATIONS

(a) The aerodrome elevation and geoid undulation at the aerodrome elevation points shall be measured to the accuracy of one-half metre and reported to the Aeronautical Information Services.

(b) For an aerodrome used by International Civil Aviation for non-precision approaches, the elevation and geoid undulation of each threshold, the elevation of the runway end and any significant high and low intermediate points along the runway shall be measured to the accuracy of one-half metre and reported to the Aeronautical Information Services.

(c) For precision approach runway, the elevation and geoid undulation of the threshold, the elevation of the runway end and the highest elevation of the touchdown zone shall be measured to the accuracy of one- quarter metre and reported to the Aeronautical Information Services.

Note – Geoid undulation must be measured in accordance with the appropriate system of coordinates.

12.2.2.4 AERODROME REFERENCE TEMPERATURE

(a) An aerodrome reference temperature shall be determined for an aerodrome in degrees Celsius.

(b) The aerodrome reference temperature shall be the monthly mean of the daily maximum temperatures for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature). This temperature shall be averaged over a period of years.

12.2.2.5 AERODROME DIMENSIONS AND RELATED INFORMATION

(a) The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome:

(1) runway – true bearing to one-hundredth of a degree, designation number, length, width, displaced threshold location to the nearest metre, slope, surface type, type of runway and, for a precision approach runway category I, the existence of an obstacle free zone when provided;

(2) strip runway end safety area, length, width to the nearest stop way metre or foot surface type; and arresting system— location (which runway end) and description;

(3) taxiway – designation, width, surface type;

(4) apron – surface type, aircraft stands;

(5) the boundaries of the air traffic control service;

(6) clearway – length to the nearest metre, ground profile;

(7) visual aids for approach procedures, marking and lighting of runways, taxiways and aprons, other visual guidance and control aids on taxiways and aprons, including taxi-holding positions and stop bars, and location and type of visual docking guidance systems;

(8) location and radio frequency of any VOR aerodrome check-point;

(9) location and designation of standard taxi-routes; and

(10) distances to the nearest metre of localizer and glide path elements comprising an instrument landing system (ILS) or azimuth and elevation antenna of microwave landing system (MLS) in relation to the associated runway extremities.

(b) The geographical coordinates of each threshold shall be measured and reported to the AIS in degrees, minutes, seconds and hundredths of seconds.

(c) The geographical coordinates of appropriate taxiway centre line points shall be measured and reported to the AIS in degrees, minutes, seconds and hundredths of seconds.

(d) The geographical coordinates of each aircraft stand shall be measured reported to the AIS in degrees, minutes, seconds and hundredths of seconds.

(e) The geographical coordinates of obstacles in Area 2 (the part within the aerodrome boundary) and in Area 3 shall be measured and reported to the aeronautical information services in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles shall be reported to the aeronautical information services.

Note — PANS-AIM (Doc 10066) Appendix 8 provides requirements for obstacle data determination in Areas 2 and 3.

12.2.2.6 STRENGTH OF PAVEMENTS (APPLICABLE UNTIL 27 NOVEMBER 2024)

(a) The bearing strength of a pavement shall be determined.

(b) The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5700 kg shall be made available using the aircraft classification number – pavement classification number(ACN/PCN) method by reporting all of the following information:

(1) the pavement classification number (PCN);

(2) pavement type for determination;

(3) sub-grade strength category;

(4) maximum allowable tyre pressure category or maximum allowable tyre pressure value; and

(5) evaluation method.

Note – If necessary, PCNs may be published to an accuracy of one-tenth of a whole number.

(c) The pavement classification number (PCN) reported shall indicate that an aircraft with an aircraft classification number(ACN) equal to or less than the reported PCN can operate on the pavement subject to any limitation on the tyre pressure, or aircraft all-up mass for specified aircraft type(s).

Note – Different PCNs may be reported if the strength of the pavement is subject to significant seasonal variation.

(d) The ACN of an aircraft shall be determined in accordance with the standard procedures associated with the ACN-PCN method.

Note – The standard procedures for determining the ACN of an aircraft are given in the ICAO Aerodrome Design Manual (DOC 9157), Part 3. For convenience several aircraft types currently in use have been evaluated on rigid and flexible pavements founded on the four sub-grade categories in paragraph (f)(2) below and the results tabulated in that manual.

(e) For the purposes of determining the ACN, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction.

(f) Information on pavement type for ACN-PCN determination, sub grade strength category, maximum allowable tyre pressure category and evaluation method shall be reported using the following codes:

(1) Pavement type for ACN-PCN determination:

	Code
Rigid pavement	R
Flexible pavement	F

Note – If the actual construction is composite or non-standard, include a note to that effect (See example 2 below).

(2) Sub grade strength category:

	Code
High strength: characterised by K = 150MN/m³and representing all K values above 120 MN/m³ for rigid pavements, and by CBR = 15 and representing all CBR values above 13 for flexible pavements.	A
Medium strength: characterised by K = 80MN/m³ and representing a range in K of 60 to 120 MN/m³ for rigid pavements, and by CBR = 10 and representing a range in CBR of 8 to 13 for flexible pavements.	B
Low strength: characterised by K = 40MN/m³ and representing a range in K of 25 to 60 MN/m³ for rigid pavements, and by CBR = 6 and representing a range in CBR of 4 to 8 for flexible pavements.	C
Ultra low strength: characterised by K = 20MN/m³ and representing all K values below 25 MN/m³ for rigid pavements, and by CBR = 3 and representing all	D

CBR values below 4 for flexible pavements.

(3) Maximum allowable tyre pressure category

	Code
Unlimited: no pressure limit	W
High: pressure limited to 1.50MPa	X
Medium: pressure limited to 1.00MPa	Y
low: pressure limited to 0.50MPa	Z

Note. — See Note 5 to 12.2.10.2(a). *where the pavement is used by aircraft with tire pressures in the upper categories.*

(4) Evaluation method:

	Code
Technical evaluation: representing a specific study of the pavement characteristics and application of pavement behaviour technology.	T
Using aircraft experience: representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

Note – The following examples illustrate how pavement strength data are reported under the ACN-PCN method

Example 1 – If the bearing strength of a rigid pavement, resting on a medium strength sub grade, has been assessed by technical evaluation to be PCN 80 and there is no tyre pressure limitation, then the reported information would be:

PCN 80/ R / B / W / T

Example 2 – If the bearing strength of a composite pavement, behaving like a flexible pavement and resting on a high strength sub grade, has been assessed using aircraft experience to be PCN50 and the maximum tyre pressure allowable is 1.00 MPa, then the reported information would be:

PCN50/ F / A / Y / U

Note. —Composite construction.

Example 3 – If the bearing strength of a flexible pavement, resting on a medium strength sub grade, has been assessed by technical evaluation to be PCN 40 and the maximum allowable tyre pressure is 0.80 MPa, then the reported information would be:

PCN 40 / F / B / 0.80 MPa / T

Example 4 – If a pavement is subject to a B747-400 all-up mass limitation of 390 000 kg, then the reported information would include the following note.

Note – The reported PCN is subject to a B747-400 all-up mass limitation of 390 000 kg.

(g) Criteria shall be established to regulate the use of a pavement by an aircraft with an ACN higher than the PCN reported for that pavement in accordance with sections 12.2.2.6(b) and 12.2.2.6(c).

Note – Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation (NCAA-AC-ARD036), Section 19 details a simple method for regulating overload operations while the ICAO Aerodrome Design Manual (Doc 9157), Part 3 includes the descriptions of more detailed procedures for evaluation of pavements and their suitability for restricted overload operations.

(h) The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5700 kg shall be made available by reporting the following information:

(1) maximum allowable aircraft mass; and

(2) maximum allowable tyre pressure.

Example: 4 000 kg/0.50MPa.

12.2.2.6 STRENGTH OF PAVEMENTS (APPLICABLE AS OF 28 NOVEMBER 2024)

(a) The bearing strength of a pavement shall be determined.

(b) The bearing strength of a pavement intended for aircraft of apron (ramp) mass greater than 5700 kg shall be made available using the aircraft classification number – pavement classification rating (ACR/PCR) method by reporting all of the following information:

(1) the pavement classification rating (PCR) and numerical value;

(2) pavement type for ACR-PCR determination;

(3) sub-grade strength category;

(4) maximum allowable tyre pressure category or maximum allowable tyre pressure value; and

(5) evaluation method.

Note – Guidance on reporting and publishing of PCRs is contained in the Aerodrome Design Manual (Doc 9157, Part 3).

(c) The PCR reported shall indicate that an aircraft with an aircraft classification rating (ACR) equal to or less than the reported PCR can operate on the pavement subject to any limitation on the tyre pressure, or aircraft all-up mass for specified aircraft type(s).

Note – Different PCRs may be reported if the strength of the pavement is subject to significant seasonal variation.

(d) The ACR of an aircraft shall be determined in accordance with the standard procedures associated with the ACR-PCR method.

Note – The standard procedures for determining the ACR of an aircraft are given in the Aerodrome Design Manual (DOC 9157), Part 3. For convenience, dedicated software is available on the ICAO website for computing any aircraft ACR at any mass on rigid and flexible pavements for the four standard subgrade strength categories detailed in (f) below.

(e) For the purposes of determining the ACR, the behaviour of a pavement shall be classified as equivalent to a rigid or flexible construction.

(f) Information on pavement type for ACR-PCR determination, sub grade strength category, maximum allowable tyre pressure category and evaluation method shall be reported using the following codes:

(1) Pavement type for ACR-PCR determination:

	Code
Rigid pavement	R
Flexible pavement	F

Note – If the actual construction is composite or non-standard, include a note to that effect (See example 2 below).

(2) Sub grade strength category:

	Code
High strength: characterised by E = 200 Mpa and representing all E values equal to or above 150Mpa, for rigid and flexible pavements.	A
Medium strength: characterised by E = 120Mpa and representing a range in E values equal to or above 100 Mpa and strictly less than 150Mpa, for rigid and flexible pavements	B
Low strength: characterised by E = 80 Mpa and representing a range in E values equal to or above 60Mpa and strictly less than 100 Mpa, for rigid and flexible pavements	C
Ultra low strength: characterised by E = 50Mpa and representing all E values strictly less than 60Mpa, for rigid and flexible pavements.	D

(3) Maximum allowable tyre pressure category

	Code
Unlimited: no pressure limit	W
High: pressure limited to 1.75MPa	X
Medium: pressure limited to 1.25MPa	Y
low: pressure limited to 0.50MPa	Z

Note. — See Note 5 to 12.2.10.2(a). where the pavement is used by aircraft with tire pressures in the upper categories.

(4) Evaluation method:

	Code
Technical evaluation: representing a specific study of the pavement characteristics and application of pavement behaviour technology.	T
Using aircraft experience: representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

Note – The following examples illustrate how pavement strength data are reported under the ACR-PCR method.
Further guidance on this topic is contained in the Aerodrome Design Manual (Doc 9157), Part

3.

Example 1 – If the bearing strength of a rigid pavement, resting on a medium strength sub grade, has been assessed by technical evaluation to be PCR 760 and there is no tyre pressure limitation, then the reported information would be:

PCR 760/ R / B / W / T

Example 2 – If the bearing strength of a composite pavement, behaving like a flexible pavement and resting on a high strength sub grade, has been assessed using aircraft experience to be PCR550 and the maximum allowable tyre pressure allowable is 1.25 MPa, then the reported information would be:

PCR550/ F / A / Y / U

Note. —Composite construction.

(g) Criteria should be established to regulate the use of a pavement by an aircraft with an ACR higher than the PCR reported for that pavement in accordance with 12.2.2.6(b) and 12.2.2.6(c).

Note. — Attachment A, Section 19, details a simple method for regulating overload operations while the Aerodrome Design Manual *(Doc 9157), Part 3, includes the descriptions of more detailed procedures for evaluation of pavements and their suitability for restricted overload operations.*

(h) The bearing strength of a pavement intended for aircraft of apron (ramp) mass equal to or less than 5700 kg shall be made available by reporting the following information:

(8) maximum allowable aircraft mass; and

(9) maximum allowable tyre pressure.

Example: 4 800 kg / 0.60MPa.

12.2.2.7 PRE-FLIGHT ALTIMETER CHECK LOCATION

(a) One or more pre-flight altimeter check locations shall be established for an aerodrome.

(b) A pre-flight check location shall be located on an apron.

Note 1 – Locating a pre-flight altimeter location on an apron enables an altimeter check to be made prior to obtaining taxi clearance and eliminates the need for stopping for that purpose after leaving the apron.

Note 2 – Normally an entire apron can serve as a satisfactory altimeter check location.

(c) The elevation of a pre-flight altimeter check location shall be given as the average elevation, rounded to the nearest metre, of the area on which it is located. The elevation of any portion of a pre-flight altimeter check location shall be within 3m of the average elevation for that location.

12.2.2.8 DECLARED DISTANCES

The following distances shall be calculated to the nearest meter for a runway intended for use by international commercial air transport:

(a) take-off run available;

(b) take-off distance available;

(c) accelerate-stop distance available; and

(d) landing distance available.

Note – Guidance on calculation of declared distances is given in Advisory Circular NCAA- AC-ARD004.

12.2.2.9 CONDITION OF THE MOVEMENT AREA AND RELATED FACILITIES

(a) Information on the condition of the movement area and the operational status of related facilities shall be provided to the Aeronautical Information Services and similar information of operational significance to the air traffic service units, to enable those units to provide the necessary information to arriving and departing aircraft. The information shall be kept up to date and changes in conditions reported without delay.

*Note. —The nature, format and conditions of the information to be provided are specified in the ICAO Annex 15PANS-AIM (Doc 10066) and the PANS-ATM (Doc 4444). Specific procedures pertaining to work in progress on the movement area and to the reporting of such works are specified in the NCAA-AC-ARD006 (*Aerodrome Works Safety Plan (Plan of Construction Operations)*).*

(b) The condition of the movement area and the operational status of related facilities shall be monitored and reports on matters of operational significance or affecting aircraft and aerodrome operations shall be provided in order to take appropriate action, particularly in respect of the following:

(1) construction or maintenance work;

(2) rough or broken surfaces on a runway, taxiway or an apron;

(3) water on a runway, a taxiway or an apron;

(4) other temporary hazards, including parked aircraft;

(5) failure or irregular operation of part of all of the aerodrome visual aids; and

(6) failure of the normal or secondary power supply.

Note 1. — Other contaminants may include mud, dust, sand, Volcanic ash, oil and rubber. NCAA-AC-ARD032 provides guidance on the description of *runway surface conditions. Additional guidance is included in the ICAO Airport Services Manual (Doc 9137), Part2.*

Note 2. — The Aeroplane Performance Manual (Doc 10064) provides guidance on aircraft performance calculation

requirements regarding the description of runway surface conditions in 12.2.2.9(b)(iii), (iv) and (v).

Note 3. — Origin and evolution of data, assessment process and the procedures are prescribed in the PANS-Aerodromes NCAA-AC-ARD 036

These procedures are intended to fulfil the requirements to achieve the desired level of safety for aeroplane operations prescribed by Annex 6 and Annex 8 and to provide the information fulfilling the syntax requirements for dissemination specified in Nig.CARs 14.4, PANS-AIM (Doc 10066) and the PANS-ATM (Doc 4444).

(c) To facilitate compliance with (a) and (b), the following inspections shall be carried out each day:

(1) for the movement area, at least once where the aerodrome reference code number is 1 or 2 and at least twice where the aerodrome reference code number is 3 or 4; and

(2) for the runway(s), inspections in addition to a) whenever the runway surface conditions may have changed significantly due to meteorological conditions.

Note 1. — Procedures on carrying out daily inspections of the movement area are given in the PANS-Aerodromes NCAA-AC-ARD 036. Further guidance is available in the Airport Service Manual (Doc 9137), Part 8, in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476) and in Advanced Surface Movement Guidance and

Control Systems (A-SMGCS) Manual (Doc 9830).

Note 2. — The PANS-Aerodromes NCAA-AC-ARD 036 contains clarifications on the scope of a significant change in the runway

surface conditions

(d) Personnel assessing and reporting runway surface conditions required in paragraphs (b) and (e) shall be trained and competent to meet criteria set by the Authority.

Note 1. — Guidance on training of personnel is given in Attachment A, Section 6.

Note 2. — Information on training for personnel assessing and reporting runway surface conditions is available in the PANS-Aerodromes NCAA-AC-ARD 036.

Runway surface condition(s) for use in the runway condition report

Introductory Note. — The philosophy of the runway condition report is that the aerodrome operator assesses the runway surface conditions whenever water, snow, slush, ice or frost are present on an operational runway. From this assessment, a runway condition code (RWYCC) and a description of the runway surface are reported which can be used by the flight crew for aeroplane performance calculations. This report, based on the type, depth and coverage of contaminants, is the best assessment of the runway surface condition by the aerodrome operator; however, all other pertinent information may be taken into consideration.

See Attachment A, Section 6, for further details. The PANS-Aerodromes NCAA-AC-ARD 036 contains procedures on the use of the runway condition report and assignment of the RWYCC in accordance with the runway condition matrix (RCAM).

(e) The runway surface condition shall be assessed and reported through a runway condition code (RWYCC) and a description using the following terms:

(1) STANDING WATER

(2) CHEMICALLY TREATED

(3) LOOSE SAND

(4) DRY

(5) WET

Note 1. — The runway surface conditions are those conditions for which, by means of the methods described in the PANS-Aerodromes NCAA-AC-ARD 036 the flight crew can derive appropriate aeroplane performance.

Note 2. — The conditions, either singly or in combination with other observations, are criteria for which the effect on aeroplane performance is sufficiently deterministic to allow assignment of a specific runway condition code.

Note 3. — The terms CHEMICALLY TREATED and LOOSE SAND do not appear in the aeroplane performance section but are used in the situational awareness section of the runway condition report.

(f) Whenever an operational runway is contaminated, an assessment of the contaminant depth and coverage over each third of the runway shall be made and reported.

Note. — Procedures on depth and coverage reporting are found in Advisory Circular NCAA-AC-ARD032: assessment and reporting of runway surface condition using global reporting format.

(g) Friction measurements made on runway surface conditions with contaminants other than compacted snow and ice shall not be reported.

Note. — Friction measurements on loose contaminants such as snow and slush, in particular, are unreliable due to drag effects on the measurement wheel.

(h) Information that a runway or portion thereof is slippery wet shall be made available.

Note 1. — The surface friction characteristics of a runway or a portion thereof can be degraded due to rubber deposits, surface polishing, poor drainage or other factors. The determination that a runway or portion thereof is slippery wet *stems from various methods used solely or in combination. These methods may be functional friction measurements, using a continuous friction measuring device, that fall below a minimum standard as defined by the Authority, observations by aerodrome maintenance personnel, repeated reports by pilots and aircraft operators based on flight crew experience, or through analysis of aeroplane stopping performance that indicates a substandard surface. Supplementary tools to undertake this assessment are described in the PANS-Aerodromes NCAA-AC-ARD 036.*

Note 2. —sections 12.2.2.9(a) and 12.2.2.13 concerning the provision of information to, and coordination between, appropriate authorities.

(i) Notification shall be given to relevant aerodrome users when the friction level of a paved runway or portion thereof is less than the minimum friction level specified by the Authority in accordance with 12.2.10.2(c).

Note 1. — Guidance on determining and expressing the minimum friction level is provided in Advisory Circular on Runway Friction (NCAA-AC-ARD 014).

Note 2. — Procedures on conducting a runway surface friction characteristics evaluation programme are provided in Advisory Circular on Runway Friction (NCAA-AC-ARD 014).

Note 3. — Information to be promulgated in a NOTAM includes specifying which portion of the runway is below the minimum friction level and its location on the runway.

12.2.2.10 DISABLED AIRCRAFT REMOVAL

Note – See Section 12.2.9.3 of this Regulation for information on disabled aircraft removal services.

(a) The telephone/fax number(s) of the office of the aerodrome coordinator of operations for the removal of an aircraft disabled on or adjacent to the movement area shall be made available to aircraft operators.

(b) Information concerning the capability to remove an aircraft disabled on or adjacent to the movement area shall be made available.

Note – The capability to remove a disabled aircraft may be expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove.

12.2.2.11 RESCUE AND FIREFIGHTING

Note – See 12.2.9.2 of this Part for information on rescue and firefighting services.

(a) Information concerning the level of protection provided at an aerodrome for aircraft rescue and firefighting purposes shall be made available.

(b) The level of protection normally available at the aerodrome shall be expressed in terms of the category of the rescue and firefighting services as described in 12.2.9.2 of this Part and in accordance with the types and amounts of extinguishing agents normally available at the aerodrome.

(c) Changes in the level of protection normally available at an aerodrome for rescue and firefighting shall be notified to the air traffic services unit and the Aeronautical Information Services to enable those units to provide the necessary information to arriving and departing aircraft. When such a change has been corrected, the above units shall be advised accordingly.

Note – Change in the level of protection from that normally available at the aerodrome, could result from a change in availability of extinguishing agents, equipment to deliver the agents or personnel to operate the equipment, etc.

(d) A change shall be expressed in terms of the new category of the rescue and firefighting service available at the aerodrome.

12.2.2.12 VISUAL APPROACH SLOPE INDICATOR SYSTEMS

The following information concerning a visual approach slope indicator system installation shall be made available:

a. associated runway designation number;

b. type of system according to 12.2.5.3(e)(2) of these Regulations. For a PAPI or APAPI installation, the side of the runway on which the lights are installed, i.e. left or right, shall be given;

c. where the axis of the system is not parallel to the runway centre line, the angle of displacement and the direction of displacement, i.e. left or right shall be indicated;

d. nominal approach slope angle(s) for a PAPI and an APAPI this shall be angle (B+C) ÷ 2 and (A+B) ÷ 2, respectively as in Figure 5-20; and

e. minimum eye height(s) over the threshold of the on-slope signal(s). For a T-VASIS or an AT-VASIS this shall be the lowest height at which only the wing bar(s) are visible; however, the additional heights at which the wing bar(s) plus one, two or three fly down light units come into view may also be reported if such information would be of benefit to aircraft using the approach. For a PAPI this shall be the setting angle of the third unit from the runway minus 2′, i.e. angle B minus 2′, and for an APAPI this shall be the setting angle of the unit farther from the runway minus 2′, i.e. angle A minus 2′.

12.2.2.13 COORDINATION BETWEEN AERONAUTICAL INFORMATION SERVICES AND AERODROME AUTHORITIES

(a) To ensure that the Aeronautical Information Services obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, the aerodrome operator shall establish arrangements with the Aeronautical Information Services to report, with a minimum of delay:

(1) information on the status of certification of aerodromes and aerodrome conditions (reference section 12.1.2 and subsections 12.2.2.9, 12.2.2.10, 12.2.2.11, 12.2.2.12 above);

(2) the operational status of associated facilities, services and navigation aids within their area of responsibility;

(3) any other information considered to be of operational significance.

(b) Before introducing changes to the air navigation system, due account shall be taken by the aerodrome operator of the time needed by the Aeronautical Information Services for the preparation, production and issue of relevant material for promulgation. To ensure timely provision of information to the Aeronautical Information Services, close coordination between those services concerned is therefore required.

(c) Of a particular importance are changes to aeronautical information that affects charts and/or computer-based navigation systems which qualify to be notified by the Aeronautical Information Regulation and Control (AIRAC) system, as specified in Nig.CARs 14.4. The pre-determined internationally agreed AIRAC effective dates shall be observed by the responsible aerodrome operator when submitting the raw information/data to the Aeronautical Information Services.

Note. — Detailed specifications concerning the AIRAC system are contained in PANS-AIM (Doc 10066), Section6.

(d) The aerodrome services responsible for the provision of raw aeronautical information/data to the Aeronautical Information Services shall do that while taking into account accuracy and integrity requirements required to meet the needs of the end user of aeronautical data for aeronautical data.

Note 1. — Specifications concerning the accuracy and integrity classification of aerodrome- related aeronautical data are contained in PANS-AIM (Doc 10066), Appendix 1.

Note 2 – Specifications for the issue of a NOTAM are contained in Nig.CARs14.4, Section 6 and PANS-AIM (Doc 10066), Appendix 63 and 24 respectively.

Note 3 – AIRAC information is distributed by the AIS at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

Note 4 – The schedule of the predetermined internationally agreed AIRAC common effective dates at intervals of 28 days, including 19 November 2009 and guidance for the AIRAC use are contained in the ICAO Aeronautical Information Services Manual (Doc 8126, Section2).

12.2.3 PHYSICAL CHARACTERISTICS

12.2.3.1 RUNWAYS

Number and Orientation of Runways

Introductory Note — Many factors affect the determination of the orientation, siting and number of runways.

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 section 4 of this Part. In Advisory Circular "Establishment and Development of Aerodromes" (NCAA- AC-ARD002-A), Section 2.6, information is given concerning these and other factors.

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.

(a) The number and orientation of runways at an aerodrome shall 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.

(b) The siting and orientation of runways at an aerodrome shall, 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 Airport Planning Manual *(Doc 9184), Part 2, and in* Guidance on the Balanced Approach to Aircraft Noise Management *(Doc 9829).*

(c) **Choice of Maximum Permissible Cross-Wind Components**

In the application of section 12.2.3.1(a) above, it shall be assumed that landing or take-off of aeroplanes is, in normal circumstances, precluded when the cross-wind component exceeds:

— 37 km/h (20 kt) in the case of aeroplanes whose reference field length is 1 500 m or over, except that when poor runway braking action owing to an insufficient longitudinal coefficient of friction is experienced with some frequency, a cross-wind component not exceeding 24 km/h (13 kt) shall be assumed;

— 24 km/h (13 kt) in the case of aeroplanes whose reference field length is 1 200 m or up to but not including 1 500 m; and

— 19 km/h (10 kt) in the case of aeroplanes whose reference field length is less than 1 200 m.

Note — In Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 1, guidance is given 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.

(d) **Data to be used**

The selection of data to be used for the calculation of the usability factor shall 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 shall 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 Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 1.

Location of threshold

(e) A threshold shall 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 Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 12.

(f) When it is necessary to displace a threshold, either permanently or temporarily, from its normal location, account shall 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 shall be available between the unserviceable area and the displaced threshold. Additional distance shall 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, Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 12.

Actual Length of Runways

(g) **Primary Runway**

Except as provided in section 12.2.3.1(i) of this Part, 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 shall 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 — This specification does not necessarily mean providing for operations by the critical aeroplane at its maximum mass.

Note 2 — 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.

Note 3 — Local conditions that may need to be considered include elevation, temperature, runway slope, humidity and the runway surface characteristics.

Note 4 — 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 ICAO Aerodrome Design Manual (Doc 9157), Part 1.

(h) **Secondary Runway**

The length of a secondary runway shall 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.

(i) **Runways with Stop ways or Clearways**

Where a runway is associated with a stop way or clearway, an actual runway length less than that resulting from application of sections 12.2.3.1(g) or

12.2.3.1(h), as appropriate, may be considered satisfactory, but in such a case any combination of runway, stop way 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 stop ways and clearways is given in, Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 2.

Width of Runways

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

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

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

Note 1 — The combinations of code numbers and OMGWS for which widths are specified have been developed for typical aeroplane characteristics.

Note 2 — Factors affecting runway width are given in the ICAO Aerodrome Design Manual (Doc 9157), Part 1.

Note 3. — See 12.2.3.2 concerning the provision of runway shoulders, in particular for Code F aeroplanes with four (or more) engines.

Minimum Distance between Parallel Runways

(k) Where parallel non-instrument runways are intended for simultaneous use, the minimum distance between their centre lines shall be:

— 210 m where the higher code number is 3 or 4;

— 150 m where the higher code number is 2; and

— 120 m where the higher code number is 1.

Note — Procedures for wake turbulence categorization of aircraft and wake turbulence separation minima are contained in the Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM), Doc 4444, Section4, 4.9 and Section5,5.8, respectively.

(l) Where parallel instrument runways are intended for simultaneous use subject to conditions specified in the PANS-ATM (Doc 4444) and the PANS-OPS (Doc 8168), Volume I, the minimum distance between their centre lines shall be:

— 1 035 m for independent parallel approaches;

— 915 m for dependent parallel approaches;

— 760 m for independent parallel departures;

— 760 m for segregated parallel operations;

except that:

(1) for segregated parallel operations the specified minimum distance:

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

(ii) shall be increased by 30 m for each 150 m that the arrival runway is staggered away from the arriving aircraft;

(2) 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), Section6 and the PANS-OPS (Doc 8168), Volume I, Part 3, Section 2, and Volume 2, Part I, Section 3; Part 2, Section 1; and Part 3, Section 3, and relevant guidance is contained in the Manual on Simultaneous Operations on Parallel or Near-Parallel Instrument Runways (SOIR) *(Doc 9643).*

Slopes on Runways

(m) **Longitudinal Slopes**

The slope computed by dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length shall not exceed:

— 1 per cent where the code number is 3 or 4; and

— 2 per cent where the code number is 1 or 2.

(n) An operator shall not allow any portion of a runway to exceed the longitudinal slopes stipulated as follows:

— 1.25 per cent where the code number is 4, except that for the first and last quarter of the length of the runway the longitudinal slope shall not exceed 0.8 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 shall not exceed 0.8 per cent; and

— 2 per cent where the code number is 1 or 2.

(o) **Longitudinal Slope Changes**

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

— 1.5 per cent where the code number is 3 or 4; and

— 2 per cent where the code number is 1 or 2.

Note — Guidance on slope changes before a runway is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 4.

(p) The transition from one slope to another shall be accomplished by a curved surface with a rate of change not exceeding:

— 0.1 per cent per 30 m (minimum radius of cur5ature of 30 000 m) where the code number is 4;

— 0.2 per cent per 30 m (minimum radius of cur5ature of 15 000 m) where the code number is 3; and

— 0.4 per cent per 30 m (minimum radius of cur5ature of 7 500 m) where the code number is 1 or 2.

(q) **Sight Distance**

Where slope changes cannot be avoided, they shall be such that there will be an unobstructed line of sight from:

— 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.

— 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

— 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. See the ICAO Aerodrome Design Manual, *(Doc 9157), Part 1.*

(r) **Distance between Slope Changes**

Undulations or appreciable changes in slopes located close together along a runway shall be avoided. The distance between the points of intersection of two successive curves shall not be less than:

(1) 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

(2) 45 m; whichever is greater.

Note — Guidance on implementing this specification is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036) Section 4.

(s) **Transverse Slopes**

To promote the most rapid drainage of water, the runway surface shall, 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 shall ideally be:

— 1.5 per cent when the code letter is C, D, E or F;

— 2 per cent when the code letter is A or B;

but in any event shall 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.

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

Note — On wet runways with cross-wind conditions the problem of aquaplaning from poor drainage is apt to be accentuated. In Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 9, information is given concerning this problem and other relevant factors.

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

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

Strength of Runways

(u) A runway shall be capable of withstanding the traffic of aeroplanes the runway is intended to serve.

Surface of Runways

(v) 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 Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC- ARD036) Section 5. Additional guidance is included in the ICAO Aerodrome Design Manual *(Doc 9157), Part 3.*

(w) A paved runway shall be so constructed as to provide good friction characteristics when the runway is wet.

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

Note. — Guidance on surface friction characteristics of a new or resurfaced runway is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA- AC-ARD036) Section 8. Additional guidance is included in the ICAO Airport Services Manual (Doc 9137), Part 2.

(y) Measurements of the surface friction characteristics of a new or resurfaced paved runway shall be made with a continuous friction measuring device using self-wetting

Note — Guidance on surface friction characteristics of new runway surfaces is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA- AC-ARD036) Section 6. Additional guidance is included in the ICAO Airport Services Manual *(Doc 9137), Part 2.*

(z) The average surface texture depth of a new surface shall be not less than 1.0 mm.

Note 1 — Macrotexture and microtexture are taken into consideration in order to provide the required surface friction characteristics. Guidance on surface design is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC- ARD036), Section 8.

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

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

(aa) When the surface is grooved or scored, the grooves or scorings shall 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 ICAO Aerodrome Design Manual (Doc 9157, Part 12.2.3.)

12.2.3.2 RUNWAY SHOULDERS

General

Note — Guidance on characteristics and treatment of runway shoulders is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC- ARD036) Section 10, and in the ICAO Aerodrome Design Manual (Doc 9157), Part 1.

(a) Runway shoulders shall be provided for a runway where the code letter is D, E or F.

Width of runway shoulders

(b) For aeroplanes with OMGWS of 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:

— 60 m where the code letter is D or E;

— 60m where the code letter is F with two or three-engined aeroplanes; and

— 75 m where the code letter is F with four (or more) – engined aeroplanes.

Slopes on Runway Shoulders

(c) The surface of the shoulder that abuts the runway shall be flush with the surface of the runway and its transverse slope shall not exceed 2.5 per cent.

Strength of Runway Shoulders

(d) The portion of a runway shoulder between the runway edge and a distance of 30m from the runway centreline shall 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.

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

Surface of runway shoulders

(f) A runway shoulder shall be prepared or constructed so as to resist erosion and the ingestion of the surface material by aeroplane engines.

(g) Runway shoulders for code letter F aeroplanes shall be paved to a minimum overall width of runway and shoulder of not less than 60 m

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

12.2.3.3 RUNWAY TURN PADS

General

(a) 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. **(See Figure 3-1)**.

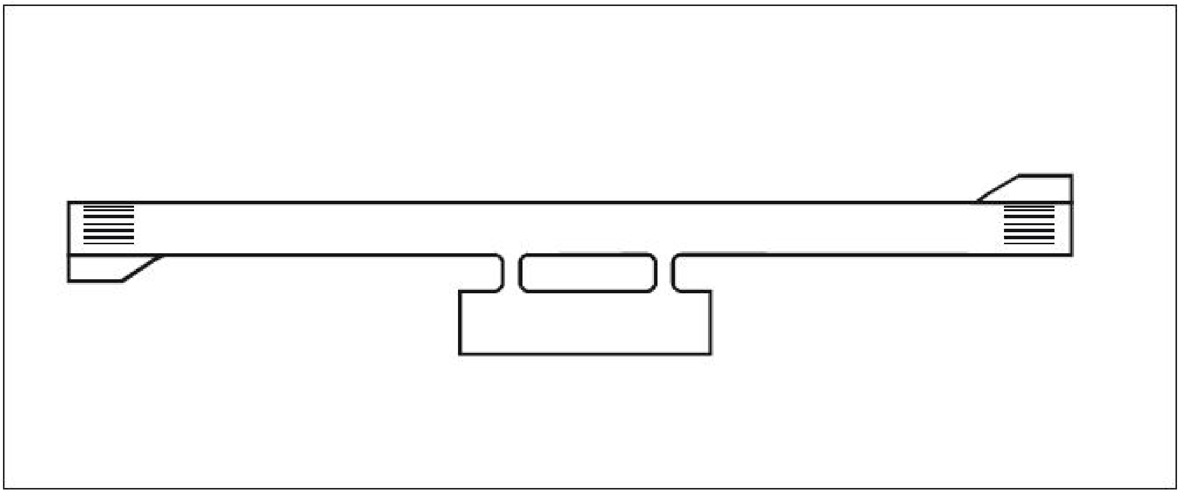


Figure 3- 1. Typical turn pad layout

(b) 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 shall 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.

(c) The runway turn pad shall 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.

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.

(d) The intersection angle of the runway turn pad with the runway shall not exceed 30 degrees.

(e) The nose wheel steering angle to be used in the design of the runway turn pad shall not exceed 45 degrees.

(f) 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:

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

Slopes on Runway Turn Pads

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

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.*

(g) The longitudinal and transverse slopes on a runway turn pad shall 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 of Runway Turn Pads

(h) The strength of a runway turn pad shall 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 tyres during turning manoeuvres.

Surface of Runway Turn Pads

(i) The surface of a runway turn pad shall not have surface irregularities that may cause damage to an aeroplane using the turn pad.

(j) The surface of a runway turn pad shall be so constructed or resurfaced as to provide good surface friction characteristics at least equal to that of the adjoining runway

Shoulders for Runway Turn Pads

(k) The runway turn pads shall 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.

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.

(l) The strength of runway turn pad shoulders shall be capable of withstanding the 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.

12.2.3.4 RUNWAY STRIPS

General

(a) A runway and any associated stop ways shall be included in a strip.

Length of Runway Strips

(b) A strip shall extend before the threshold and beyond the end of the runway or stop way for a distance of at least:

— 60 m where the code number is 2, 3 or 4;

— 60 m where the code number is 1 and the runway is an instrument one; and

— 30 m where the code number is 1 and the runway is a non-instrument one.

Width of Runway Strips

(c) A strip including a precision approach runway shall, wherever practicable, extend laterally to a distance of at least:

— 140 m where the code number is 3 or 4; and

— 70 m where the code number is 1 or 2;

on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(d) A strip including a non-precision approach runway shall extend laterally to a distance of at least:

— 140 m where the code number is 3 or 4; and

— 70 m where the code number is 1 or 2;

on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

(e) A strip including a non-instrument runway shall extend on each side of the centre line of the runway and its extended centre line throughout the length of the strip, to a distance of at least:

— 75 m where the code number is 3 or 4;

— 40 m where the code number is 2; and

— 30 m where the code number is 1.

Objects on Runway Strips

Note — See section 12.2.9.9 of this Part for information regarding siting and construction of equipment and installations on runway strips.

(f) An object situated on a runway strip which may endanger aeroplanes shall be regarded as an obstacle and shall, as far as practicable, be removed.

Note 1. — Consideration will have to 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 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. See also Note 1 to 12.2.3.4(p)

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. Procedures on wildlife *management are specified in Advisory Circular NCAA-AC-ARD012 (Wildlife Strike Hazard Management). Further Guidance can be found in the Airport Services Manual (Doc 9137), Part 3.*

(g) 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 requirement in Section 5 of this Part shall be permitted on any part of a runway strip of a precision approach runway delineated by the lower edges of the inner transitional surfaces. No mobile object shall be permitted on this part of the runway strip during the use of the runway for landing or take-off.

Note. — See Section 4, section 12.2.4.1, for characteristics of inner transitional surfaces.

Grading of Runway Strips

(h) That portion of a strip of an instrument runway within a distance of at least:

— 75 m where the code number is 3 or 4; and

— 40 m where the code number is 1 or 2;

from the centre line of the runway and its extended centre line shall provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

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 Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 10.

(i) That portion of a strip of a non-instrument runway within a distance of at least:

— 75 m where the code number is 3 or 4;

— 40 m where the code number is 2; and

— 30 m where the code number is 1;

from the centre line of the runway and its extended centre line shall provide a graded area for aeroplanes which the runway is intended to serve in the event of an aeroplane running off the runway.

(j) 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.

(k) That portion of a strip to at least 30 m before the start of a runway shall be prepared against blast erosion in order to protect a landing aeroplane from the danger of an exposed edge.

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.

(l) Where the areas in 12.2.3.4(k) have paved surfaces, they shall be able to withstand the occasional passage of the critical aeroplane for runway pavement design.

Slopes on Runway Strips

(m) Longitudinal Slopes.

A longitudinal slope along that portion of a strip to be graded shall not exceed:

— 1.5 per cent where the code number is 4;

— 1.75 per cent where the code number is 3; and

— 2 per cent where the code number is 1 or 2.

(n) **Longitudinal Slope Changes**

Slope changes on that portion of a strip to be graded shall be as gradual as abrupt changes or sudden reversals of slopes avoided.

(o) **Transverse Slopes**

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

— 2.5 per cent where the code number is 3 or 4; and

— 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 stop way edge shall be negative as measured in the direction away from the runway and may be as great as 5 per cent.

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

(q) That portion of a strip of an instrument runway within a distance of at least:

— 75 m where the code number is 3 or 4; and

— 40 m where the code number is 1 or 2;

from the centre line of the runway and its extended centre line shall 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.

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

(r) That portion of a strip containing a non-instrument runway within a distance of at least:

— 75 m where the code number is 3 or 4;

— 40 m where the code number is 2; and

— 30 m where the code number is 1;

from the centre line of the runway and its extended centre line shall 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.

12.2.3.5 RUNWAY END SAFETY AREAS

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

— the code number is 3 or 4; and

— the code number is 1 or 2 and the runway is an instrument one.

Note — Guidance on runway end safety areas is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036) Section 11.

(b) A runway end safety area shall be provided at each end of a runway strip where the code number is 1 or 2 and the runway is a non-instrument one.

Dimensions of Runway End Safety Areas

(c) A runway end safety area shall extend from the end of a runway strip to a distance of at least 90 m where

— the code number is 3 or 4; and

— the code number is 1 or 2 and the runway is an instrument one

If an arresting system is installed, the above length may be reduced, based on the design specification of the system, subject to acceptance by the Authority.

Note. — Guidance on arresting systems is given in *Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036)* Section 1.

(d) The width of a runway end safety area shall be at least twice that of the associated runway.

(e) The width of a runway end safety area shall, be equal to that of the graded portion of the associated runway strip.

Objects on Runway End Safety Areas

Note — See section 12.2.9.9 of this Part for information regarding siting and construction of equipment and installations on runway end safety areas.

(f) An object situated on a runway end safety area which may endanger aeroplanes shall be regarded as an obstacle and shall be removed.

Clearing and Grading of Runway End Safety Areas

(g) A runway end safety area shall 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.

Note — 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. See, however, section 12.2.3.5(k) of this Part.

Slopes on Runway End Safety Areas

(h) **General**

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

(i) **Longitudinal Slopes**

The longitudinal slopes of a runway end safety area shall not exceed a downward slope of 5 per cent. Longitudinal slope changes shall be as gradual and abrupt changes or sudden reversals of slopes avoided.

(j) **Transverse Slopes**

The transverse slopes of a runway end safety area shall not exceed an upward or downward slope of 5 per cent. Transitions between differing slopes shall be as gradual as practicable.

Strength of Runway End Safety Areas

(k) A runway end safety area shall 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 fire fighting vehicles as required in sections 12.2.9.2.30 to 12.2.9.2.32. of this Part.

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

12.2.3.6 CLEARWAYS

Note. — The inclusion of detailed specifications for clearways in this section is not intended to imply that a clearway has to be provided. Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 2 provides information on the use of clearways.

Location of Clearways

(a) The origin of a clearway shall be at the end of the take-off run available.

Length of Clearways

(b) The length of a clearway shall not exceed half the length of the take-off run available.

Width of Clearways

(c) A clearway shall extend laterally on each side of the extended centre line of the runway, to a distance of at least:

(1) 75 m for instrument runways; and

(2) half of the width of the runway strip for non-instrument runways.

Slopes on Clearways

(d) The ground in a clearway shall 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:

(1) is perpendicular to the vertical plane containing the runway centre line; and

(2) 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.

(e) Abrupt upward changes in slope shall 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 shall conform with those of the runway with which the clearway is associated.

Objects on clearways

Note — See section 12.2.9.9 of this Part for information regarding siting and construction of equipment and installations on clearways.

(f) An object situated on a clearway which may endanger aeroplanes in the air shall be regarded as an obstacle and shall be removed.

12.2.3.7 STOPWAYS

Note — The inclusion of detailed specifications for stopways in this section is not intended to imply that a stopway has to be provided. Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 2 provides information on the use of stopways.

Width of Stopways

(a) A stop way shall have the same width as the runway with which it is associated.

Slopes on Stopways

(b) Slopes and changes in slope on a stopway, and the transition from a runway to a stopway, shall comply with the specifications of sections 12.2.3.1(m) to 12.2.3.1(s) of this Regulation for the runway with which the stopway is associated except that:

(1) the limitation in section 12.2.3.1(n) of this Part 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

(2) at the junction of the stopway and runway and along the stopway the maximum rate of slope change may be 0.3per 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

(c) A stopway shall 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.

Note — Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 2 presents guidance relative to the support capability of a stopway.

Surface of Stopways

(d) The surface of a paved stopway shall be so constructed or resurfaced as to provide surface friction characteristic at or above those of the associated runway.

12.2.3.8 RADIO ALTIMETER OPERATING AREA

General

(a) A radio altimeter operating area shall be established in the pre-threshold area of a precision approach runway.

Length of the Area

(b) A radio altimeter operating area shall extend before the threshold for a distance of at least 300 m.

Width of the Area

(c) A radio altimeter operating area shall 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.

Longitudinal Slope Changes

(d) On a radio altimeter operating area, slope changes shall be avoided or kept to a minimum. Where slope changes cannot be avoided, the slope changes shall be as gradual and abrupt changes or sudden reversals of slopes avoided. The rate of change between two consecutive slopes shall not exceed 2 per cent per 30 m.

Note — Guidance on radio altimeter operating area is given in, Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 4.3 and in the ICAO Manual of All-Weather Operations, (Doc 9365), Section 5.2. Guidance on the use of radio altimeter is given in the PANS-OPS, Volume 2, Part 2, Section I.

12.2.3.9 TAXIWAYS

Note 1 — Unless otherwise indicated the requirements in this section are applicable to all types of taxiways.

Note 2. — Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036) Section 23 for specific taxiway design guidance which may assist in the prevention of runway incursions when developing a new taxiway or improving existing ones with a known runway incursion safety risk.

General

(a) Taxiways shall be provided to permit the safe and expeditious surface movement of aircraft.

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

(b) Sufficient entrance and exit taxiways for a runway shall be provided to expedite the movement of aeroplanes to and from the runway and provision of rapid exit taxiways considered when traffic Volumes are high.

(c) 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:

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

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

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.*

Width of Taxiways

(d) A straight portion of a taxiway shall have a width of not less than that given by the following tabulation:

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

	OMGWS			
	Up to but not including 4.5 m	4.5 m up to but not including 6 m	6 m up to but not including 9 m	9 m up to but not including 15 m
Taxiway width	7.5 m	10.5 m	15 m	23 m

Taxiway curves

(e) Changes in direction of taxiways shall be as few and small as possible. The radii of the curves shall be compatible with the maneuvering capability and normal taxiing speeds of the aeroplanes for which the taxiway is intended. The design of the curve shall 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 shall not be less than those specified in 12.2.3.9(c).

*Note 1 — An example of widening taxiways to achieve the wheel clearance specified is illustrated in **Figure 3-2** Guidance on the values of suitable dimensions is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 2.*

Note 2 — The location of taxiway centre line markings and lights is specified in 12.2.5.2(h)(6) and 12.2.5.3(o) (11) of these Regulations.

Note 3 — Compound curves may reduce or eliminate the need for extra taxiway width.

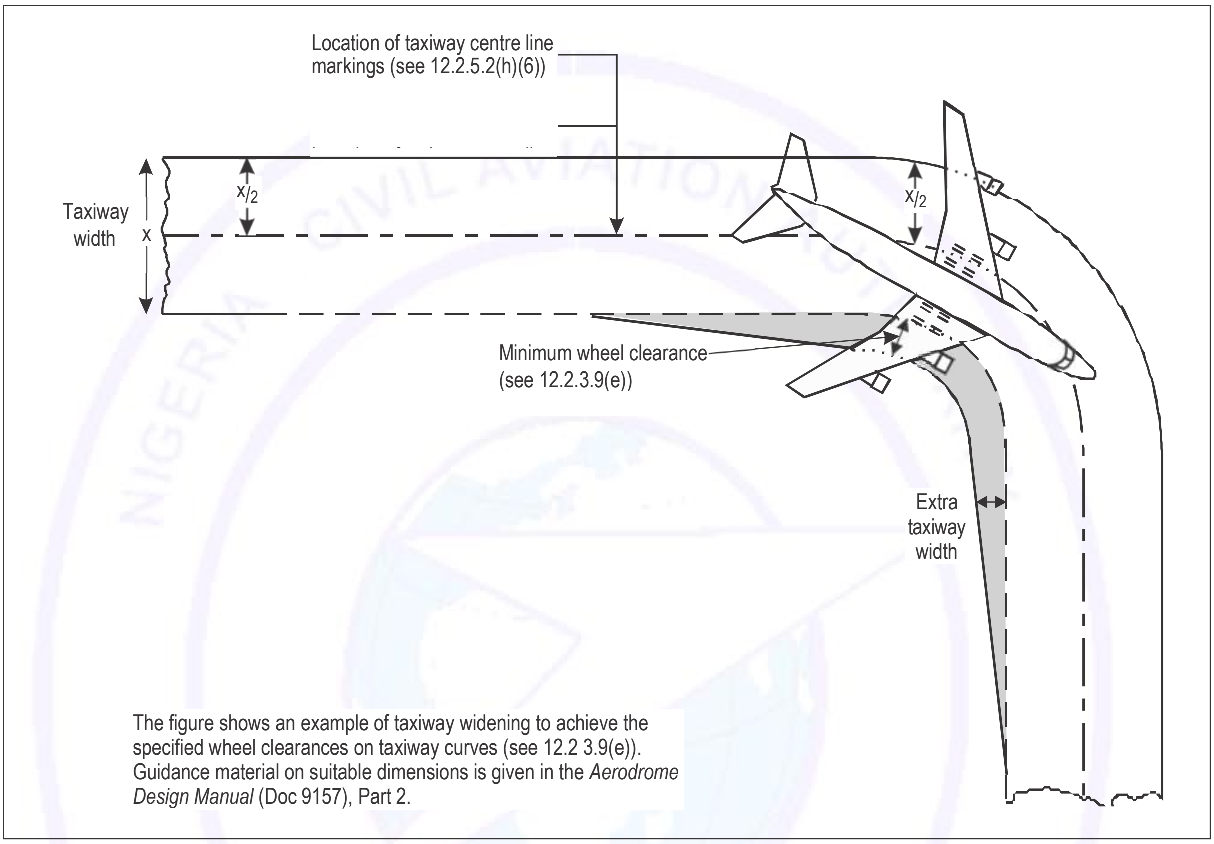


Figure 3- 2 Taxiway Curve

Junctions and Intersections

(f) To facilitate the movement of aeroplanes, fillets shall be provided at junctions and intersections of taxiways with runways, aprons and other taxiways. The design of the fillets shall ensure that the minimum wheel clearances specified in section 12.2.7.2(i)(3) 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 ICAO Aerodrome Design Manual (Doc 9157), Part 2.

Taxiway Minimum Separation Distances

(g) 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 shall not be less than the appropriate dimension specified in Table 3-1, 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.

Note 1 — Guidance on factors which may be considered in the aeronautical study is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 2.

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 ICAO Annex 10, Volume I - Radio Navigation Aids, Attachments C and G (respectively).

Note 3 — The separation distances of Table 3-1, 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 ICAO 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 3-1, column 12, may need to be increased when jet exhaust wake velocity may cause hazardous conditions for ground servicing.

Slopes on Taxiways

(h) **Longitudinal Slopes**

The longitudinal slope of a taxiway shall not exceed:

— 1.5 per cent where the code letter is C, D, E or F; and

— 3 per cent where the code letter is A or B.

(i) **Longitudinal Slope Changes**

Where slope changes on a taxiway cannot be avoided, the transition from one slope to another slope shall be accomplished by a curved surface with a rate of change not exceeding:

— 1 per cent per 30 m (minimum radius of curvature of 3 000 m) where the code letter is C, D, E or F; and

— 1 per cent per 25 m (minimum radius of curvature of 2 500 m) where the code letter is A or B.

Table 3-1 – Taxiway minimum separation distances

Code letter	Distance between taxiway centre line and runway centre line (metres)								Taxiway centre line to taxiway centre line (metres)	Taxiway, other than aircraft stand taxi-lane, centre line to object (metres)	*Aircraft stand taxilane centre line to aircraft stand taxilane centre line (metres)*	Aircraft stand taxi-lane centre line to object (metres)
	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 ICAO 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 ICAO Aerodrome Design Manual(Doc 9157), Part 2.

Table 3- 1- Taxiway minimum separation distances

Code letter	Distance between taxiway centre line and runway centre line (metres)								Taxiway centre line to taxiway centre line (metres)	Taxiway, other than aircraft stand taxilane, centre line to object (metres)	Aircraft stand taxilane centre line to aircraft stand taxilane centre line (metres)	Aircraft stand taxilane centre line to object (metres)
	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.

(j) **Sight Distance**

Where a change in slope on a taxiway cannot be avoided, the change shall be such that, from any point:

— 3 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 300 m from that point, where the code letter is C, D, E or F;

— 2 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 200 m from that point, where the code letter is B; and

— 1.5 m above the taxiway, it will be possible to see the whole surface of the taxiway for a distance of at least 150 m from that point, where the code letter is A.

(k) **Transverse Slopes**

The transverse slopes of a taxiway shall be sufficient to prevent the accumulation of water on the surface of the taxiway but shall not exceed:

— 1.5 per cent where the code letter is C, D, E or F; and

— 2 per cent where the code letter is A or B.

Note — See section 12.2.3.13(d) of this Part regarding transverse slopes on an aircraft stand taxi-lane.

Strength of Taxiways

(l) The strength of a taxiway shall 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 ICAO Aerodrome Design Manual (Doc 9157), Part 3.

Surface of Taxiways

(m) The surface of a taxiway shall not have irregularities that cause damage to aeroplane structures.

(n) The surface of a paved taxiway shall be so constructed 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.

Rapid Exit Taxiways

Note — The following specifications detail requirements particular to rapid exit taxiways. See Figure 3-3. General requirements for taxiways also apply to this type of taxiway. Guidance on the provision, location and design of rapid exit taxiways is included in the ICAO Aerodrome Design Manual (Doc 9157), Part 2.

(o) A rapid exit taxiway shall be designed with a radius of turn-off curve of at least:

— 550 m where the code number is 3 or 4; and

— 275 m where the code number is 1 or 2;

to enable exit speeds under wet conditions of:

— 93 km/h where the code number is 3 or 4; and

— 65 km/h where the code number is 1 or 2.

Note — The locations of rapid exit taxiways along a runway are based on several criteria described in the ICAO Aerodrome Design Manual (Doc 9157), Part 2, in addition to different speed criteria.

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

(q) A rapid exit taxiway shall 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.

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

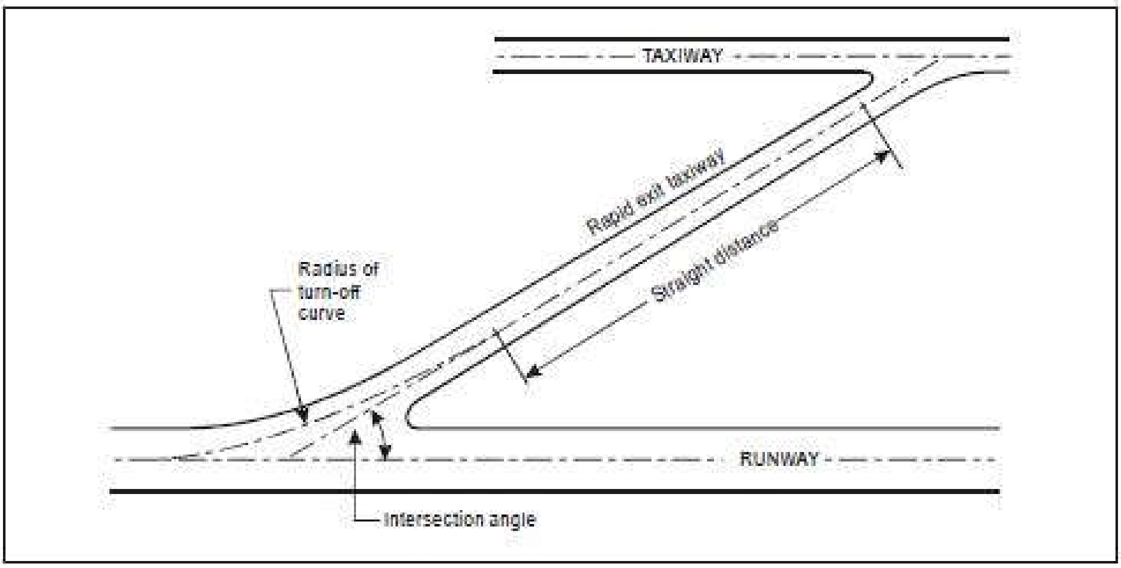


Figure 3- 3 Rapid Exit Taxiway

Taxiways on Bridges

(s) 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.

(t) Access shall be provided to allow rescue and fire fighting vehicles to intervene in both directions within the specified response time to the largest aeroplane for which the taxiway bridge is intended.

Note — If aeroplane engines overhang the bridge structure, protection of adjacent areas below the bridge from engine blast may be required.

(u) A bridge shall 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.

12.2.3.10 TAXIWAY SHOULDERS

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

(a) Straight portions of a taxiway where the code letter is C, D, E or F shall 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:

— ~~60m~~ 44 m where the code letter is F;

— ~~44m~~ 38 m where the code letter is E;

— ~~38m~~ 34 m where the code letter is D; and

— 25 m where the code letter is C.

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

(b) When a taxiway is intended to be used by turbine-engined aeroplanes, the surface of the taxiway shoulder shall be so prepared as to resist erosion and the ingestion of the surface material by aeroplane engines.

12.2.3.11 TAXIWAY STRIPS

Note — Guidance on characteristics of taxiway strips is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 2.

General

(a) A taxiway, other than an aircraft stand taxi-lane, shall be included in a strip.

Width of Taxiway Strips

(b) A taxiway strip shall 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 3-1, column 11 of these Regulations.

Objects on Taxiway Strips

Note — See section 12.2.9.9 of this Part for information regarding siting and construction of equipment and installations on taxiway strips.

(c) The taxiway strip shall 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. For further guidance, see the 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 do not extend above the surrounding ground so as not to be considered an obstacle. See also Note 1 to 12.2.3.11(f)

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 Advisory Circular, Wildlife Strike Hazard Management *(NCAA-AC-ARD012).*

Grading of Taxiway Strips

(d) The centre portion of a taxiway strip shall provide a graded area to a distance from the centre line of the taxiway of not less than that given by the following tabulation:

— *10.25 m where the OMGWS is up to but not including 4.5 m*

— *11 m where the OMGWS is 4.5 m up to but not including 6 m*

— *12.40 m where the OMGWS is 6 m up to but not including 9 m*

— *18.50 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is D*

— *19 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is E*

— *22 m where the OMGWS is 9 m up to but not including 15 m, where the code letter is F*

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

Slopes on Taxiway Strips

(e) The surface of the strip shall be flush at the edge of the taxiway or shoulder, if provided, and the graded portion shall not have an upward transverse slope exceeding:

— 2.5 per cent for strips where the code letter is C, D, E or F; and

— 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 shall not exceed 5 per cent measured with reference to the horizontal.

(f) The transverse slopes on any portion of a taxiway strip beyond that to be graded shall 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

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

General

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

(b) A runway-holding position or positions shall be established:

(1) on the taxiway, at the intersection of a taxiway and a runway; and

(2) at an intersection of a runway with another runway when the former runway is part of a standard taxi-route.

(c) 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.

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

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

Location

(f) 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 3-2 of this Part 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 or penetrate the inner transitional surface.

Note. — Guidance for the positioning of runway-holding positions is given in the Aerodrome Design Manual *(Doc 9157), Part 2.*

(g) At elevations greater than 700 m (2 300 ft) the distance of 90m specified in Table 3-2 for a precision approach runway code number 4 shall be increased as follows:

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

(2 300 ft);

(2) elevation in excess of 2 000 m (6 600 ft) and up to 4 000 m (12 320 ft); 13 m plus 1.5 m for every 100 m (330 ft) in excess of 2 000 m (6 600 ft); and

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

(h) 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, specified in Table 3-2 of this Part shall be further increased 5 m for every metre the bay or position is higher than the threshold.

(i) The location of a runway-holding position established in accordance with section 12.2.3.12(c) of this Part 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.

Table 3-2 –Minimum distance from the runway centre line to a holding bay, runway-holding position or road-holding position

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

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 ICAO Annex 10, Volume I, Attachments C and G to Part I, respectively (See also 12.2.3.12(f)).

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 7.7 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.

Note 3.— For code number 4 where the width of the inner edge of the inner approach surface is more than 120 m, a distance greater than 90 m may be necessary to ensure that a holding aircraft is clear of the obstacle free zone. For example, the distance of 100 m 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 3- 2 -Minimum distance from the runway centre line to a holding bay, runway- holding position or road-holding position

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

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 (see also 12.2.3.12(f)).

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.

Note 3.— For code number 4 where the width of the inner edge of the inner approach surface is more than 120 m, a distance greater than 90 m may be necessary to ensure that a holding aircraft is clear of the obstacle free zone. For example, a distance of 100 m 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.

12.2.3.13 APRONS

General

(a) Aprons shall 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.

Size of Aprons

(b) The total apron area shall be adequate to permit expeditious handling of the aerodrome traffic at its maximum anticipated density.

Strength of Aprons

(c) Each part of an apron shall 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.

Slopes on Aprons

(d) Slopes on an apron, including those on an aircraft stand taxi lane, shall be sufficient to prevent accumulation of water on the surface of the apron but shall be kept as level as drainage requirements permit.

(e) On an aircraft stand the maximum slope shall not exceed 1 per cent.

Clearance Distances on Aircraft Stands

(f) 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

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:

(1) between the terminal, including any fixed passenger bridge, and the nose of an aircraft; and

(2) 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 ICAO Aerodrome Design Manual (Doc 9157), Part 2, for guidance on storage of ground equipment).

12.2.3.14 ISOLATED AIRCRAFT PARKING POSITION

(a) 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.

(b) The isolated aircraft parking position shall be located at the maximum distance and in any case never less than 100 m 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.

12.2.3.15 DE-ICING/ANTI-ICING FACILITIES (*RESERVED)*

12.2.4 OBSTACLE RESTRICTION AND REMOVAL

Note 1 – The objectives of the specifications in this section are to define the airspace around aerodromes to be maintained free from obstacles so as to permit the intended aeroplane operations at the aerodromes to be conducted safely and to prevent the aerodromes from becoming unusable by the growth of obstacles around the aerodromes. This is achieved by establishing a series of obstacle limitation surfaces that define the limits to which objects may project into the airspace.

Note 2 – Objects which penetrate the obstacle limitation surfaces contained in this section may in certain circumstances cause an increase in the obstacle clearance altitude/height for an instrument approach procedure or any associated visual circling procedure or have other operational impact on flight procedure design. Criteria for evaluation of obstacles are contained in Procedures for Air Navigation Services – Aircraft Operations (PANS-OPS) (Doc8168)

Note 3. — The establishment of, and requirements for, an obstacle protection surface for visual approach slope indicator systems are specified in 12.2.5.3(e)(42) to 12.2.5.3(e)(46).

12.2.4.1 OBSTACLE LIMITATION SURFACES

Note – See Figure 4-1.

Outer Horizontal Surface

Note – Guidance on the need to provide an outer horizontal surface and its characteristics is contained in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles)

Conical Surface

(a) **Description** – Conical surface. A surface sloping upwards and outwards from the periphery of the inner horizontal surface.

(b) **Characteristics** – The limits of the conical surface shall comprise:

(1) a lower edge coincident with the periphery of the inner horizontal surface; and

(2) an upper edge located at a specified height above the inner horizontal surface.

(c) The slope of the conical surface shall be measured in a vertical plane perpendicular to the periphery of the inner horizontal surface.

Inner Horizontal Surface

(d) **Description** – Inner horizontal surface. A surface located in a horizontal plane above an aerodrome and its environs.

(e) **Characteristics** – The radius or outer limits of the inner horizontal surface shall be measured from a reference point or points established for such purpose.

Note – The shape of the inner horizontal surface need not necessarily to be circular. Guidance on determining the extent of the inner horizontal surface is contained in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles).

(f) The height of the inner horizontal surface shall be measured above an elevation datum established for such purpose.

Note - Guidance on determining the elevation datum is contained in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles).

Approach Surface

(g) **Description**– Approach surface. An inclined plane or combination of planes preceding the threshold.

(h) **Characteristics**– The limits of the approach surface shall comprise:

(1) an inner edge of specified length, horizontal and perpendicular to the extended centre line of the runway and located at a specified distance before the threshold;

(2) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the runway;

(3) an outer edge parallel to the inner edge; and

(4) The above surfaces shall be varied when lateral offset, offset or curved approaches are utilized, specifically, two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the extended centre line of the lateral offset, offset or curved ground track.

(i) The elevation of the inner edge shall be equal to the elevation of the mid-point of the threshold.

(j) The slope(s) of the approach surface shall be measured in the vertical plane containing the centre line of the runway and shall continue containing the centre line of any lateral offset or curved ground track.

Note. — See Figure 4-2.

Inner Approach Surface

(k) Description – Inner approach surface. A rectangular portion of the approach surface immediately preceding the threshold.

(l) Characteristics – The limits of the inner approach surface shall comprise:

(1) an inner edge coincident with the location of the inner edge of the approach surface but of its own specified length;

(2) two sides originating at the ends of the inner edge and extending parallel to the vertical plane containing the centre line of the runway; and

(3) an outer edge parallel to the inner edge.

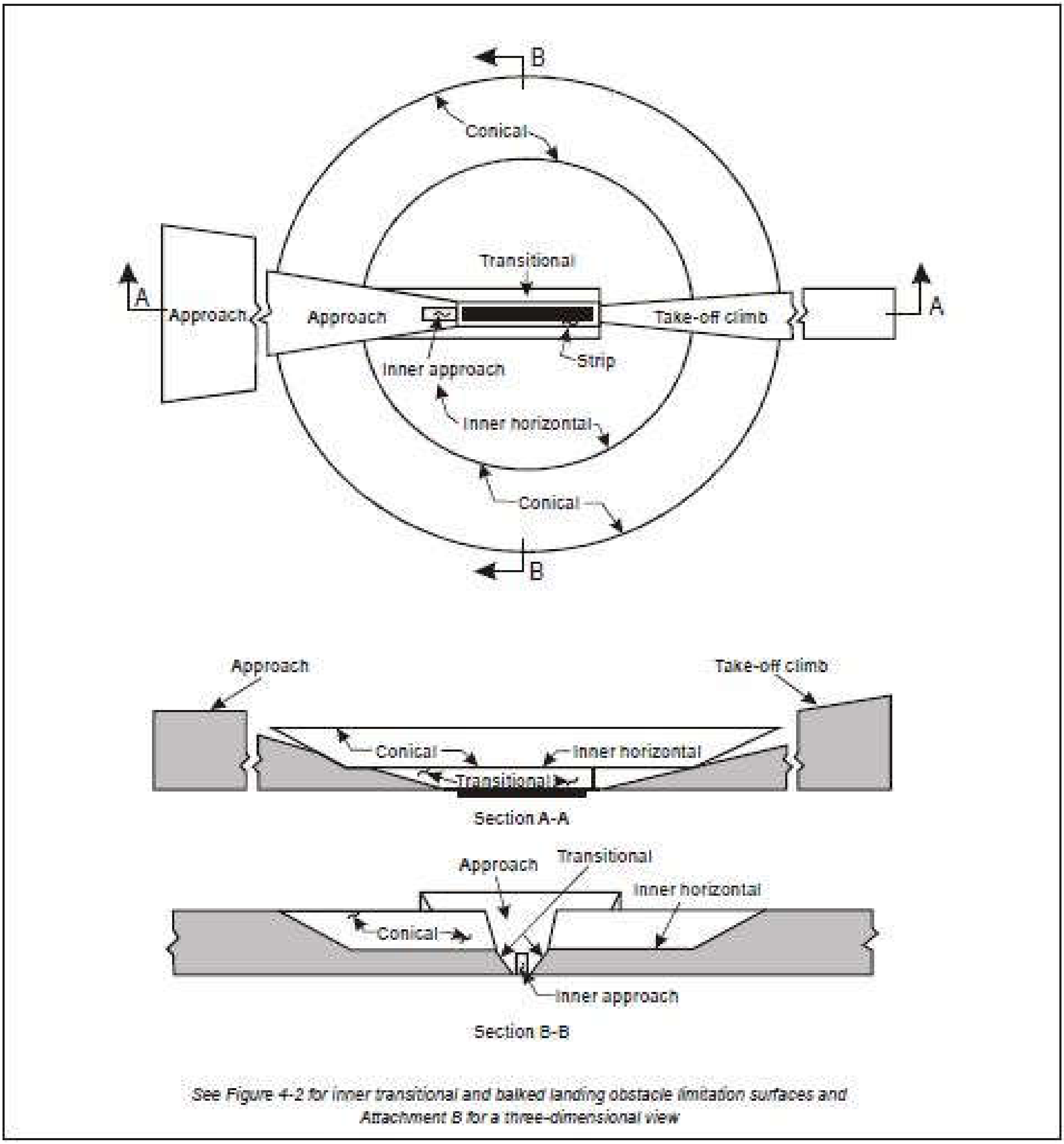


Figure 4- 1. Obstacle limitation surfaces

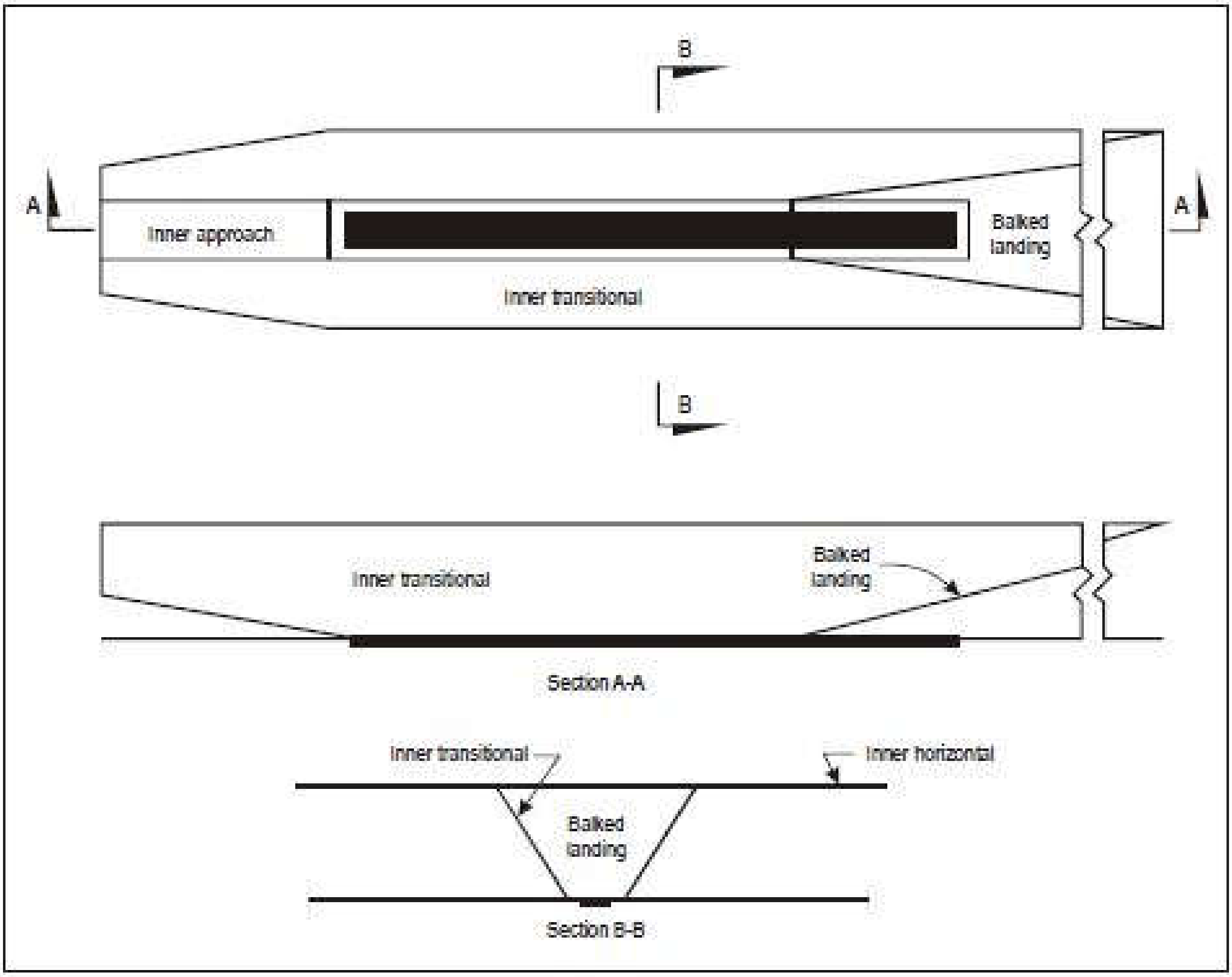


Figure 4- 2. Inner approach, inner transitional and balked landing obstacle limitation surfaces

Transitional Surface

(m) Description – Transitional surface. A complex surface along the side of the strip and part of the side of the approach surface, that slopes upwards and outwards to the inner horizontal surface.

(n) Characteristics – The limits of the transitional surface shall comprise:

(1) a lower edge beginning at the intersection of the side of the approach surface with the inner horizontal surface and extending down the side of the approach surface to the inner edge of the approach surface and from there along the length of the strip parallel to the runway centre line; and

(2) an upper edge located in the plane in the inner horizontal surface.

(o) The elevation of a point on the lower edge shall be:

(1) along the side of the approach surface – equal to the elevation of the approach surface at that point; and

(2) along the strip – equal to the elevation of the nearest point on the centre line of the runway or its extension.

Note – As a result of (2) the transitional surface along the strip will be curved if the runway profile is curved, or a plane if the runway profile is a straight line. The intersection of the transitional surface with the inner horizontal surface will also be a curved or a straight line depending on the runway profile.

(p) The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway.

Inner Transitional Surface

Note – It is intended that the inner transitional surface be the controlling obstacle limitation surface for navigation aids, aircraft and other vehicles that must be near the runway and which is not to be penetrated except for frangible objects. The transitional surface described in paragraph 12.2.4.1(m) of this Part is intended to remain as the controlling obstacle limitation surface for buildings, etc.

(q) **Description** – Inner transitional surface. A surface similar to the transitional surface but closer to the runway.

(r) **Characteristics** – The limits of an inner transitional surface shall comprise:

(1) a lower edge beginning at the end of the inner approach surface and extending down the side of the inner approach surface to the inner edge of that surface, from there along the strip parallel to the runway centre line to the inner edge of the balked landing surface and from there up the side of the balked landing surface to the point where the side intersects the inner horizontal surface; and

(2) an upper edge located in the plane of the inner horizontal surface.

(s) The elevation of a point on the lower edge shall be:

(1) along the side of the inner approach surface and balked landing surface – equal to the elevation of the particular surface at that point; and

(2) along the strip – equal to the elevation of the nearest point on the centre line of the runway or its extension.

Note – As a result of (2) the inner transitional surface along the strip will be curved if the runway profile is curved or a plane if the runway profile is a straight line. The intersection of the inner transitional surface with the inner horizontal surface will also be a curved or a straight line depending on the runway profile.

(t) The slope of inner transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway.

Balked Landing Surface

(u) **Description** – Balked landing surface. An inclined plane located at a specified distance after the threshold, extending between the inner transitional surface.

(v) **Characteristics** – The limits of the balked landing surface shall comprise:

(1) an inner edge horizontal and perpendicular to the centre line of the runway and located at a specified distance after the threshold;

(2) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the runway; and

(3) an outer edge parallel to the inner edge and located in the plane of the inner horizontal surface.

(w) The elevation of the inner edge shall be equal to the elevation of the runway centre line at the location of the inner edge.

(x) The slope of the balked landing surface shall be measured in the vertical plane containing the centre line of the runway.

Take-Off Climb Surface

(y) **Description** – Take-off climb surface. An inclined plane or other specified surface beyond the end of a runway or clearway.

(z) **Characteristics** – The limits of the take-off climb surface shall comprise:

(1) an inner edge horizontal and perpendicular to the centre line of the runway and located either at a specified distance beyond the end of the runway or at the end of the clearway when such is provided and its length exceeds the specified distance;

(2) two sides originating at the ends of the inner edge, d4erging uniformly at a specified rate from the take-off track to a specified final width and

continuing thereafter at that width for the remainder of the length of the take-off climb surface; and

(3) an outer edge horizontal and perpendicular to the specified take-off track.

(a) The elevation of the inner edge shall be equal to the highest point on the runway centre line between the end of the runway and the inner edge, except that when a clearway is provided the elevation shall be equal to the highest point on the ground on the centre line of the clearway.

(b) In the case of a straight take-off flight path, the slope of the take-off climb surface shall be measured in the vertical plane containing the centre line of the runway.

(c) In the case of a take-off flight path involving a turn, the take-off climb surface shall be a complex surface containing the horizontal normal to its centre line, and the slope of the centre line shall be the same as that for a straight take-off flight path.

12.2.4.2 OBSTACLE LIMITATION REQUIREMENTS

Note – The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a runway, i.e. take-off or landing and type of approach, and are intended to be applied when such use is made of the runway. In case where operations are conducted to or from both directions of a runway; then the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.

Non-Instrument Runways

(a) The following obstacle limitation surfaces shall be established for a non-instrument runway.

— Conical surface;

— inner horizontal surface;

— approach surface; and

— transitional surfaces.

(b) The heights and slopes of the surfaces shall not be greater than and their other dimensions not less than, those specified in Table 4-1 of this Part.

(c) New objects or extensions of existing objects shall not be permitted above an approach or transitional surface except when the new object or extension would be shielded by an existing immovable object.

Note – Circumstances in which the shielding principle may reasonably be applied are described in the ICAO Airport Services Manual (Doc 9137), Part 6.

(d) New objects or extensions of existing objects shall not be permitted above the conical surface or inner horizontal surface except when, in the opinion of the Authority, the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(e) Existing objects above any of the surfaces required by section 12.2.4.2(a) of this Part shall as far as practicable be removed except when, in the opinion of the Authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

Note – Because of transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered they may endanger aeroplanes.

(f) In considering proposed construction, account shall be taken of the possible future development of an instrument runway and consequent requirement for more stringent obstacle limitation surfaces.

Non-Precision Approach Runways

(g) The following obstacle limitation surfaces shall be established for a non-precision approach runway:

— Conical surface;

— inner horizontal surface;

— approach surface; and

— transitional surfaces.

(h) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those specified in Table 4-1 of this Part, except in the case of the horizontal section of the approach surface (See12.2.4.2(i)).

(i) The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects:

(1) a horizontal plane 150m above the threshold elevation; or

(2) the horizontal plane passing through the top of any object that governs the obstacle clearance altitude/height (OCA/H); whichever is the higher.

Table 4- 1- Dimensions and Slopes of Obstacle Limitation Surfaces

APPROACH RUNWAYS

	RUNWAY CLASSIFICATION										
	Non-instrument Code number				Non-precision approach Code number			Precision approach category I Code number		Precision approach category II or III Code number
Surface and dimensions[a] (1)	1 (2)	2 (3)	3 (4)	4 (5)	1,2 (6)	3 (7)	4 (8)	1,2 (9)	3,4 (10)	3,4 (11)
CONICAL										
Slope	5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Height	35 m	55 m	75 m	100 m	60 m	75 m	100 m	60 m	100 m	100 m
INNER HORIZONTAL										
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m
Radius	2 000 m	2 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m	3 500 m	4 000 m	4 000 m
INNER APPROACH										
Width	—	—	—	—	—	—	—	90 m	120 m[e]	120 m[e]
Distance from threshold	—	—	—	—	—	—	—	60 m	60 m	60 m
Length	—	—	—	—	—	—	—	900 m	900 m	900 m
Slope								2.5%	2%	2%
APPROACH										
Length of inner edge	60 m	80 m	150 m	150 m	140 m	280 m	280 m	140 m	280 m	280 m
Distance from threshold	30 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence (each side)	10%	10%	10%	10%	15%	15%	15%	15%	15%	15%
First section										
Length	1 600 m	2 500 m	3 000 m	3 000 m	2 500 m	3 000 m	3 000 m	3 000 m	3 000 m	3 000 m
Slope	5%	4%	3.33%	2.5%	3.33%	2%	2%	2.5%	2%	2%
Second section										
Length	—	—	—	—	—	3 600 m[b]	3 600 m[b]	12 000 m	3 600 m[b]	3 600 m[b]
Slope	—	—	—	—	—	2.5%	2.5%	3%	2.5%	2.5%
Horizontal section										
Length	—	—	—	—	—	8 400 m[b]	8 400 m[b]	—	8 400 m[b]	8 400 m[b]
Total length	—	—	—	—	—	15 000 m	15 000 m	15 000 m	15 000 m	15 000 m
TRANSITIONAL										
Slope	20%	20%	14.3%	14.3%	20%	14.3%	14.3%	14.3%	14.3%	14.3%
INNER TRANSITIONAL										
Slope	—	—	—	—	—	—	—	40%	33.3%	33.3%
BALKED LANDING SURFACE										
Length of inner edge	—	—	—	—	—	—	—	90 m	120 m[e]	120 m[e]
Distance from threshold	—	—	—	—	—	—	—	c	1 800 m[d]	1 800 m[d]
Divergence (each side)	—	—	—	—	—	—	—	10%	10%	10%
Slope	—	—	—	—	—	—	—	4%	3.33%	3.33%

a. All dimensions are measured horizontally unless specified otherwise.
b. Variable length (see 12.2.4.2(i) or 12.2.4.2(q)).
c. Distance to the end of strip.
d. Or end of runway whichever is less.
e. Where the code letter is F (Table 1-1), the width is increased to 140 m except for those aerodromes that accommodate a code letter F aeroplane equipped with digital avionics that provide steering commands to maintain an established track during the go-around manoeuvre.

Note.— See Circulars 301 and 345 (forthcoming), and Chapter 4 of the PANS-Aerodromes, Part I (Doc 9981) for further information.

Note. — See Circulars 301-345, and Section 4 of the PANS-Aerodromes, NCAA-AC-ARD 036 for further information.

(j) New objects or extensions of existing objects shall not be permitted above an approach surface within 3,000m of the inner edge or above a transitional surface except when the new object or extension would be shielded by an existing immovable object.

Note – Circumstances in which the shielding principle may reasonably be applied are described in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles).

(k) New objects or extensions of existing objects shall not be permitted above the approach surface beyond 3000m from the inner edge, the conical surface or inner horizontal surface except when the object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

(l) Existing objects above any of the surfaces required by 12.2.4.2(g) shall as far as practicable be removed except when the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

Note – Because of the transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered they may endanger aeroplanes

Precision Approach Runways

Note 1 – See section 12.2…. for information regarding siting and construction of equipment and installations on operational areas.

Note 2 – Guidance on obstacle limitation surfaces for precision approach runways is given in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles).

(m) The following obstacle limitation surfaces shall be established for a precision approach runway category I:

— conical surface;

— inner horizontal surface;

— approach surface; and

— transitional surfaces.

(n) The following obstacle limitation surfaces shall be established for a precision approach runway category I:

— inner approach surface;

— inner transitional surfaces; and

— balked landing surface.

(o) The following obstacle limitation surfaces shall be established for a precision approach runway category II or III:

— Conical surface;

— inner horizontal surface;

— approach surface and inner approach surface;

— transitional surfaces;

— inner transitional surfaces; and

— balked landing surface.

(p) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those specified in Table 4-1, except in the case of the horizontal section of the approach surface (See paragraph12.2.4.2(q)).

(q) The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects:

(1) a horizontal plane 150m above the threshold elevation; or

(2) the horizontal plane passing through the top of any object that governs the obstacle clearance limit;

whichever is the higher.

(r) Fixed objects shall not be permitted above the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which because of their function must be located on the strip. Mobile objects shall not be permitted above these surfaces during the use of the runway for landing.

(s) New objects or extensions of existing objects shall not be permitted above an approach surface or a transitional surface except when, in the opinion of the

Authority, the new object or extension would be shielded by an existing immovable object.

Note – Circumstances in which the shielding principle may reasonably be applied are described in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles).

(t) New objects or extensions of existing objects shall not be permitted above the conical surface and the inner horizontal surface except when, in the opinion of the Authority, an object would be shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

(u) Existing objects above an approach surface, a transitional surface, the conical surface and inner horizontal surface shall as far as practicable be removed except when, in the opinion of the Authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

Note – Because of transverse or longitudinal slopes on a strip, in certain cases the inner edge or portions of the inner edge of the approach surface may be below the corresponding elevation of the strip. It is not intended that the strip be graded to conform with the inner edge of the approach surface, nor is it intended that terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, be removed unless it is considered they may endanger aeroplanes.

Runways Meant for Take-Off

(v) The following obstacle limitation surface shall be established for a runway meant for take-off climb surface.

(w) The dimensions of the surface shall be not less than the dimensions specified in Table 4-2 of this Part, except that a lesser length may be adopted for the take-off climb surface where such lesser length would be consistent with procedural measures adopted to govern the outward flight of aeroplanes.

(x) The operational characteristics of aeroplanes for which the runway is intended shall be examined to see if it is desirable to reduce the slope specified in Table 4-

2 of this Part when critical operating conditions are to be catered to. If the specified slope is reduced, corresponding adjustment in the length of take-off climb surface shall be made so as to provide protection to a height of 300m.

Note – When local conditions differ widely from sea level standard atmospheric conditions, it may be advisable for the slope specified in Table 4-2 of this Part to be reduced. The degree of this reduction depends on the divergence between local conditions and sea level standard atmospheric conditions, and on the performance characteristics and operational requirements of the aeroplanes for which the runway is intended.

(y) New objects or extensions of existing objects shall not be permitted above a take-off climb surface except when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

Note – Circumstances in which the shielding principle may reasonably be applied are described in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles).

(z) If no object reaches the 2 per cent (1:50) take-off climb surface, new objects shall be limited to preserve the existing obstacle free surface or a surface down to a slope of 1.6 percent (1:62.5).

Table 4- 2 - Dimensions and slopes of obstacle limitation surfaces

RUNWAYS MEANT FOR TAKE-OFF

Surface and dimensions[a] (1)	Code number 1 (2)	2 (3)	3 or 4 (4)
TAKE-OFF CLIMB			
Length of inner edge	60 m	80 m	180 m
Distance from runway end[b]	30 m	60 m	60 m
Divergence (each side)	10%	10%	12.5%
Final width	380 m	580 m	1 200 m 1 800 m[c]
Length	1 600 m	2 500 m	15 000 m
Slope	5%	4%	2%[d]

a. All dimensions are measured horizontally unless specified otherwise.
b. The take-off climb surface starts at the end of the clearway if the clearway length exceeds the specified distance.
c. 1 800 m when the intended track includes changes of heading greater than 15° for operations conducted in IMC, VMC by night.
d. See 12.2.4.2(X) and 12.2.4.2(Z).

(a) Existing objects that extend above a take-off climb surface shall be removed except when, in the opinion of the Authority, an object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

Note – Because of transverse slopes on a strip or clearway, in certain cases portions of the inner edge of the take-off climb surface may be below the corresponding elevation of the strip or clearway. It is not intended that the strip or clearway be graded to conform with the inner edge of the take-off climb surface, nor is it intended that terrain or objects which are above the take-off climb surface beyond the end of the strip of clearway, but below the level of the strip or clearway, be removed unless it is considered that it may endanger aeroplanes. Similar considerations apply at the junction of a clearway and strip where differences in transverse slopes exist.

12.2.4.3 OBJECTS OUTSIDE THE OBSTACLE LIMITATION SURFACES

(a) Arrangements shall be made to enable the Authority to be consulted concerning proposed construction beyond the limits of the obstacle limitation surfaces that extend above a height established by the Authority, in order to permit an aeronautical study of the effect of such construction on the operation of aeroplanes.

(b) In areas beyond the limits of the obstacle limitation surfaces, at least those objects that extend to a height of 150m or more above ground elevation shall be regarded as obstacles, unless a special aeronautical study indicate that they do not constitute a hazard to operations.

Note – The study may have regard to the nature of operations concerned and may distinguish between day and night operations.

12.2.4.4 OTHER OBJECTS

Objects which do not project through the approach surface but which would nevertheless adversely affect the optimum siting or performance of visual or non-visual aids shall, be removed.

Anything which may, after aeronautical study, endanger aeroplanes on the movement area or in the air within the limits of the inner horizontal and conical surfaces shall be regarded as an obstacle and shall be removed.

Note – In certain circumstances, objects that do not project above any of the surfaces enumerated in 12.2.4.1 may constitute a hazard to aeroplanes as, for example, where there are one or more isolated objects in the vicinity of an aerodrome.

12.2.5 VISUAL AIDS FOR NAVIGATION

12.2.5.1 INDICATORS AND SIGNALING DEVICES

(a) WIND DIRECTION INDICATOR

Application

(1) An aerodrome shall be equipped with at least one wind direction indicator.

Location

(2) A wind direction indicator shall be located so as to be visible from aircraft in flight or on the movement area and in such a way as to be free from the effects of air disturbances caused by nearby objects.

Characteristics

(3) The wind direction indicator shall be in the form of a truncated cone made of fabric and shall have a length of not less than 3.6 m and a diameter, at the larger end, of not less than 0.9 m. It shall be constructed so that it gives a clear indication of the direction of the surface wind and a general indication of the wind speed. The colour or colours shall be so selected as to make the wind direction indicator clearly visible and understandable from a height of at least 300 m, having regard to background. A single colour, preferably white or orange, shall be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they shall be orange and white, red and white, or black and white, and shall be arranged in five alternate bands, the first and last bands being the darker colour.

(4) The location of at least one wind direction indicator shall be marked by a circular band 15 m in diameter and 1.2 m wide. The band shall be centered about the wind direction indicator support and shall be in a colour chosen to give adequate conspicuity, preferably white.

(5) Provision shall be made for illuminating at least one wind indicator at an aerodrome intended for use at night.

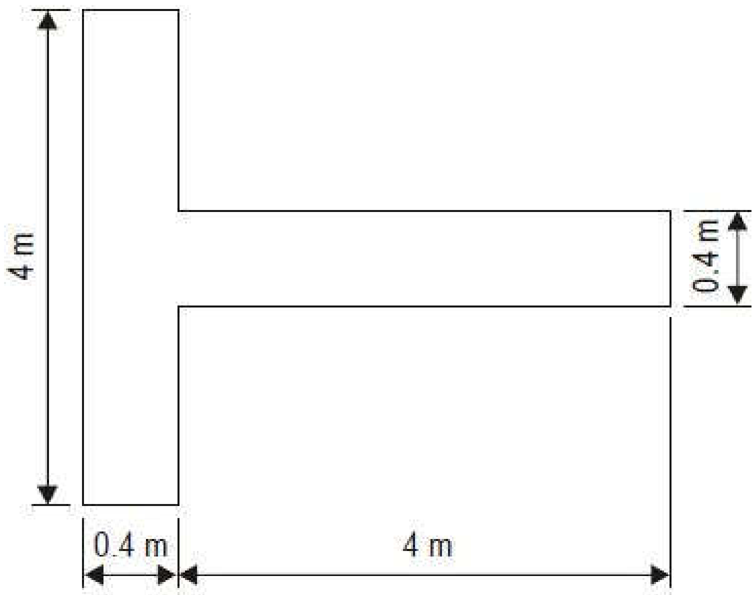
(b) LANDING DIRECTION INDICATOR

Location

(1) Where provided, a landing direction indicator shall be located in a conspicuous place on the aerodrome.

Characteristics

(2) The landing direction indicator shall be in the form of a "T"



(3) The shape and minimum dimensions of a landing "T" shall be as shown in Figure 5-1. The colour of the landing "T" shall be either white or orange, the choice being dependent on the colour that contrasts best with the background against which the indicator will be viewed. Where required for use at night, the landing "T" shall either be illuminated or outlined by white lights.

(c) SIGNALLING LAMP

Application

(1) A signalling lamp shall be provided at a controlled aerodrome in the aerodrome control tower.

Characteristics

(2) A signalling lamp shall be capable of producing red, green and white signals, and of:

(i) being aimed manually at any target as required;

(ii) giving a signal in any one colour followed by a signal in either of the two other colours; and

(iii) transmitting a message in any one of the three colours by Morse Code up to a speed of at least four words per minute.

When selecting the green light, use shall be made of the restricted boundary of green as specified in IS:12.2.1.2

(3) The beam spread shall be not less than 1° nor greater than 3°, with negligible light beyond 3°. When the signalling lamp is intended for use in the daytime the intensity of the coloured light shall be not less than 6 000cd.

(d) SIGNAL PANELS AND SIGNAL AREA

Note — The inclusion of detailed specifications for a signal area in this section is not intended to imply that one has to be provided. Advisory Circular "Visual Aids" (NCAA-AC- ARD017). ICAO Annex 2, Appendix 1 specifies the shape, colour and use of visual ground signals. The ICAO Aerodrome Design Manual (Doc 9157), Part 4 provides guidance on their design.

Location of Signal Area

(1) The signal area shall be located so as to be visible for all angles of azimuth above an angle of 10° above the horizontal when viewed from a height of 300m.

Characteristics of Signal Area

(2) The signal area shall be an even horizontal surface at least 9 m square.

(3) The colour of the signal area shall be chosen to contrast with the colours of the signal panels used, and it shall be surrounded by a white border not less than 0.3 m wide.

12.2.5.2 MARKINGS

(a) GENERAL

Interruption of Runway Markings

(1) At an intersection of two (or more) runways the markings of the more important runway, except for the runway side stripe marking, shall be displayed and the markings of the other runway(s) shall be interrupted. The runway side stripe marking of the more important runway may be either continued across the intersection or interrupted.

(2) The order of importance of runways for the display of runway markings shall be as follows:

1st — precision approach runway;

2nd — non-precision approach runway; and

3rd. — non-instrument runway.

(3) At an intersection of a runway and taxiway the markings of the runway shall be displayed and the markings of the taxiway interrupted, except that runway side stripe markings may be interrupted.

Note — See 12.2.5.2(h)(7) of this Part regarding the manner of connecting runway and taxiway centre line markings.

Colour and Conspicuity

(4) Runway Markings shall be White.

Note 1 — It has been found that, on runway surfaces of light colour, the conspicuity of white markings can be improved by outlining them in black.

Note 2 — It is preferable that the risk of uneven friction characteristics on markings be reduced by the use of a suitable kind of paint.

Note 3 — Markings may consist of solid areas or a series of longitudinal stripes providing an effect equivalent to the solid areas.

(5) Taxiway markings, runway turn pads and aircraft stand markings shall be yellow.

(6) Apron safety lines shall be of a conspicuous colour which shall contrast with that used for aircraft stand markings.

(7) At aerodromes where operations take place at night, pavement markings shall be made with reflective materials designed to enhance the visibility of the markings.

Note — Guidance on reflective materials Advisory Circular "Visual Aids" (NCAA-AC- ARD017)

Unpaved Taxiways

(8) An unpaved taxiway shall be provided, with the markings prescribed for paved taxiways

(b) RUNWAY DESIGNATION MARKING

Application

(1) A runway designation marking shall be provided at the thresholds of a paved runway.

(2) A runway designation marking shall be provided at the thresholds of an unpaved runway.

Location

(3) A runway designation marking shall be located at a threshold as shown in Figure 5-2 as appropriate.

Note — If the runway threshold is displaced from the extremity of the runway, a sign showing the designation of the runway may be provided for aeroplanes taking off.

Characteristics

(4) A runway designation marking shall consist of a two-digit number and on parallel runways shall be supplemented with a letter. On a single runway, dual parallel runways and triple parallel runways the two-digit number shall be the whole number nearest the one-tenth of the magnetic north when viewed from the direction of approach. On four or more parallel runways, one set of adjacent runways shall be numbered to the nearest one-tenth magnetic azimuth and the other set of adjacent runways numbered to the next nearest one-tenth of the magnetic azimuth. When the above rule would give a single digit number, it shall be preceded by a zero.

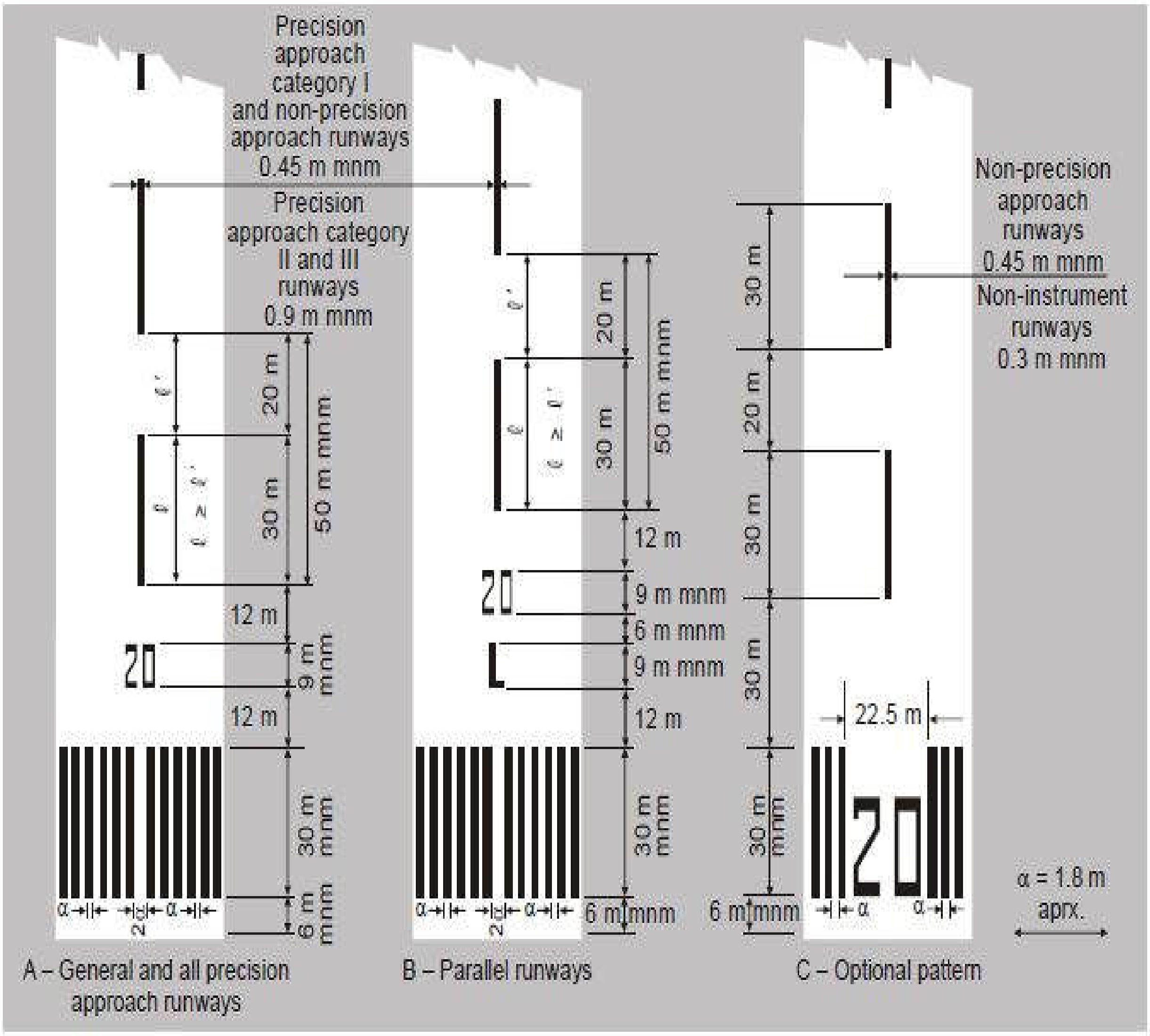


Figure 5- 2 Runway Designation, Centre Line and Threshold Marking

(5) In the case of parallel runways, each runway designation number shall be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

— for two parallel runways: “L”“R”;

— for three parallel runways: “L” “C”“R”;

— for four parallel runways: “L” “R” “L”“R”;

— for five parallel runways: “L” “C” “R” “L” “R” or “L” “R” “L”“C” “R”;and

— for six parallel runways: “L” “C” “R” “L” “C”“R”.

(6) The numbers and letters shall be in the form and proportion shown in Figure 5-3. The dimensions shall be not less than those shown in Figure 5-3, but where the numbers are incorporated in the threshold marking, larger dimensions shall be used in order to fill adequately the gap between the stripes of the threshold marking.

(c) **RUNWAY CENTRE LINE MARKING**

Application

(1) A runway centre line marking shall be provided on a paved runway.

Location

(2) A runway centre line marking shall be located along the centre line of the runway between the runway designation markings as shown in Figure 5-2, except when interrupted in compliance with 12.2.5.2(a)(1) of this regulations.

Characteristics

(3) A runway centre line marking shall consist of a line of uniformly spaced stripes and gaps. The length of a stripe plus a gap shall be not less than 50 m or more than 75 m. The length of each stripe shall be at least equal to the length of the gap or 30 m, whichever is greater.

(4) The width of the stripes shall be not less than:

— 0.90 m on precision approach category II and III runways;

— 0.45 m on non-precision approach runways where the code number is 3 or 4, and precision approach category I runways; and

— 0.30 m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.

(d) **THRESHOLD MARKING**

Application

(1) A threshold marking shall be provided at the threshold of a paved instrument runway, and of a paved non- instrument runway where the code number is 3 or 4 and the runway is intended for use by international commercial air transport.

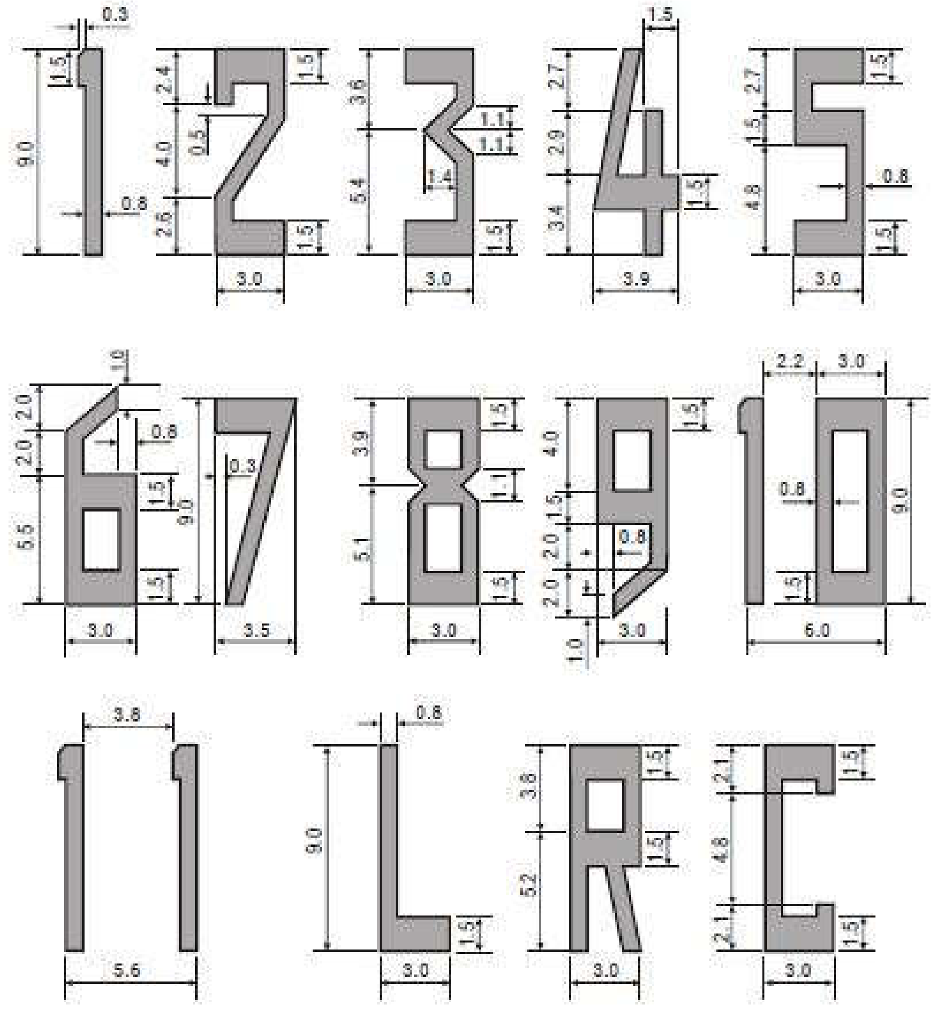
(2) A threshold marking shall be provided at the threshold of a paved non-instrument runway where the code number is 3 or 4 and the runway is intended for use by other than international commercial air transport.

(3) A threshold marking shall be provided at the thresholds of an unpaved runway.

Note — The ICAO Aerodrome Design Manual (Doc 9157), Part 4, shows a form of marking which has been found satisfactory for the marking of downward slopes immediately before the threshold.

Location

(4) The stripes of the threshold marking shall commence 6 m from the threshold.



Note.—All units are expressed in metres.

Figure 5- 3. Forms and Proportion of Numbers and Letters for Runway Designation Marking

Characteristics

(5) A runway threshold marking shall consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway as shown in Figure 5-2 (A) and (B) for a runway width of 45m. The number of stripes shall be in accordance with the runway width as follows:

Runway width	Number of stripes
18m	4
23m	6
30m	8
45m	12
60m	16

except that on non-precision approach and non-instrument runways 45m or greater in width, they may be as shown in Figure 5-2(C).

(6) The stripes shall extend laterally to within 3m of the edge of a runway or to a distance of 27m on either side of a runway centre line, whichever results in the smaller lateral distance. Where a runway designation marking is placed within a threshold marking there shall be a minimum of three stripes on each side of the centre line of the runway. Where a runway designation marking is placed above a threshold marking, the stripes shall be continued across the runway. The stripes shall be at least 30m long and approximately 1.80 m wide with spacing's of approximately 1.80m between them except that, where the stripes are continued across a runway, a double spacing shall be used to separate the two stripes nearest the centre line of the runway, and in the case where the designation marking is included within the threshold marking this spacing shall be 22.5m.

Transverse Stripe

(7) Where a threshold is displaced from the extremity of a runway or where the extremity of a runway is not square with the runway centre line, a transverse stripe as shown in Figure 5-4 (B) shall be added to the threshold marking.

(8) A transverse stripe shall be not less than 1.80 m wide.

Arrows

(9) Where a runway threshold is permanently displaced, arrows conforming to Figure 5-4 (B) shall be provided on the portion of the runway before the displaced threshold.

(10) When a runway threshold is temporarily displaced from the normal position, it shall be marked as shown in Figure 5-4 (A) or 5-4 (B) and all markings prior to the displaced threshold shall be obscured except the runway centre line marking, which shall be converted to arrows.

Note 1. — In the case where a threshold is temporarily displaced for only a short period of time, it has been found satisfactory to use markers in the form and colour of a displaced threshold marking rather than attempting to paint this marking on the runway.

Note 2. — When the runway before a displaced threshold is unfit for the surface movement of aircraft, closed markings, as described in 12.2.7.1. (d) are required to be provided.

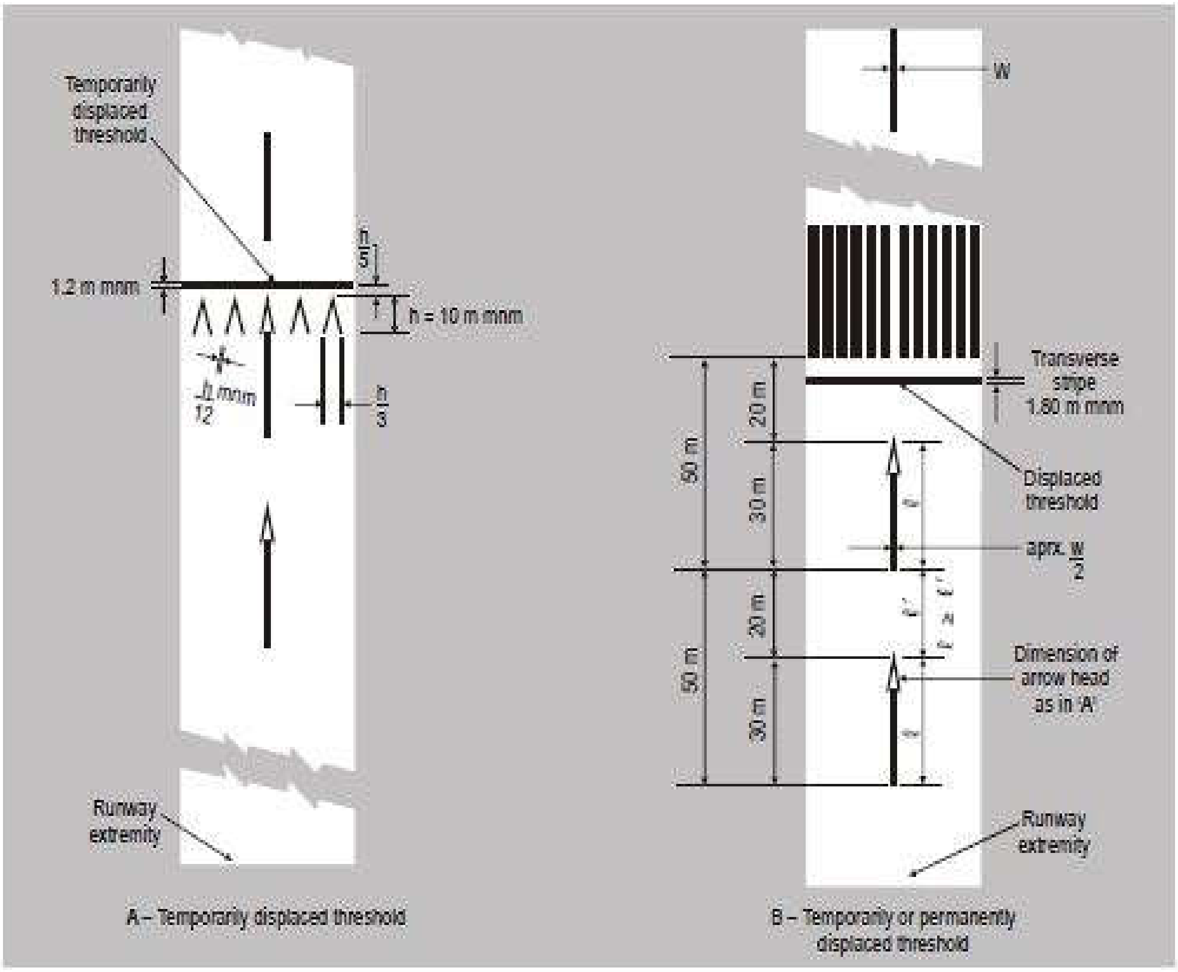


Figure 5- 4. Displaced Threshold Marking

(e) **AIMING POINT MARKING**

Application

(1) An aiming point marking shall be provided at each approach end of a paved instrument runway where the code number is 2, 3 or4.

(2) An aiming point marking shall be provided at each approach end of:

— a paved non-instrument runway where the code number is 3 or4,

— a paved instrument runway where the code number is 1, when additional conspicuity of the aiming point is desirable.

Location

(3) The aiming point marking shall commence no closer to the threshold than the distance indicated in the appropriate column of Table 5-2 of this Part, except that, on a runway equipped with a visual approach slope indicator system, the beginning of the marking shall be coincident with the visual approach slope origin.

(4) An aiming point marking shall consist of two conspicuous stripes. The dimensions of the stripes and the lateral spacing between their inner sides shall be in accordance with the provisions of the appropriate column of Table 5-2 of this Part. Where a touchdown zone marking is provided, the lateral spacing between the markings shall be the same as that of the touch-down zone marking.

(f) **TOUCHDOWN ZONE MARKING**

Application

(1) A touchdown zone marking shall be provided in the touchdown zone of a paved precision approach runway where the code number is 2, 3 or4.

(2) A touchdown zone marking shall be provided in the touchdown zone of a paved non-precision approach or non-instrument runway where the code number is 3 or 4 and additional conspicuity of the touchdown zone is desirable.

Table 5- 1- Location and dimensions of aiming point marking

Location and dimensions (1)	Landing distance available: Less than 800 m (2)	800 m up to but not including 1 200 m (3)	1 200 m up to but not including 2 400 m (4)	2 400 m and above (5)
Distance from threshold to beginning of marking	150 m	250 m	300 m	400 m
Length of stripe[a]	30–45 m	30–45 m	45–60 m	45–60 m
Width of stripe	4 m	6 m	6–10 m[b]	6–10 m[b]
Lateral spacing between inner sides of stripes	6 m[c]	9 m[c]	18–22.5 m	18–22.5 m

a. The greater dimensions of the specified ranges are intended to be used where increased conspicuity is required.
b. The lateral spacing may be varied within these limits to minimize the contamination of the marking by rubber deposits.
c. These figures were deduced by reference to the outer main gear wheel span which is element 2 of the aerodrome reference code at Section 12.2.1.5, Table 1-1.

Location and Characteristics

(3) A touchdown zone marking shall consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

Landing distance available or the distance between the threshold	***Pair(s) of markings***
Less than 900 m	1
900m up to but not including 1200 m	2
1200m up to but not including 1500 m	3
1500m up to but not including 2400 m	4
2400m or more	6

(4) A

touchdown zone marking shall conform to either of the two patterns shown in Figure 5-5. For the pattern shown in Figure 5-5 (A), the markings shall be not less than 22.5 m long and 3 m wide. For the pattern shown in Figure 5-5(B), each stripe of each marking shall be not less than 22.5 m long and 1.8 m wide with a spacing of 1.5 m between adjacent stripes. The lateral spacing between the inner sides of the rectangles shall be equal to that of the aiming point marking where provided. Where an aiming point marking is not provided, the lateral spacing between the inner sides of the rectangles shall correspond to the lateral spacing specified for the aiming point marking in Table 5-1 of this Part (columns 2, 3, 4 or 5, as appropriate). The pairs of markings shall be provided at longitudinal spacing of 150 m beginning from the threshold except that pairs of touchdown zone markings coincident with or located within 50m of an aiming point marking shall be deleted from the pattern.

(5) On a non-precision approach runway where the code number is 2, an additional pair of touchdown zone marking stripes shall be provided 150m beyond the beginning of the aiming point marking.

(g) **RUNWAY SIDE STRIPE MARKING**

Application

(1) A runway side stripe marking shall be provided between the thresholds of a paved runway where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain.

(2) A runway side stripe marking shall be provided on a precision approach runway irrespective of the contrast between the runway edges and the shoulders or the surrounding terrain.

Location

(3) A runway side stripe marking shall consist of two stripes, one placed along each edge of the runway with the outer edge of each stripe approximately on the edge of the runway, except that, where the runway is greater than 60 m in width, the stripes shall be located 30 m from the runway centre line.

(4) Where runway turn pad is provided, the runway stripe marking shall be continued between the runway and the runway turn pad.

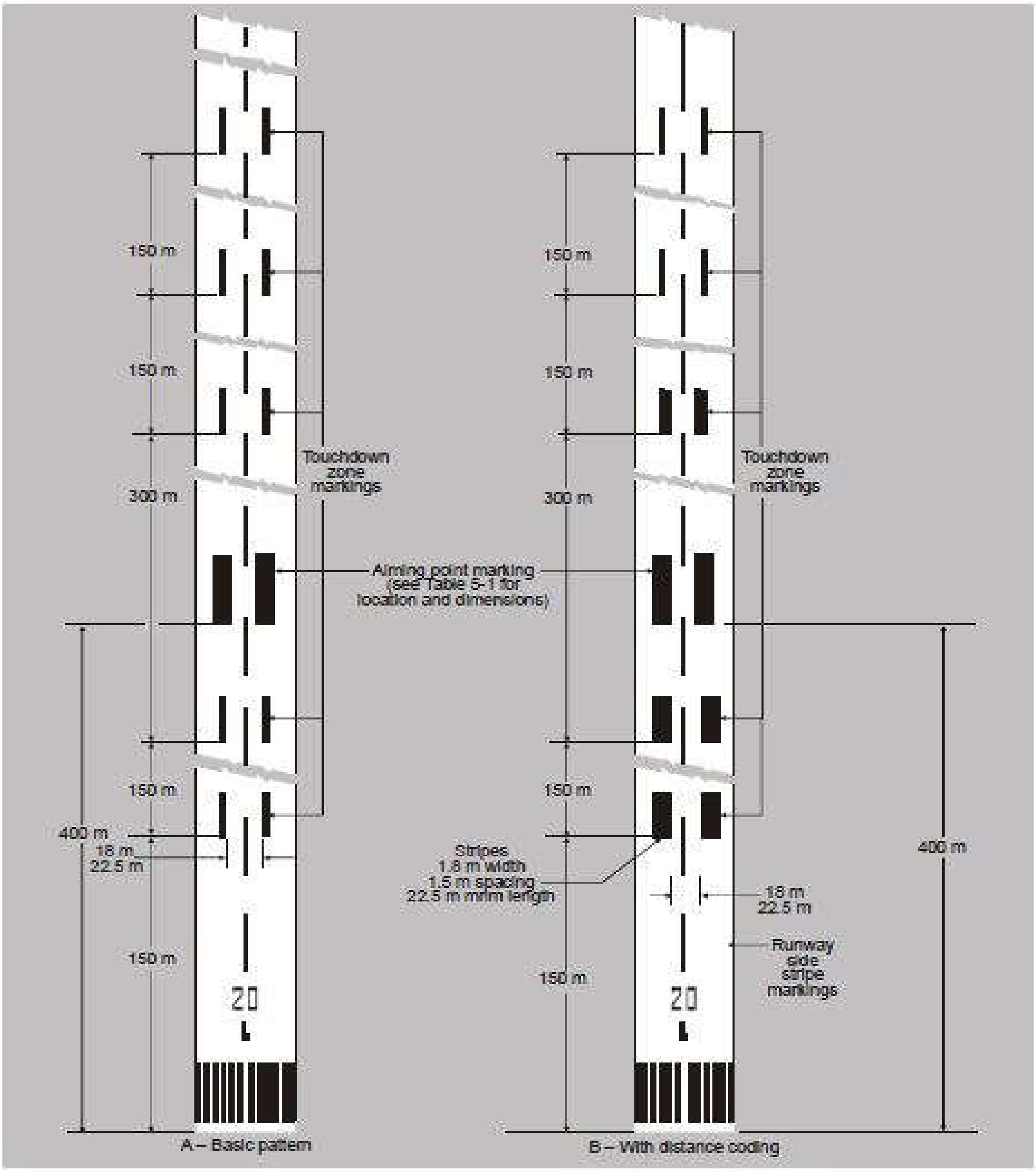


Figure 5- 5 Aiming point and touchdown zone markings (illustrated for a runway with a length of 2 400m or more

Characteristics

(5) A runway side stripe shall have an overall width of at least 0.9 m on runways 30 m or more in width and at least 0.45 m on narrower runways.

(h) TAXIWAY CENTRE LINE MARKING

Application

(1) Taxiway centre line marking shall be provided on a paved taxiway and apron where the code number is 3 or 4 in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

(2) Taxiway centre line marking shall be provided on a paved taxiway and apron where the code number is 1 or 2 in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

(3) Taxiway centre line marking shall be provided on a paved runway when the runway is part of a standard taxi-route and:

(i) there is no runway centre line marking; or

(ii) where the taxiway centre line is not coincident with the runway centre line.

(4) Where it is necessary to denote the proximity of a runway-holding position, enhanced taxiway centre line marking shall be provided.

Note. – The provision of enhanced taxiway centre line marking may form part of runway incursion prevention measures.

(5) Where provided, enhanced taxiway centre line marking shall be installed at each taxiway/runway intersection.

Location

(6) On a straight section of a taxiway, the taxiway centre line marking shall be located along the taxiway centre line. On a taxiway curve the marking shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the curve.

Note — See 12.2.3.9(e) and Figure 3-2.

(7) At an intersection of a taxiway with a runway where the taxiway serves as an exit from the runway, the taxiway centre line marking shall be curved into the runway centre line marking as shown in Figures 5-6 and 5-26. The taxiway centre line marking shall be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

(8) Where taxiway centre line marking is provided on a runway in accordance with 12.2.5.2(h)(3) the marking shall be located on the centre line of the designated taxiway.

(9) Where provided

(i) An enhanced taxiway centre line marking shall extend from the runway-holding position Pattern A (as defined in Figure 5-6, Taxiway markings) to a distance of up to 47 m in the direction of travel away from the runway. See Figure 5-7(a).

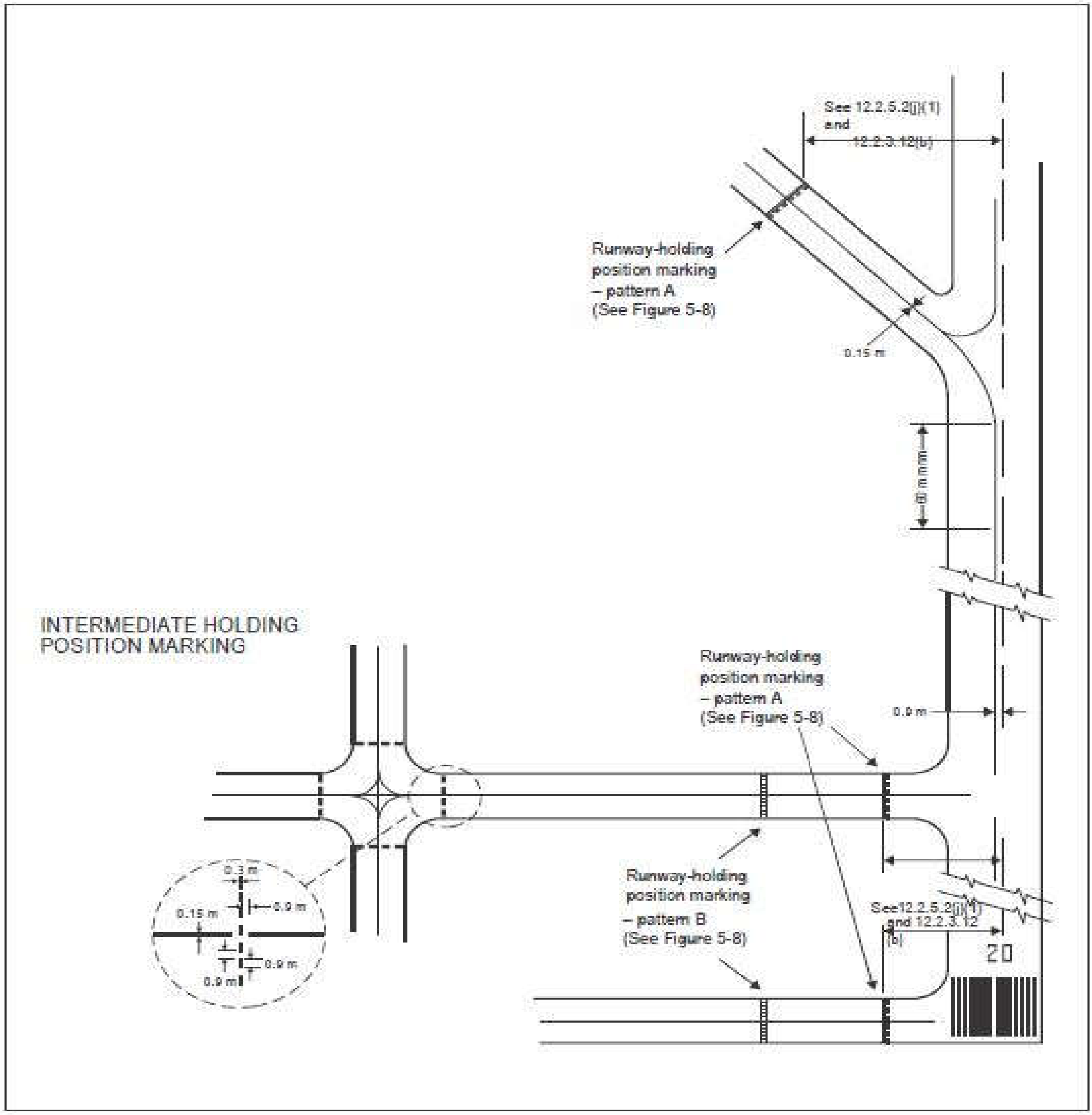


Figure 5- 6. Taxiway markings
(shown with basic runway markings)

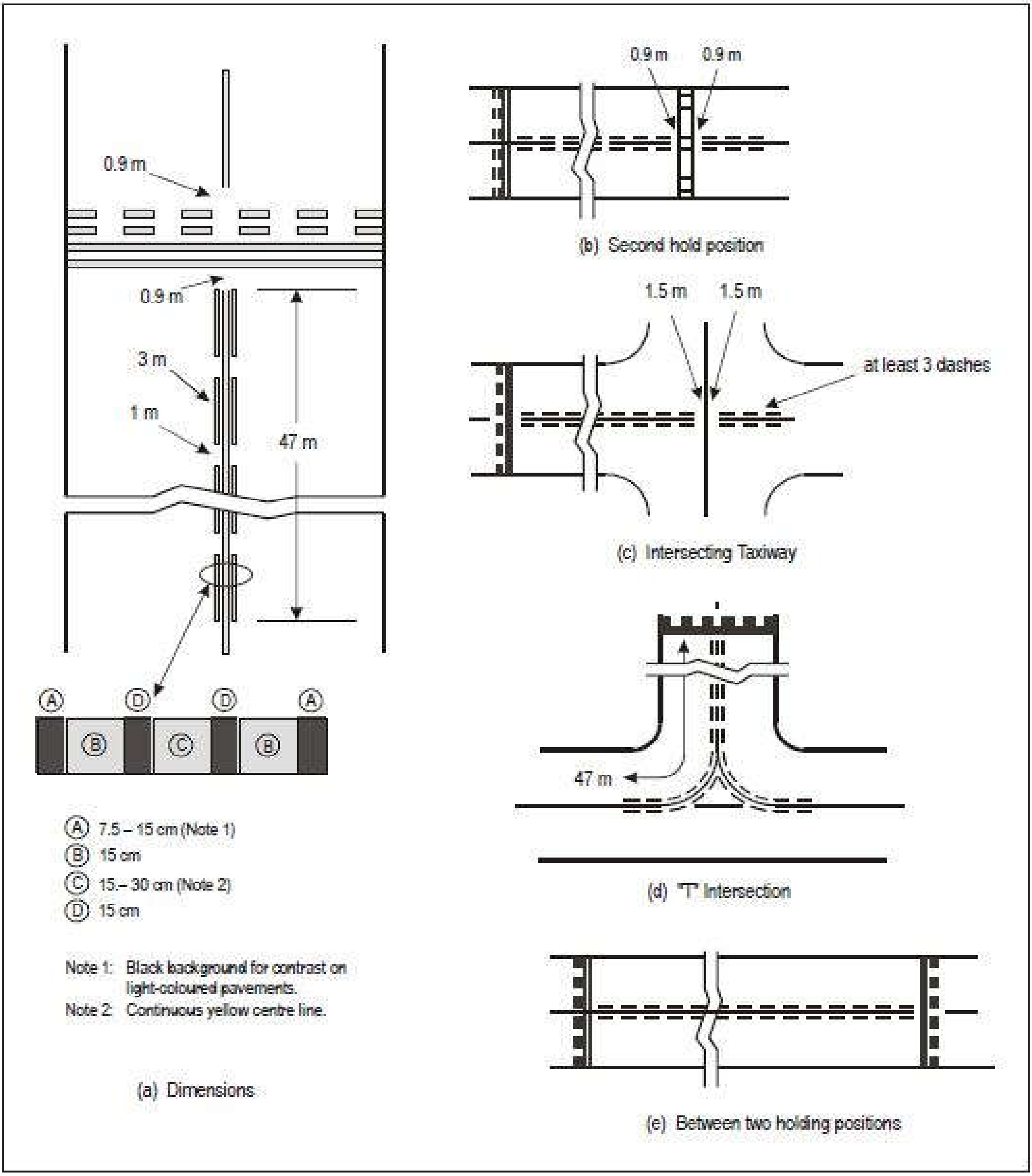


Figure 5- 7. Enhanced taxiway centre line marking

(ii) If the enhanced taxiway centre line marking intersects another runway-holding position marking, such as for a precision approach category II or III runway that is located within 47 m of the first runway-holding position marking the enhanced taxiway centre line marking shall be interrupted 0.9 m prior to and after the intersected runway-holding position marking. The enhanced taxiway centre line marking shall continue beyond the intersected runway-holding position marking for at least three dashed line segments or 47 m from start to finish, whichever is greater. See Figure 5-7(b).

(iii) If the enhanced taxiway centre line marking continues through a taxiway/taxiway intersection that is located within 47 m of the runway-holding position marking, the enhanced taxiway centre line marking shall be interrupted 1.5m prior to and after the point where the intersected taxiway centre line crosses the enhanced taxiway centre line. The enhanced taxiway centre line marking shall continue beyond the taxiway/taxiway intersection for at least three dashed line segments or 47 m from start to finish, whichever is greater. See Figure 5-7(c).

(iv) Where two taxiway centre lines converge at or before the runway-holding position marking, the inner dashed line shall not be less than 3m in length. See Figure 5-7(d).

(v) Where there are two opposing runway-holding position markings and the distance between the markings is less than 94 m, the enhanced taxiway centre line markings shall extend over this entire distance. The enhanced taxiway centre line markings shall not extend beyond either runway-holding position marking. See Figure 5-7(e).

Characteristics

(10) A taxiway centre line marking shall be at least 15cm in width and continuous in length except where it intersects with a runway-holding position marking or an intermediate holding position marking as shown in Figure5-6.

(11) Enhanced taxiway centre line marking shall be as shown in Figure5-7.

(i) RUNWAY TURN PAD MARKING

Marking Application

(1) Where a runway turn pad is provided, a runway turn pad marking shall be provided for continuous guidance to enable an aeroplane to complete a 180-degree turn and align with the runway centreline.

Location

(2) The runway turn pad marking shall be curved from the runway centre line into the turn pad. The radius of the curve shall be compatible with the maneuvering capability and normal taxiing speeds of the aeroplanes for which the runway turn pad is intended. The intersection angle of the runway turn pad marking with the runway centre line shall not be greater than 30 degrees.

(3) The runway turn pad marking shall be extended parallel to the runway centre line marking for a distance of at least 60 m beyond the point of tangency where the code number is 3 or 4, and for a distance of at least 30 m where the code number is 1 or 2.

(4) A runway turn pad marking shall guide the aeroplane in such a way as to allow a straight portion of taxiing before the point where a 180-degree turn is to be made. The straight portion of the runway turn pad marking shall be parallel to the outer edge of the runway turn pad.

(5) The design of the curve allowing the aeroplane to negotiatea180-degree turn shall be based on a nose wheel steering angle not exceeding 45degrees.

(6) The design of the turn pad marking shall be such that, when the cockpit of the aeroplane remains over the runway turn pad marking, the clearance distance between any wheel of the aeroplane landing gear and the edge of the runway turn pad shall be not less than those specified in 12.2.3.3(f).

Note. — For ease of maneuvering, consideration may be given to providing a larger wheel-to-edge clearance for codes E and F aeroplanes.

Characteristics

(7) A runway turn pad marking shall be at least 15 cm in width and continuous in length.

(j) **RUNWAY-HOLDING POSITION MARKING**

Application and Location

(1) A runway-holding position marking shall be displayed along a runway-holding position.

Note — See section 12.2.5.4(b) concerning the provision of signs at runway-holding positions.

Characteristics

(2) At an intersection of a taxiway and a non-instrument, non-precision approach or take-off runway, the runway-holding position marking shall be as shown in Figure 5-6, pattern A.

(3) Where a single runway-holding position is provided at an intersection of a taxiway and a precision approach category I, 2 or 3 runway, the runway-holding position marking shall be as shown in Figure 5-6, pattern A. Where two or three runway-holding positions are provided at such an intersection, the runway-holding position marking closer (closest) to the runway shall be as shown in Figure 5-6, pattern A and the markings farther from the runway shall be as shown in Figure 5-6, pattern B.

(4) The runway-holding position marking displayed at a runway-holding position established in accordance with 12.2.3.12(c) of this Part shall be as shown in Figure 5-6, pattern A.

(5) Until 26 November 2026, the dimensions of runway-holding position markings shall be as shown in Figure 5-8, pattern A1 (or A2) or pattern B1 (or B2), as appropriate.

(6) As of 26 November 2026, the dimensions of runway-holding position marking shall be as shown in Figure 5-8, pattern A2 or pattern B2, as appropriate.

(7) Where increased conspicuity of the runway-holding position is required, the dimensions of runway-holding position marking shall be as shown in Figure 5-8, pattern A2 or pattern B2, as appropriate.

Note. — An increased conspicuity of the runway-holding position can be required, notably to avoid incursion risks.

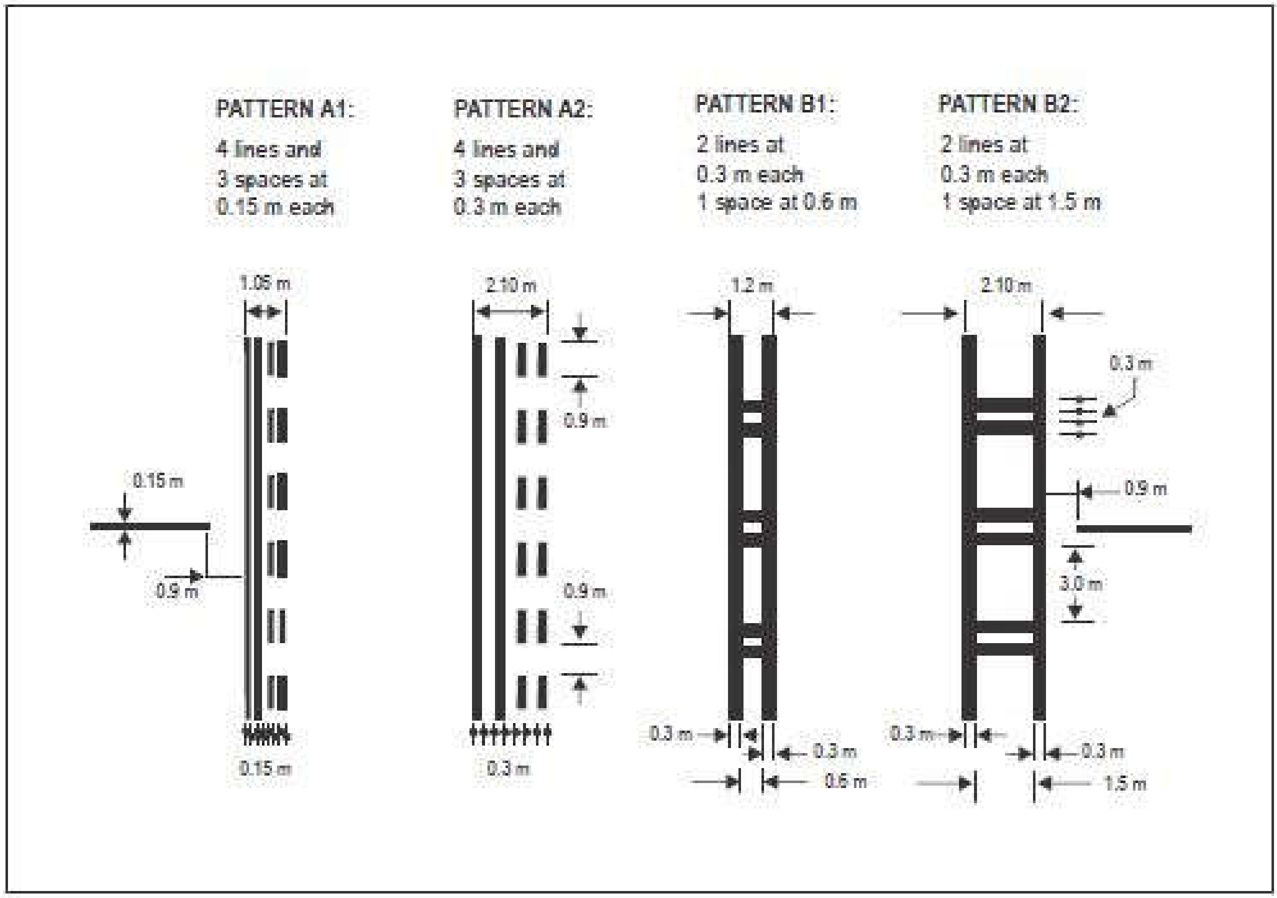


Figure 5- 8. Runway- holding position markings
Note. - Patterns A1 and B1 are no longer valid after 2026

(8) Where a pattern B runway-holding position marking is located on an area where it would exceed 60 m in length, the term “CAT II” or “CAT III” as appropriate shall be marked on the surface at the ends of the runway-holding position marking and at equal intervals of 45 m maximum between successive marks. The letters shall be not less than 1.8 m high and shall be placed not more than 0.9 m beyond the holding position marking.

(9) The runway-holding position marking displayed at a runway/runway intersection shall be perpendicular to the centre line of the runway forming part of the standard taxi-route. The pattern of the marking shall be as shown in Figure 5-8, pattern A2.

(k) **INTERMEDIATE HOLDING POSITION MARKING**

Application and Location

(1) An intermediate holding position marking shall be displayed along an intermediate holding position.

(2) RESERVED

(3) Where an intermediate holding position marking is displayed at an intersection of two paved taxiways, it shall be located across the taxiway at sufficient distance from the near edge of the intersecting taxiway to ensure safe clearance between taxiing aircraft. It shall be coincident with a stop bar or intermediate holding position lights, where provided.

(4) RESERVED

Characteristics

(5) An intermediate holding position marking shall consist of a single broken line as shown in Figure 5-6.

(l) **VOR AERODROME CHECKPOINT MARKING**

Marking Application

(1) When a VOR aerodrome check-point is established, it shall be indicated by a VOR aerodrome check-point marking and sign.

Note — See 12.2.5.4(d) for VOR aerodrome check-point sign.

(2) Sites election

Note — Guidance on the selection of sites for VOR aerodrome check-points is given in ICAO Annex 10, Vol. 1, Attachment E.

Location

(3) A VOR aerodrome check-point marking shall be centred on the spot at which an aircraft is to be parked to receive the correct VOR signal.

Characteristics

(4) A VOR aerodrome check-point marking shall consist of a circle 6 m in diameter and have a line width of 15 cm (Figure 5-9(A)).

(5) When it is preferable for an aircraft to be aligned in a specific direction, a line shall be provided that passes through the centre of the circle on the

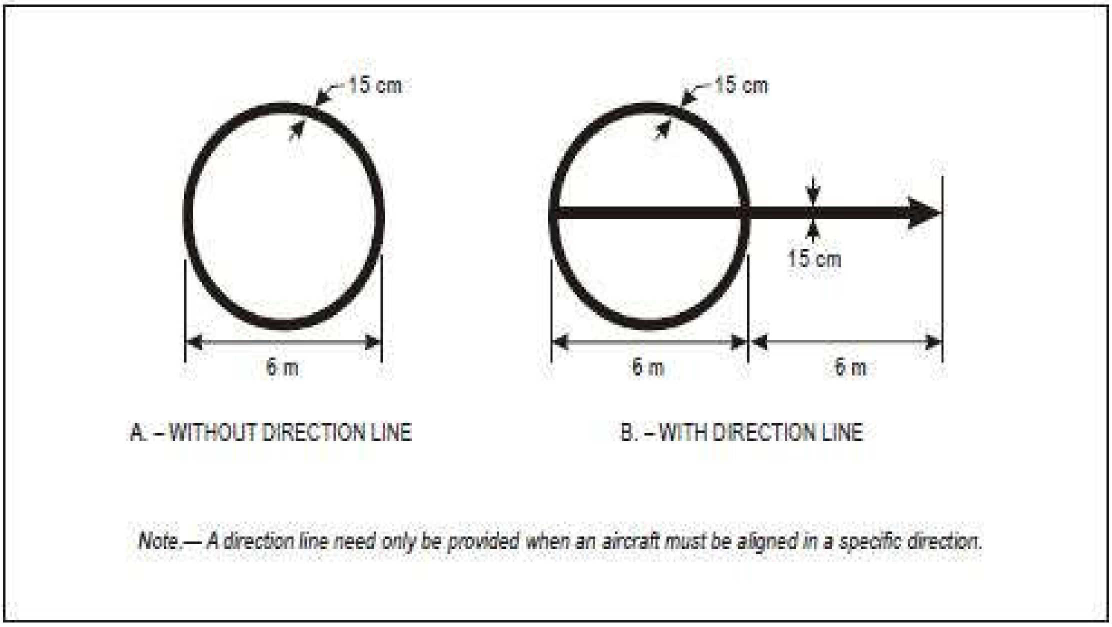


Figure 5- 9. VOR aerodrome checkpoint marking

desired azimuth. The line shall extend 6 m outside the circle in the desired direction of heading and terminate in an arrowhead. The width of the line shall be 15 cm (see Figure 5-9(B)).

(6) A VOR aerodrome check-point marking shall preferably be white in colour but shall differ from the colour used for the taxiway markings.

Note — To provide contrast, markings may be bordered with black.

(m) **AIRCRAFT STAND MARKING**

Note — Guidance on the layout of aircraft stand markings is contained in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Application

(1) Aircraft stand markings shall be provided for designated parking positions on a paved apron.

Location

(2) Aircraft stand markings on a paved apron shall be located so as to provide the clearances specified in 12.2.3.13(f), when the nose wheel follows the stand marking.

Characteristics

(3) Aircraft stand markings shall include such elements as stand identification, lead-in line, turn bar, turning line, alignment bar, stop line and lead-out line, as are required by the parking configuration and to complement other parking aids.

(4) An aircraft stand identification (letter and/or number) shall be included in the lead-in line a short distance after the beginning of the lead-in line. The height of the identification shall be adequate to be readable from the cockpit of aircraft using the stand.

(5) Where two sets of aircraft stand markings are superimposed on each other in order to permit more flexible use of the apron and it is difficult to identify which stand marking shall be followed, or safety would be impaired if the wrong marking was followed, then identification of the aircraft for which each set of markings is intended shall be added to the stand identification.

Note — Example: 2A-B747, 2B-F28.

(6) Lead-in, turning and lead-out lines shall normally be continuous in length and have a width of not less than 15 cm. Where one or more sets of stand markings are superimposed on a stand marking, the lines shall be continuous for the most demanding aircraft and broken for other aircraft.

(7) The curved portions of lead-in, turning and lead-out lines shall have radii appropriate to the most demanding aircraft type for which the markings are intended.

(8) Where it is intended that an aircraft proceed in one direction only, arrows pointing in the direction to be followed shall be added as part of the lead-in and lead-outlines.

(9) A turn bar shall be located at right angles to the lead-in line, abeam the left pilot position at the point of initiation of any intended turn. It shall have

a length and width of not less than 6 m and 15 cm, respectively, and include an arrowhead to indicate the direction of turn.

Note — The distances to be maintained between the turn bar and the lead-in line may vary according to different aircraft types, taking into account the pilot's field of view.

(10) If more than one turn bar and/or stop line is required, they shall be coded.

(11) An alignment bar shall be placed so as to be coincident with the extended centre line of the aircraft in the specified parking position and visible to the pilot during the final part of the parking manoeuvre. It shall have a width of not less than 15cm.

(12) A stop line shall be located at right angles to the alignment bar, abeam the left pilot position at the intended point of stop. It shall have a length and width of not less than 6 m and 15 cm, respectively.

Note — The distances to be maintained between the stop line and the lead-in line may vary according to different aircraft types, taking into account the pilot's field of view.

(n) **APRON SAFETY LINES**

Note — Guidance on apron safety lines is contained in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Application

(1) Apron safety lines shall be provided on a paved apron as required by the parking configurations and ground facilities.

Location

(2) Apron safety lines shall be located so as to define the areas intended for use by ground vehicles and other aircraft servicing equipment, etc., to provide safe separation from aircraft.

Characteristics

(3) Apron safety lines shall include such elements as wing tip clearance lines and service road boundary lines as required by the parking configurations and ground facilities.

(4) An apron safety line shall be continuous in length and at least 10 cm in width.

(o) **ROAD-HOLDING POSITION MARKING**

Application

(1) A road-holding position marking shall be provided at all road entrances to a runway.

Location

(2) The road-holding position marking shall be located across the road at the holding position.

Characteristics

(3) The road-holding position marking shall be in accordance with the local road traffic regulations.

(p) **MANDATORY INSTRUCTION MARKING**

Note — Guidance on mandatory instruction marking is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Application

(1) Where it is impracticable to install a mandatory instruction sign in accordance with 12.2.5.4(b)(1), a mandatory instruction marking shall be provided on the surface of the pavement.

(2) Where operationally required, such as on taxiways exceeding 60 m in width, a mandatory instruction sign shall be supplemented by a mandatory instruction marking.

Location

(3) The mandatory instruction marking shall be located on the left-hand side of the taxiway centre line marking and on the holding side of the runway-holding position marking as shown in Figure 5-10(A). The distance between the nearest edge of the marking and the runway- holding position marking or the taxiway centre line marking shall be not less than 1m.

(4) The mandatory instruction marking on taxiways where the code letter is E or F shall be located on both sides of the taxiway centre line marking and on the holding side of the runway-holding position marking as shown in Figure 5-10 (B). The distance between the nearest edge of the marking and the runway-holding position marking or the taxiway centre line marking shall be not less than 1m.

(5) Except where operationally required, a mandatory instruction marking shall not be located on a runway.

Characteristics

(6) A mandatory instruction marking shall consist of an inscription in white on a red background. Except for a NO ENTRY marking, the inscription shall provide information identical to that of the associated mandatory instruction sign.

(7) A ‘NO ENTRY’ marking shall consist of an inscription in white reading ‘NO ENTRY’ on a red background.

(8) Where there is insufficient contrast between the marking and the pavement surface, the mandatory instruction marking shall include an appropriate border, preferably white or black.

(9) The character height should be 4 m for inscriptions where the code letter is C, D, E or F, and 2 m where the code letter is A or B. The inscriptions should be in the form and proportions shown in 12.2.5.2(p).

(10) The background shall be rectangular and extend a minimum of 0.5 m laterally and vertically beyond the extremities of the inscription.

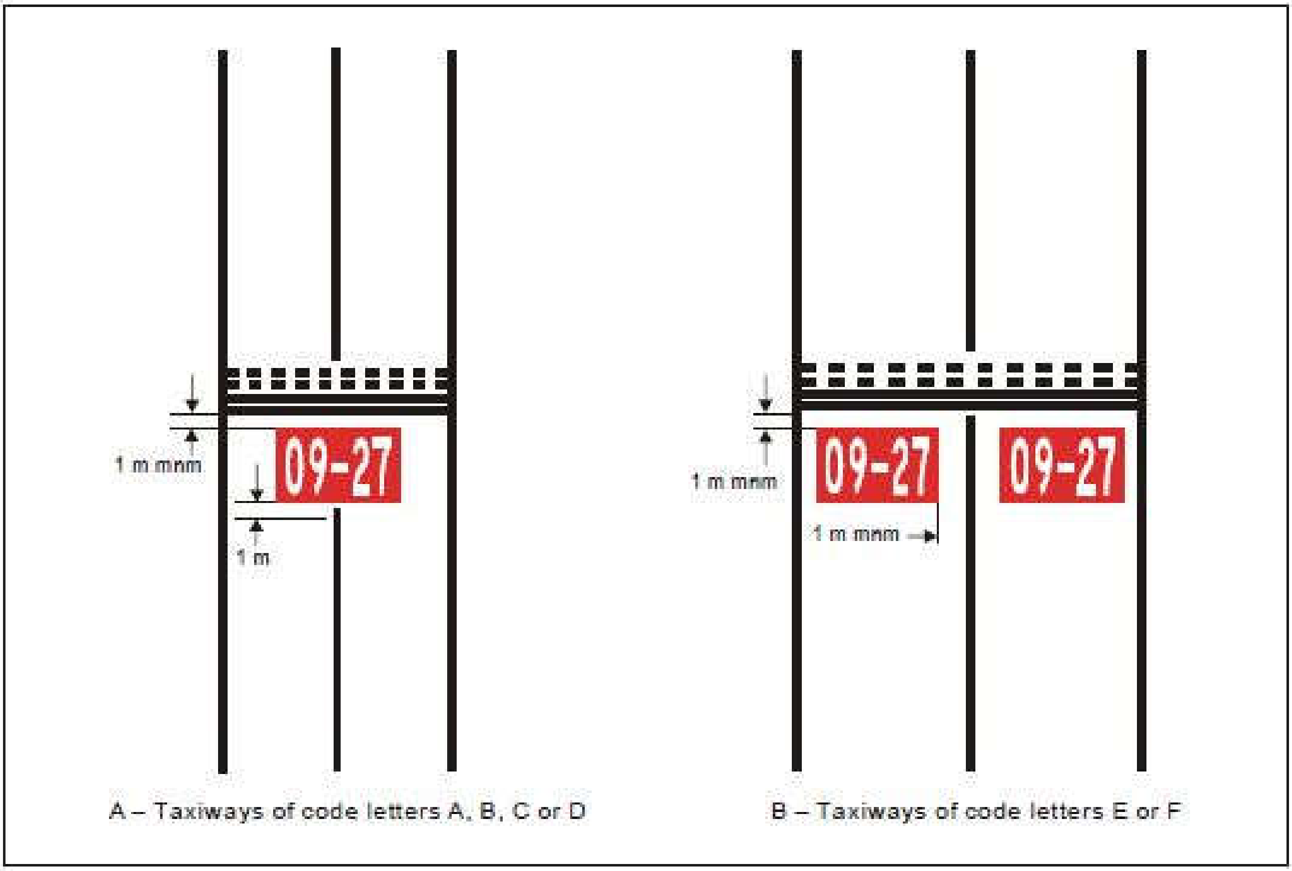


Figure 5- 10. Mandatory instruction marking

(q) **INFORMATION MARKING**

Note — Guidance on information marking is contained in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Application

(1) Where an information sign would normally be installed and is impractical to install, as determined by the appropriate authority, an information marking shall be displayed on the surface of the pavement.

(2) Where operationally required an information sign shall be supplemented by an information marking.

(3) An information (location/direction) marking shall be displayed prior to and following complex taxiway intersections and where operational experience has indicated the addition of a taxiway location marking could assist flight crew ground navigation.

(4) An information (location) marking shall be displayed on the pavement surface at regular intervals along taxiways of great length.

Location

(5) The information marking shall be displayed across the surface of the taxiway or apron where necessary and positioned so as to be legible from the cockpit of an approaching aircraft.

Characteristics

(6) An information marking shall consist of:

(i) an inscription in yellow upon a black background, when it replaces or supplements a location sign; and

(ii) an inscription in black upon a yellow background, when it replaces or supplements a direction or destination sign.

(7) Where there is insufficient contrast between the marking background and the pavement surface, the marking shall include:

(i) a black border where the inscriptions are in black and

(ii) a yellow border where the inscriptions are in yellow.

12.2.5.3 LIGHTS

(a) **GENERAL**

Lights which may Endanger the Safety of Aircraft

(1) A non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or otherwise modified so as to eliminate the source of danger.

Laser Emissions which may Endanger the Safety of Aircraft

(2) To protect the safety of aircraft against the hazardous effects of laser emitters, the following protected zones shall be established around aerodromes

— a laser-beam free flight zone (LFFZ),

— a laser-beam critical flights zone (LCFZ), and

— a laser-beam sensitive flight zone (LSFZ).

Note 1 — Figures 5-11, 5-12 and 5-13 may be used to determine the exposure levels and distances that adequately protect flights operations.

Note 2 – The restrictions on the use of laser beams in the three protected flight zones, LFFZ, LCFZ and LSFZ, refer to visible laser beams only. Laser emitters operated by the authorities in a manner compatible with flight safety are excluded. In all navigable air space, the irradiance level of any laser beam, visible or invisible, is expected to be less than or equal to the maximum permissible exposure (MPE) unless such emission has been notified to the authority and permission obtained.

Note 3 – The protected flight zones are established in order to mitigate the risks of operating laser emitters in the vicinity of aerodromes.

Note 4 – Further guidance on how to protect flight operations from the hazardous effects of laser emitters is contained in the ICAO Manual on Laser Emitters and Flights Safety (ICAO Doc 9815).

Note 5 – See also Nig.CARs Part 14.1 – Air Traffic Services.

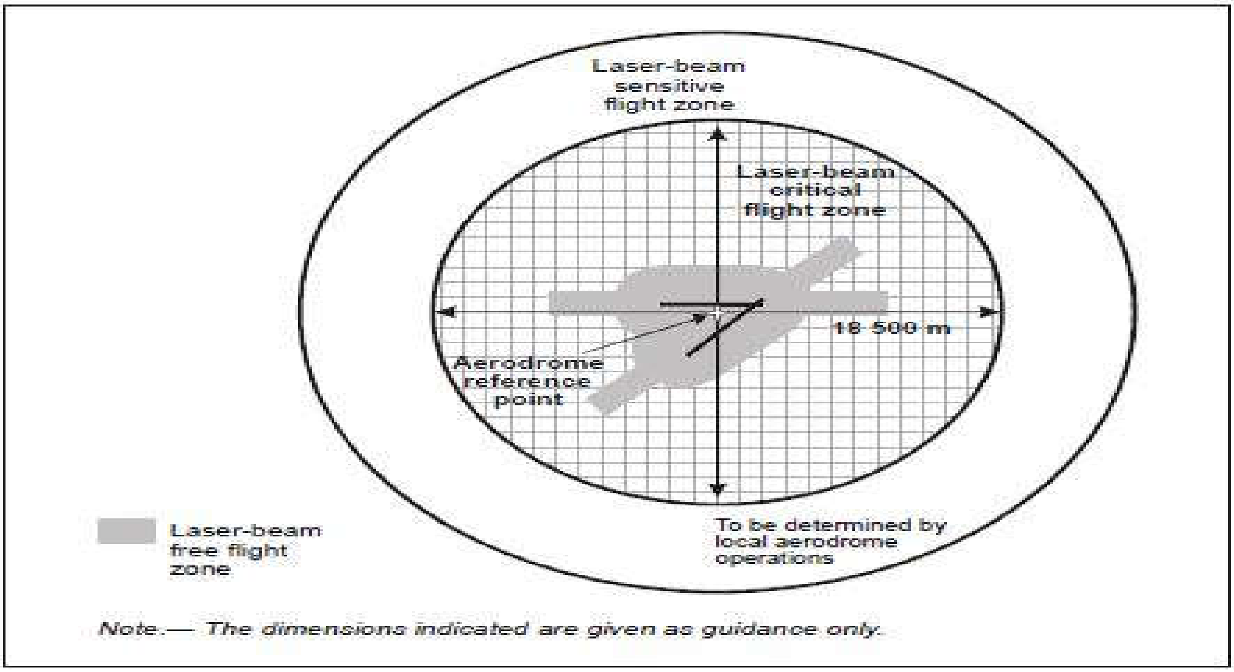


Figure 5- 11. Protected flight zones

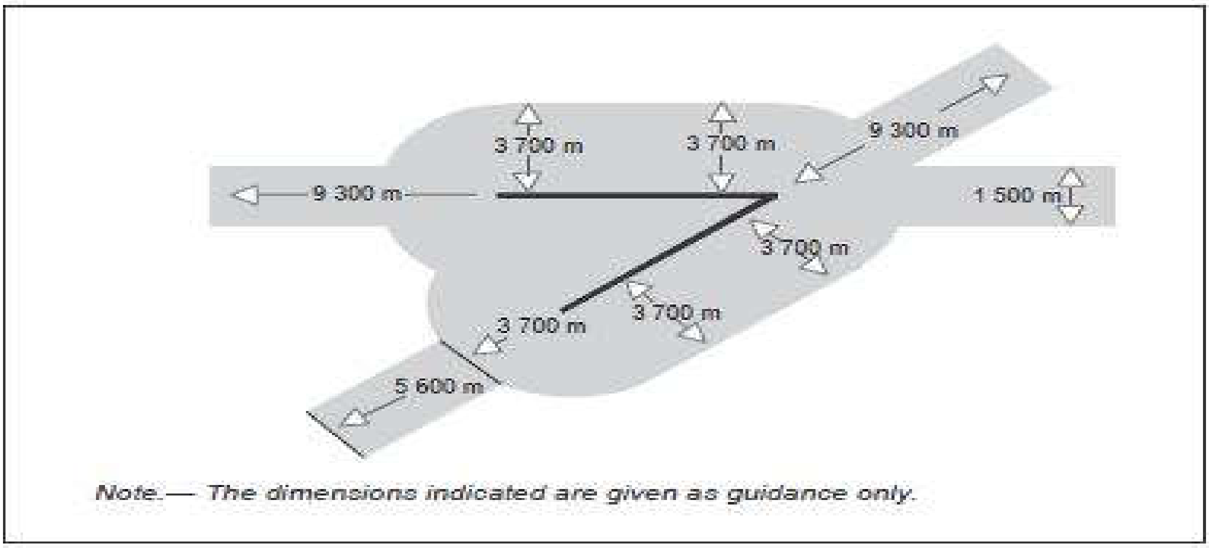


Figure 5- 12. Multiple runway laser-beam free flight zone

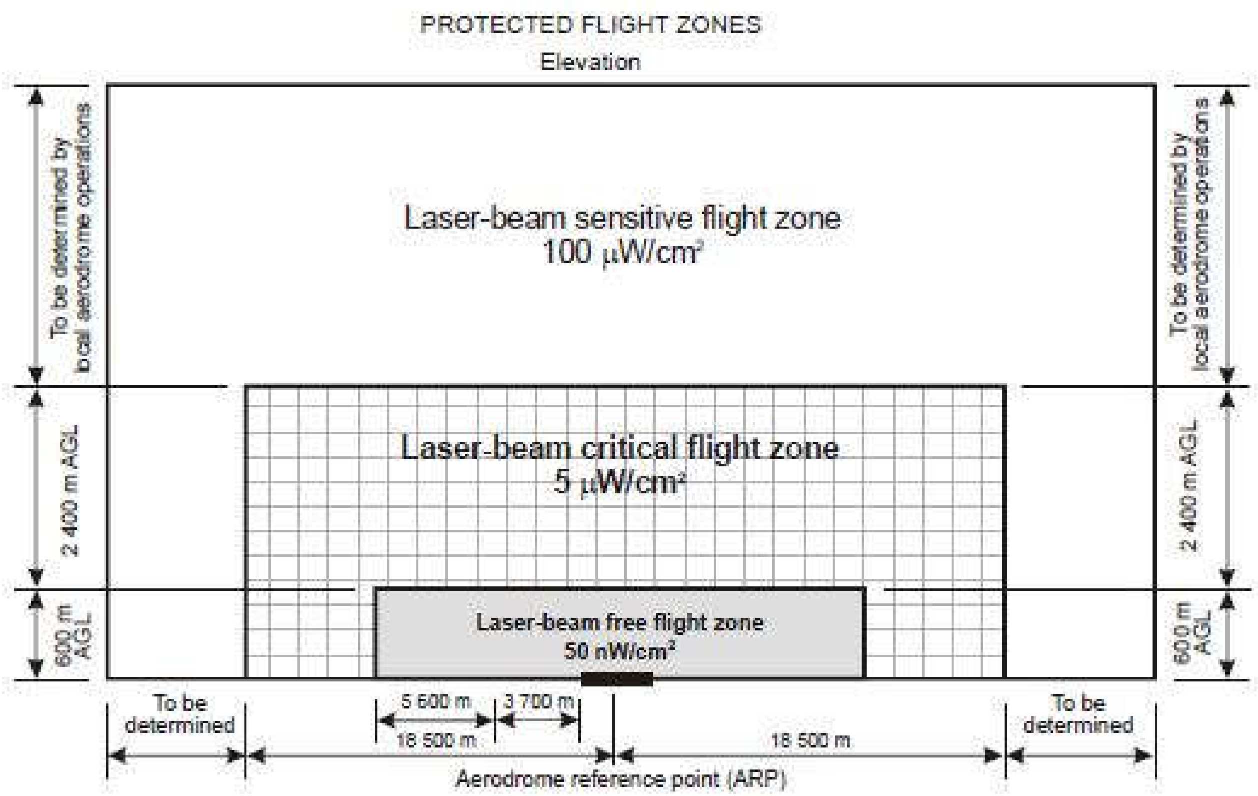


Figure 5- 13. Protected Flight zones with indication of maximum

irradiance levels for visible laser beams

(3) A non-aeronautical ground light which, by reason of its intensity, configuration or colour, might prevent, or cause confusion in, the clear interpretation of aeronautical ground lights shall be extinguished, screened or otherwise modified so as to eliminate such a possibility. In

particular, attention shall be directed to a non-aeronautical ground light visible from the air within the areas described here under:

(i) Instrument runway — code number4:

within the areas before the threshold and beyond the end of the runway extending at least 4500 m in length from the threshold and runway end and 750 m either side of the extended runway centre line in width.

(ii) Instrument runway — code number 2 or3:

as in a), except that the length shall be at least 3 000 m.

(iii) Instrument runway — code number 1; and non-instrument runway: within the approach area.

Aeronautical Ground Lights which may Cause Confusion to Mariners

Note — In the case of aeronautical ground lights near navigable waters, consideration needs to be given to ensure that the lights do not cause confusion to mariners.

Light fixtures and supporting structures

Note — See section 12.2.9.9 for information regarding siting and construction of equipment and installations on operational areas, and the ICAO Aerodrome Design Manual (Doc 9157), Part 6 (in preparation) for guidance on frangibility of light fixtures and supporting structures.

Elevated Approach Lights

(4) Elevated approach lights and their supporting structures shall be frangible except that, in that portion of the approach lighting system beyond 300 m from the threshold:

(i) where the height of a supporting structure exceeds 12 m, the frangibility requirement shall apply to the top 12 m only; and

(ii) where a supporting structure is surrounded by non-frangible objects, only that part of the structure that extends above the surrounding objects shall be frangible.

(5) When an approach light fixture or supporting structure is not in itself sufficiently conspicuous, it shall be suitably marked.

Elevated Lights

(6) Elevated runway, stop way and taxiway lights shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

Surface Lights

(7) Light fixtures inset in the surface of runways, stop ways, taxiways and aprons shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the lights themselves.

(8) The temperature produced by conduction or radiation at the interface between an installed inset light and an aircraft tyre shall not exceed 160°C during a 10-minute period of exposure.

Note — Guidance on measuring the temperature of inset lights is given in the ICAO Aerodrome Design Manual (Doc 9157), Part4.

Light Intensity and Control

Note — In dusk or poor visibility conditions by day, lighting can be more effective than marking. For lights to be effective in such conditions or in poor visibility by night, they must be of adequate intensity. To obtain the required intensity, it will usually be necessary to make the light directional, in which case the arcs over which the light shows will have to be adequate and so orientated as to meet the operational *requirements. The runway lighting system will have to be considered as a whole, to ensure that the relative light intensities are suitably matched to the same end. See Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC- ARD036) Section 15, and the ICAO Aerodrome Design Manual (Doc 9157), Part 4.)*

(9) The intensity of runway lighting shall be adequate for the minimum conditions of visibility and ambient light in which use of the runway is intended, and compatible with that of the nearest section of the approach lighting system when provided.

Note — While the lights of an approach lighting system may be of higher intensity than the runway lighting, it is good practice to avoid abrupt changes in intensity as these could give a pilot a false impression that the visibility is changing during approach.

(10) Where a high-intensity lighting system is provided, a suitable intensity control shall be incorporated to allow for adjustment of the light intensity to meet the prevailing conditions. Separate intensity controls or other suitable methods shall be provided to ensure that the following systems, when installed, can be operated at compatible intensities:

— approach lighting system;

— runway edge lights;

— runway threshold lights;

— runway end lights;

— runway centre line lights;

— runway touchdown zone lights; and

— taxiway centre line lights.

(11) On the perimeter of and within the ellipse defining the main beam in ICAO Annex 12, Vol. I, Appendix 2, Figures A2-1 to A2-10, the maximum light intensity value shall not be greater than three times the minimum light intensity value measured in accordance with ICAO Annex 12, Vol. I, Appendix 2, collective notes for Figures A2-1 to A2-11, Note2.

(12) On the perimeter of and within the rectangle defining the main beam in ICAO Annex 14 Vol. I, Appendix 2, Figures A2-12 to A2-20, the maximum light intensity value shall not be greater than three times the minimum

light intensity value measured in accordance with ICAO Annex 12, Vol. I, Appendix 2, collective notes for Figures A2-12 to A2-21, Note2.

(b) **EMERGENCY LIGHTING**

Application

(1) At an aerodrome provided with runway lighting and without a secondary power supply, sufficient emergency lights shall be conveniently available for installation on at least the primary runway in the event of failure of the normal lighting system.

Note — Emergency lighting may also be useful to mark obstacles or delineate taxiways and apron areas.

Location

(2) When installed on a runway the emergency lights shall, as a minimum, conform to the configuration required for a non-instrument runway.

Characteristics

(3) The colour of the emergency lights shall conform to the colour requirements for runway lighting, except that, where the provision of coloured lights at the threshold and the runway end is not practicable, all lights may be variable white or as close to variable white as practicable.

(c) **AERONAUTICAL BEACONS**

Application

(1) Where operationally necessary an aerodrome beacon or an identification beacon shall be provided at each aerodrome intended for use at night.

(2) The operational requirement shall be determined having regard to the requirements of the air traffic using the aerodrome, the conspicuity of the aerodrome features in relation to its surroundings and the installation of other visual and non-visual aids useful in locating the aerodrome.

Aerodrome beacon

(3) An aerodrome beacon shall be provided at an aerodrome intended for use at night if one or more of the following conditions exist:

(i) aircraft navigate predominantly by visual means;

(ii) reduced visibilities are frequent; or

(iii) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

Location

(4) The aerodrome beacon shall be located on or adjacent to the aerodrome in an area of low ambient back-ground lighting.

(5) The location of the beacon shall be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

Characteristics

(6) The aerodrome beacon shall show either coloured flashes alternating with white flashes, or white flashes only. The frequency of total flashes shall be from 20 to 30 per minute. Where used, the coloured flashes emitted by beacons at land aerodromes shall be green and coloured flashes emitted by beacons at water aerodromes shall be yellow. In the case of a combined water and land aerodrome, coloured flashes, if used, shall have the colour characteristics of whichever section of the aerodrome is designated as the principal facility.

(7) The light from the beacon shall show at all angles of azimuth. The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation determined by the Aerodrome Standards Department to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall be not less than 2 000 cd.

Note — At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash may be required to be increased by a factor up to a value of 10.

Identification Beacon

Application

(8) An identification beacon shall be provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means.

Location

(9) The identification beacon shall be located on the aerodrome in an area of low ambient background lighting.

(10) The location of the beacon shall be such that the beacon is not shielded by objects in significant directions and does not dazzle a pilot approaching to land.

Characteristics

(11) An identification beacon at a land aerodrome shall show at all angles of azimuth. The vertical light distribution shall extend upwards from an elevation of not more than 1° to an elevation determined by the Authority to be sufficient to provide guidance at the maximum elevation at which the beacon is intended to be used and the effective intensity of the flash shall be not less than 2 000cd.

Note — At locations where a high ambient background lighting level cannot be avoided, the effective intensity of the flash may be required to be increased by a factor up to a value of 10.

(12) An identification beacon shall show flashing-green at a land aerodrome and flashing-yellow at a water aerodrome.

(13) The identification characters shall be transmitted in the International Morse Code.

(14) The speed of transmission shall be between six and eight words per minute, the corresponding range of duration of the Morse dots being from 0.15 to 0.2 seconds per dot.

(d) **APPROACH LIGHTING SYSTEMS**

(1) **Application**

— **Non-Instrument Runway**

A simple approach lighting system as specified in 12.2.5.3(d)(2) to 12.2.5.3(d)(9) of this Part shall be provided to serve a non-instrument runway where the code number is 3 or 4 and intended for use at night, except when the runway is used only in conditions of good visibility, and sufficient guidance is provided by other visual aids.

Note — A simple approach lighting system can also provide visual guidance by day.

— **Non-Precision Approach Runway**

A simple approach lighting system as specified in 12.2.5.3(d)(2) to 12.2.5.3(d)(9) of this Part shall be provided to serve a non-precision approach runway, except when the runway is used only in conditions of good visibility or sufficient guidance is provided by other visual aids.

Note—It is advisable to give consideration to the installation of a precision approach category I lighting system or to the addition of a runway lead-in lighting system.

— **Precision Approach Runway Category I**

Where physically practicable, a precision approach category I lighting system as specified in 12.2.5.3(d) (10) to 12.2.5.3(d) (21) shall be provided to serve a precision approach runway category I.

— **Precision Approach Runway Categories II and III**

A precision approach category II and III lighting system as specified in 12.2.5.3(d) (22) to 12.2.5.3(d) (39) shall be provided to serve a precision approach runway category II or III.

Simple Approach Lighting System

Location

(2) A simple approach lighting system shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of not less than 420 m from the threshold with a row of lights forming a crossbar 18 m or 30 m in length at a distance of 300 m from the threshold.

(3) The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar shall be spaced so as to produce a linear effect, except that, when a crossbar of 30 m is used, gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6m.

Note 1 — Spacing for the crossbar lights between 1 m and 4 m are in use. Gaps on each side of the centre line may improve directional guidance when approaches are made with a lateral error, and facilitate the movement of rescue and fire fighting vehicles.

Note 2 — See Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 11 for guidance on installation tolerances.

(4) The lights forming the centre line shall be placed at longitudinal intervals of 60 m, except that, when it is desired to improve the guidance, an interval of 30 m may be used. The innermost light shall be located either 60 m or 30 m from the threshold, depending on the longitudinal interval selected for the centre line lights.

(5) If it is not physically possible to provide a centre line extending for a distance of 420 m from the threshold, it shall be extended to 300 m so as to include the crossbar. If this is not possible, the centre line lights shall be extended, and each centre line light shall then consist of a barrette at least 3 m in length. Subject to the approach system having a crossbar at 300 m from the threshold, an additional crossbar may be provided at 150 m from the threshold.

(6) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

(7) The lights of a simple approach lighting system shall be fixed lights and the colour of the lights shall be such as to ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting if present. Each centre line light shall consist of either:

(i) a single source; or

(ii) a barrette at least 3m in length.

Note 1 — When the barrette as in (B) is composed of lights approximating to point sources, a spacing of 1.5 m between adjacent lights in the barrette has been found satisfactory.

Note 2 — It may be advisable to use barrettes 4 m in length if it is anticipated that the simple approach lighting system will be developed into a precision approach lighting system.

Note 3 — At locations where identification of the simple approach lighting system is difficult at night due to surrounding lights, sequence flashing *lights installed in the outer portion of the system may resolve this problem.*

(8) Where provided for a non-instrument runway, the lights shall show at all angles in azimuth necessary to a pilot on base leg and final approach. The intensity of the lights shall be adequate for all conditions of visibility and ambient light for which the system has been provided.

(9) Where provided for a non-precision approach runway, the lights shall show at all angles in azimuth necessary to the pilot of an aircraft which on final approach does not deviate by an abnormal amount from the path defined by the non-visual aid. The lights shall be designed to provide guidance during both day and night in the most adverse conditions of visibility and ambient light for which it is intended that the system shall remain usable.

Precision Approach Category I Lighting System

Location

(10) A precision approach category I lighting system shall consist of a row of lights on the extended centre line of the runway extending, wherever possible, over a distance of 900 m from the runway threshold with a row of lights forming a crossbar 30 m in length at a distance of 300 m from the runway threshold.

Note — The installation of an approach lighting system of less than 900 m in length may result in operational limitations on the use of the runway. See Advisory Circular NCAA-AC-ARD036 Section 11.

(11) The lights forming the crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights of the crossbar shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6m.

Note 1 — Spacing for the crossbar lights between 1 m and 4 m are in use. Gaps on each side of the centre line may improve directional guidance when approaches are made with a lateral error, and facilitate the movement of rescue and fire fighting vehicles.

Note 2—See Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 11 for guidance on installation tolerances.

(12) The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost light located 30 m from the threshold.

(13) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

(14) The centre line and crossbar lights of a precision approach category I lighting system shall be fixed lights showing variable white. Each centre line light position shall consist of either:

(i) a single light source in the innermost 300 m of the centre line, two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line to provide distance information; or

(ii) a barrette.

(15) Where the serviceability level of the approach lights specified as a maintenance objective in 12.2.10.5(j) can be demonstrated, each centre line light position may consist of either:

(i) a single light source; or

(ii) a barrette.

(16) The barrettes shall be at least 4 m in length. When barrettes are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5m.

(17) If the centre line consists of barrettes as described in 12.2.5.3(d) (14) (ii) or 12.2.5.3(d) (15) (ii), each barrette shall be supplemented by a flashing light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(18) Each flashing light as described in 12.2.5.3(d) (17) shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

(19) If the centre line consists of lights as described in 12.2.5.3(d) (14) (i) or 12.2.5.3(d) (15) (i), additional crossbars of lights to the crossbar provided at 300 m from the threshold shall be provided at 150 m, 450 m, 600 m and 750 m from the threshold. The lights forming each crossbar shall be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights. The lights shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centre line. These gaps shall be kept to a minimum to meet local requirements and each shall not exceed 6m.

Note — See Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 11 for detailed configuration.

(20) Where the additional crossbars described in section 12.2.5.3(d) (19) of this Part are incorporated in the system, the outer ends of the crossbars shall lie on two straight lines that either are parallel to the line of the centre line lights or converge to meet the runway centre line 300 m from threshold.

(21) The lights shall be in accordance with the specifications of IS:12.2.5.3 FigureA2-1.

Note — The flight path envelopes used in the design of these lights are given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Figure A-6.

Precision Approach Category II and III Lighting System

Location

(22) The approach lighting system shall consist of a row of lights on the extended centre line of the runway, extending, wherever possible, over a distance of 900 m from the runway threshold. In addition, the system shall have two side rows of lights, extending 270 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in Figure 5-12. Where the serviceability level of the approach lights specified as maintenance objectives in 12.2.10.5(g) can be demonstrated, the system may have two side rows of lights, extending 240 m from the threshold, and two crossbars, one at 150 m and one at 300 m from the threshold, all as shown in Figure5-15.

Note — The length of 900 m is based on providing guidance for operations under category I, II and III conditions. Reduced lengths may support category II and III operations but may impose limitations on category I operations. see Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section11.

(23) The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost lights located 30 m from the threshold.

(24) The lights forming the side rows shall be placed on each side of the centre line, at a longitudinal spacing equal to that of the centre line lights and with the first light located 30 m from the threshold. Where the serviceability level of the approach lights specified as maintenance objectives in 12.2.10.5(g) of this Part can be demonstrated, lights forming the side rows may be placed on each side of the centre line, at a longitudinal spacing of 60m with the first light located 60 m from the threshold. The lateral spacing (or gauge) between the innermost lights of the side rows shall be not less than 18 m nor more than 22.5 m, and preferably 18 m, but in any event shall be equal to that of the touchdown zone lights.

(25) The crossbar provided at 150 m from the threshold shall fill in the gaps between the centre line and side row lights.

(26) The crossbar provided at 300 m from the threshold shall extend on both sides of the centre line lights to a distance of 15 m from the centerline.

(27) If the centre line beyond a distance of 300 m from the threshold consists of lights as described in 12.2.5.3(d) (31) (ii) or 12.2.5.3(d) (32) (ii), additional crossbars of lights shall be provided at 450 m, 600 m and 750 m from the threshold.

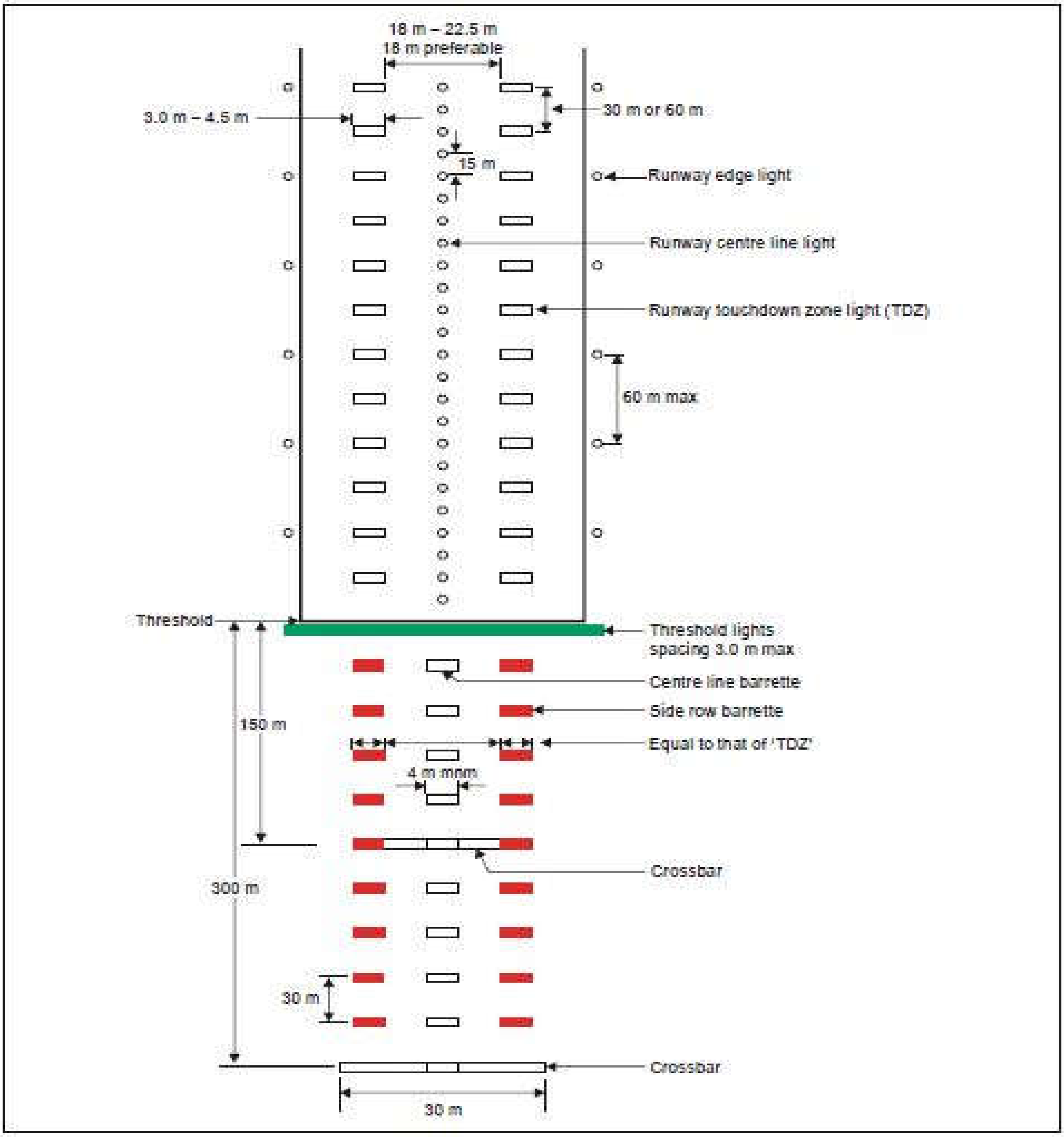


Figure 5- 14. Inner 300 m approach and runway lighting for precision approach runways, categories II and III

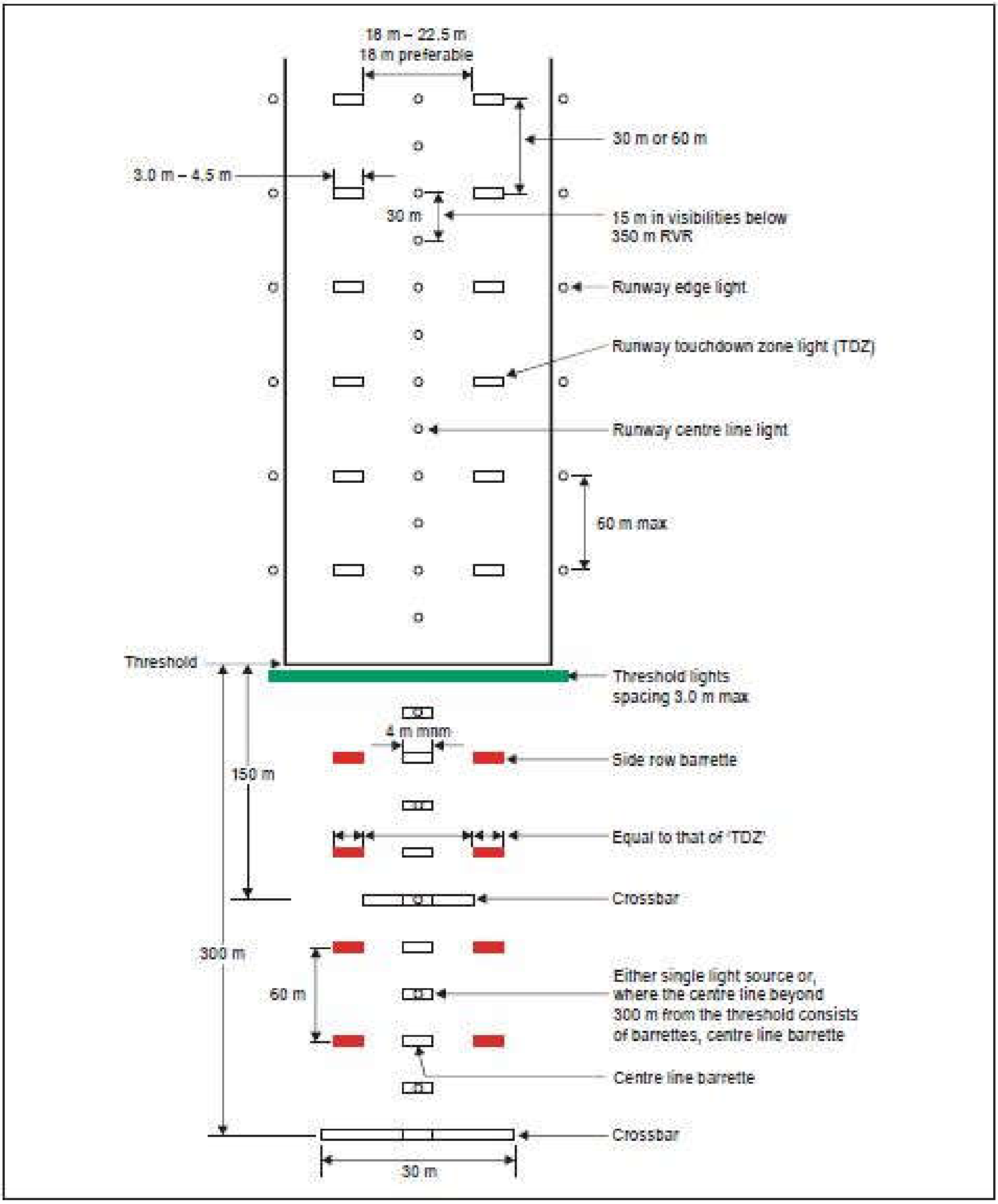


Figure 5- 15. Inner 300 m approach and runway lighting for precision approach runways, categories II and III, where the serviceability levels of the lights specified as maintenance objectives in 12.2.10 can be demonstrated

(28) Where the additional crossbars described in 12.2.5.3(d) (27) are

incorporated in the system, the outer ends of these crossbars shall lie on two straight lines that either are parallel to the centre line or converge to meet the runway centre line 300 m from the threshold.

(29) The system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that:

(i) no object other than an ILS or MLS azimuth antenna shall protrude through the plane of the approach lights within a distance of 60 m from the centre line of the system; and

(ii) no light other than a light located within the central part of a crossbar or a centre line barrette (not their extremities) shall be screened from an approaching aircraft.

Any ILS or MLS azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

Characteristics

(30) The centre line of a precision approach category II and III lighting system for the first 300 m from the threshold shall consist of barrettes showing variable white, except that, where the threshold is displaced 300 m or more, the centre line may consist of single light sources showing variable white. Where the serviceability level of the approach lights specified as maintenance objectives in 12.2.10.5(g) can be demonstrated, the centre line of a precision approach category II and III lighting system for the first 300 m from the threshold may consist of either:

(i) barrettes, where the centre line beyond 300 m from the threshold consists of barrettes as described in 12.2.5.3(d) (32) (i); or

(ii) alternate single light sources and barrettes, where the centre line beyond 300 m from the threshold consists of single light sources as described in 12.2.5.3. (d) (32) (ii), with the innermost single light source located 30 m and the innermost barrette located 60 m from the threshold; or

(iii) single light sources where the threshold is displaced 300 m or more; all of which shall show variable white.

(31) Beyond 300 m from the threshold each centre line light position shall consist of either:

(i) a barrette as used on the inner 300 m; or

(ii) two light sources in the central 300 m of the centre line and three light sources in the outer 300 m of the centre line;

all of which shall show variable white.

(32) Where the serviceability level of the approach lights specified as maintenance objectives in 12.2.10.5(g) can be demonstrated, beyond 300 m from the threshold each centre line light position may consist of either:

(i) a barrette; or

(ii) a single light source;

all of which shall show variable white.

(33) The barrettes shall be at least 4 m in length. When barrettes are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5m.

(34) If the centre line beyond 300 m from the threshold consists of barrettes as described in 12.2.5.3(d) (31) (i) or 12.2.5.3(d) (32) (i), each barrette beyond 300 m shall be supplemented by a flashing light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(35) Each flashing light as described in 12.2.5.3(d) (34) shall be flashed twice a second in sequence, beginning with the outermost light and progressing toward the threshold to the innermost light of the system. The design of the electrical circuit shall be such that these lights can be operated independently of the other lights of the approach lighting system.

(36) The side row shall consist of barrettes showing red. The length of a side row barrette and the spacing of its lights shall be equal to those of the touchdown zone light barrettes.

(37) The lights forming the crossbars shall be fixed lights showing variable white. The lights shall be uniformly spaced at intervals of not more than2.7m.

(38) The intensity of the red lights shall be compatible with the intensity of the white lights.

(39) The lights shall be in accordance with the specifications of IS:12.2.5.3, Figures A2-1 andA2-2.

Note — The flight path envelopes used in the design of these lights are given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036) FigureA-6.

(e) **VISUAL APPROACH SLOPE INDICATOR SYSTEMS**

Application

(1) A visual approach slope indicator system shall be provided to serve the approach to a runway whether or not the runway is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist:

(i) the runway is used by turbojet or other aeroplanes with similar approach guidance requirements;

(ii) the pilot of any type of aeroplane may have difficulty in judging the approach due to:

(A) inadequate visual guidance such as is experienced during an approach over water or featureless terrain by day or in the absence of sufficient extraneous lights in the approach area by night, or

(B) misleading information such as is produced by deceptive surrounding terrain or runway slopes;

(iii) the presence of objects in the approach area may involve serious hazard if an aeroplane descends below the normal approach path, particularly if there are no non- visual or other visual aids to give warning of such objects;

(iv) physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and

(v) terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

Note — Guidance on the priority of installation of visual approach slope indicator systems is contained in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036) Section 12.

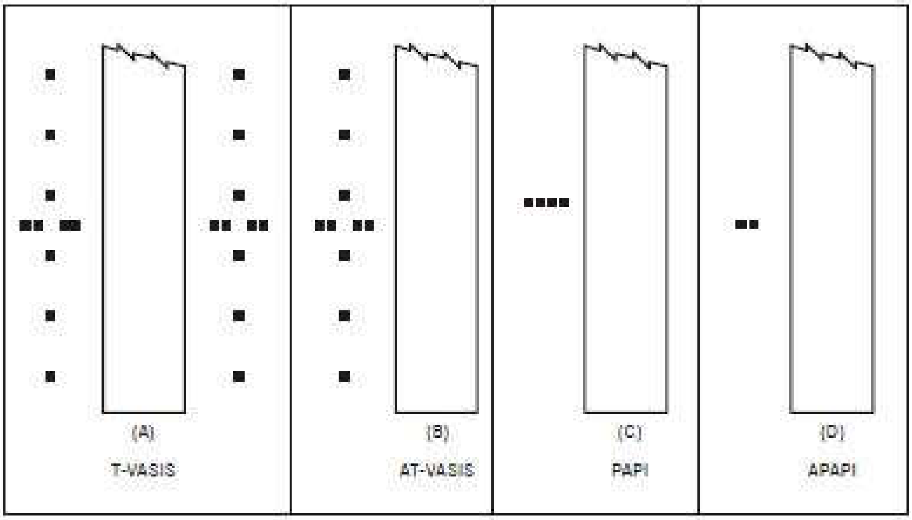


Figure 5- 16. Visual approach slope indicator systems

(2) The standard visual approach slope indicator systems shall consist of the following:

(i) PAPI and APAPI systems conforming to the specifications contained in 12.2.5.3(e) (24) to 12.2.5.3(e) (41) inclusive;

as shown in Figure 5-16.

(3) PAPI, shall be provided where the code number is 3 or 4 when one or more of the conditions specified in 12.2.5.3. (e)(1) of this Part exist.

(4) **RESERVED**

(5) PAPI or APAPI shall be provided where the code number is 1 or 2 when one or more of the conditions specified in 12.2.5.3(e)(1)

(6) Where a runway threshold is temporarily displaced from the normal position and one or more of the conditions specified in 12.2.5.3(e)(1) of this Part exist, a PAPI shall be provided except that where the code number is 1 or 2 an APAPI may be provided.

(7) **to (23) RESERVED**

PAPI and APAPI

Description

(24) The PAPI system shall consist of a wing bar of 4 sharp transition multi-lamp (or paired single lamp) units equally spaced. The system shall be located on the left side of the runway unless it is physically impracticable to do so.

Note — Where a runway is used by aircraft requiring visual roll guidance which is not provided by other external means, then a second wing bar may be provided on the opposite side of the runway.

(25) The APAPI system shall consist of a wing bar of 2 sharp transition multi-lamp (or paired single lamp) units. The system shall be located on the left side of the runway unless it is physically impracticable to do so.

Note — Where a runway is used by aircraft requiring visual roll guidance which is not provided by other external means, then a second wing bar may be provided on the opposite side of the runway.

(26) The wing bar of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

(i) when on or close to the approach slope, see the two units nearest the runway as red and the two units farthest from the runway as white;

(ii) when above the approach slope, see the one unit nearest the runway as red and the three units farthest from the runway as white; and when further above the approach slope, see all the units as white; and

(iii) when below the approach slope, see the three units nearest the runway as red and the unit farthest from the runway as white; and when further below the approach slope, see all the units as red.

(27) The wing bar of an APAPI shall be constructed and arranged in such a manner that a pilot making an approach will:

(i) when on or close to the approach slope, see the unit nearer the runway as red and the unit farther from the runway as white;

(ii) when above the approach slope, see both the units as white; and

(iii) when below the approach slope, see both the units as red.

Siting

(28) The light units shall be located as in the basic configuration illustrated in Figure 5-19, subject to the installation tolerances given therein. The units forming a wing bar shall be mounted so as to appear to the pilot of an approaching aeroplane to be substantially in a horizontal line. The light units shall be mounted as low as possible and shall be frangible.

Characteristics of the light units

(29) The system shall be suitable for both day and night operations.

(30) The colour transition from red to white in the vertical plane shall be such as to appear to an observer, at a distance of not less than 300 m, to occur within a vertical angle of not more than 3'.

(31) At full intensity the red light shall have a Y coordinate not exceeding 0.320.

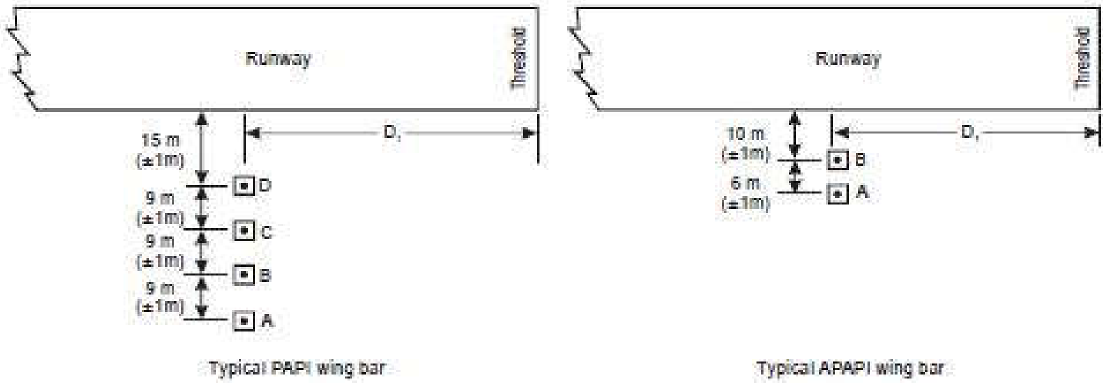
(32) The light intensity distribution of the light units shall be as shown in Appendix 2, Figure A2-23.

Note. — See the Aerodrome Design Manual *(Doc 9157), Part 4, for additional guidance on the characteristics of light units.*

(33) Suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

(34) Each light unit shall be capable of adjustment in elevation so that the lower limit of the white part of the beam may be fixed at any desired angle of elevation between 1°30’ and at least 4°30’ above the horizontal

(35) The light units shall be so designed that deposits of condensation, snow, ice, dirt, etc., on optically transmitting or reflecting surfaces shall interfere to the least possible extent with the light signals and shall not affect the contrast between the red and white signals and the elevation of the transition sector.



INSTALLATION TOLERANCES

a) Where a PAPI or APAPI is installed on a runway not equipped with an ILS or MLS, the distance D_1 shall be calculated to ensure that the lowest height at which a pilot will see a correct approach path indication (Figure 5-20, angle B for a PAPI and angle A for an APAPI) provides the wheel clearance over the threshold specified in Table 5-2 for the most demanding amongst aeroplanes regularly using the runway.

b) Where a PAPI or APAPI is installed on a runway equipped with an ILS and/or MLS, the distance D_1 shall be calculated to provide the optimum compatibility between the visual and non-visual aids for the range of eye-to-antenna heights of the aeroplanes regularly using the runway. The distance shall be equal to that between the threshold and the effective origin of the ILS glide path or MLS minimum glide path, as appropriate, plus a correction factor for the variation of eye-to-antenna heights of the aeroplanes concerned. The correction factor is obtained by multiplying the average eye-to-antenna height of those aeroplanes by the cotangent of the approach angle. However, the distance shall be such that in no case will the wheel clearance over the threshold be lower than that specified in column (3) of Table 5-2.

Note.— See Section 12.2.5.2(e) for specifications on aiming pointmarking. Guidance on the harmonization of PAPI, ILS and/orMLS signals is contained in the *Aerodrome Design Manual*(Doc 9157), Part 4.

c) If a wheel clearance, greater than that specified in a) above is required for specific aircraft, this can be achieved by increasing D_1.

d) Distance D_1 shall be adjusted to compensate for differences in elevation between the lens centres of the light units and the threshold.

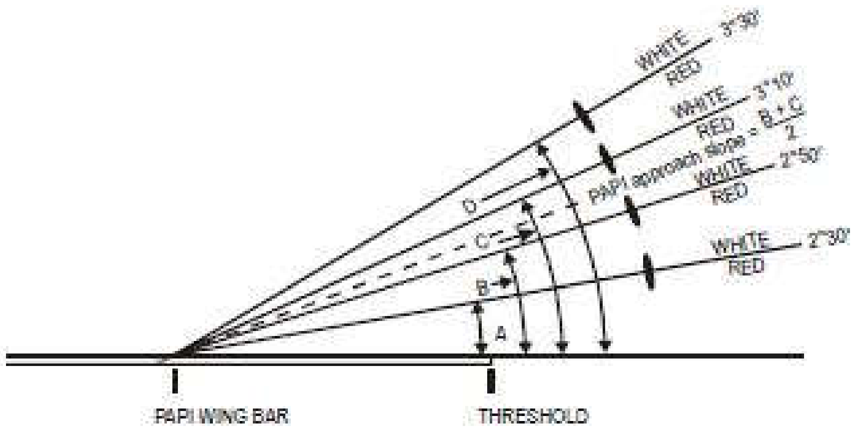
e) To ensure that units are mounted as low as possible and to allow for any transverse slope, small height adjustments of up to 5 cm between units are acceptable. A lateral gradient not greater than 1.25 per cent can be accepted provided it is uniformly applied across the units.

f) A spacing of 6 m (±1 m) between PAPI units should be used on code numbers 1 and 2. In such an event, the inner PAPI unit shall be located not less than 10 m (±1 m) from the runway edge.

Note.— Reducing the spacing between light units results in a reduction in usable range of the system.

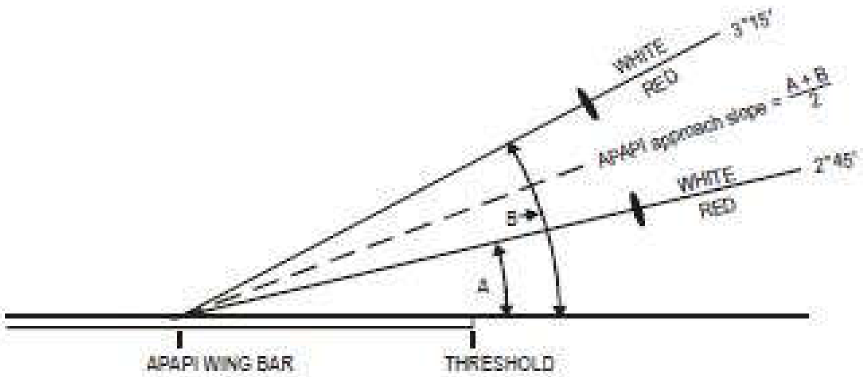
g) The lateral spacing between APAPI units may be increased to 9 m (±1 m) if greater range is required or later conversion to a full PAPI is anticipated. In the latter case, the inner APAPI unit shall be located 15 m (±1 m) from the runway edge.

Figure 5- 17. Siting of PAPI and APAPI



The height of the pilot's eye above the aircraft's ILS glide path/MLS antenna varies with the type of aeroplane and approach attitude. Harmonization of the PAPI signal and ILS glide path and/or MLS minimum glide path to a point closer to the threshold may be achieved by increasing the on-course sector from 20' to 30'. The setting angles for a 3° glide slope would then be 2°25', 2°45', 3°15' and 3°35'.

A — 3° PAPI ILLUSTRATED



B — 3° APAPI ILLUSTRATED

Figure 5- 20. Light beams and angle elevation setting of PAPI and APAPI

Table 5- 2. Wheel clearance over threshold for PAPI and APAPI

Eye-to-wheel height of aeroplane in the approach configuration[a] (1)	Desired wheel clearance (metres)[b,c] (2)	Minimum wheel clearance (metres)[d] (3)
up to but not including 3 m	6	3[e]
3 m up to but not including 5 m	9	4
5 m up to but not including 8 m	9	5
8 m up to but not including 14 m	9	6

a. In selecting the eye-to-wheel height group, only aeroplanes meant to use the system on a regular basis shall be considered. The most demanding amongst such aeroplanes shall determine the eye-to-wheel height group.

b. Where practicable the desired wheel clearances shown in column (2) shall be provided.

c. The wheel clearances in column (2) may be reduced to no less than those in column (3) where an aeronautical study indicates that such reduced wheel clearances are acceptable.

d. When a reduced wheel clearance is provided at a displaced threshold it shall be ensured that the corresponding desired wheel clearance specified in column (2) will be available when an aeroplane at the top end of the eye-to-wheel height group chosen overflies the extremity of the runway.

e. This wheel clearance may be reduced to 1.5 m on runways used mainly by light-weight non-turbojet aeroplanes.

Approach Slope and Elevation Setting of Light Units

(36) The approach slope as defined in Figure 5-20 shall be appropriate for use by the aeroplanes using the approach.

(37) When the runway is equipped with an ILS and/or MLS, the siting and the angle of elevation of the light units shall be such that the visual approach slope conforms as closely as possible with the glide path of the ILS and/or the minimum glide path of the MLS, as appropriate.

(38) The angle of elevation settings of the light units in a PAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing a signal of one white and three reds will clear all objects in the approach area by a safe margin (See Table5-4).

(39) The angle of elevation settings of the light units in an APAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing the lowest on slope signal, i.e. one white and one red, will clear all objects in the approach area by a safe margin (See Table5-4).

(40) The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the PAPI or APAPI system, but within the lateral limits of its light beam, is found to extend above the plane of the obstacle protection surface and an aeronautical study indicates that the object could adversely affect the safety of operations. The extent of the restriction shall be such that the object remains outside the confines of the light beam.

Note — See 12.2.5.3(e) (42) to 12.2.5.3(e) (46) concerning the related obstacle protection surface.

(41) Where wing bars are installed on each side of the runway to provide roll guidance, corresponding units shall be set at the same angle so that the signals of each wing bar change symmetrically at the same time.

Obstacle Protection Surface

Note — The following specifications apply to T-VASIS, AT-VASIS, PAPI and APAPI.

(42) An obstacle protection surface shall be established when it is intended to provide a visual approach slope indicator system.

(43) The characteristics of the obstacle protection surface, i.e. origin, divergence, length and slope shall correspond to those specified in the relevant column of Table 5-5 and in Figure 5-21.

(44) New objects or extensions of existing objects shall not be permitted above an obstacle protection surface except when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

Note — Circumstances in which the shielding principle may reasonably be applied are described in the Advisory Circular NCAA-AC-ARD013 (Control of Obstacles).

(45) Existing objects above an obstacle protection surface shall be removed except when, in the opinion of the Authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of aeroplanes.

Table 5- 3. Dimensions and slopes of the obstacle protection surface

	Runway type/code number							
	Non-instrument Code number				Instrument Code number			
Surface dimensions	1	2	3	4	1	2	3	4
Length of inner edge	60 m	80 m[a]	150 m	150 m	150 m	150 m	300 m	300 m
Distance from the visual approach slope indicator system[e]	D_1+30 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m	D_1+60 m
Divergence (each side)	10%	10%	10%	10%	15%	15%	15%	15%
Total length	7 500 m	7 500 m[b]	15 000 m	15 000 m	7 500 m	7 500 m[b]	15 000 m	15 000 m
Slope								
a) T-VASIS and AT-VASIS	–[c]	1.9°	1.9°	1.9°	–	1.9°	1.9°	1.9°
b) PAPI[d]	–	A–0.57°	A–0.57°	A–0.57°	A–0.57°	A–0.57°	A–0.57°	A–0.57°
c) APAPI[d]	A–0.9°	A–0.9°	–	–	A–0.9°	A–0.9°	–	–

a. This length is to be increased to 150 m for a T-VASIS or AT-VASIS.
b. This length is to be increased to 15 000 m for a T-VASIS or AT-VASIS.
c. No slope has been specified if a system is unlikely to be used on runway type/code number indicated.
d. Angles as indicated in Figure 5-20.
e. D_1 is the distance of the visual approach slope indicator system from threshold prior to any displacement to remedy object penetration of the OPS (refer Figure 5-19). The start of the OPS is fixed to the visual approach slope indicator system location, such that displacement of the PAPI results in an equal displacement of the start of the OPS. See 12.5.5.3(e)(46)(v).

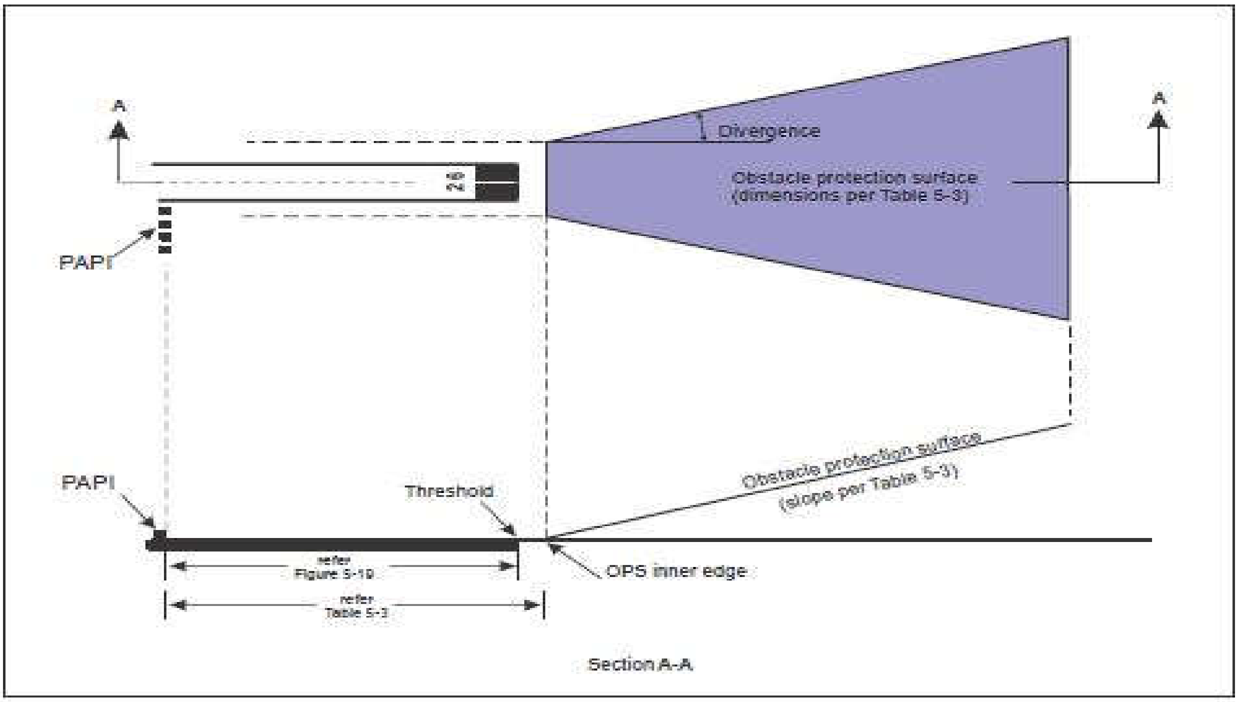


Figure 5- 21. Obstacle protection surface for visual approach slope indicator systems

(46) Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the safety of operations of aeroplanes one or more of the following measures shall be taken:

(i) remove the object;

(ii) suitably raise the approach slope of the system;

(iii) reduce the azimuth spread of the system so that the object is outside the confines of the beam;

(iv) displace the axis of the system and its associated obstacle protection surface by no more than5°;

(v) suitably displace the system upwind of the threshold such that the object no longer penetrates the OLS.

Note1 — Guidance on this issue is contained in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Note 2. — The displacement of the system upwind of the threshold reduces the operational landing distance.

(f) CIRCLING GUIDANCE LIGHTS

Application

(1) Circling guidance lights shall be provided when existing approach and runway lighting systems do not satisfactorily permit identification of the runway and/or approach area to a circling aircraft in the conditions for which it is intended the runway be used for circling approaches.

Location

(2) The location and number of circling guidance lights shall be adequate to enable a pilot, as appropriate, to:

(i) join the downwind leg or align and adjust the aircraft's track to the runway at a required distance from it and to distinguish the threshold in passing; and

(ii) keep in sight the runway threshold and/or other features which will make it possible to judge the turn on to base leg and final approach, taking into account the guidance provided by other visual aids.

(3) Circling guidance lights shall consist of:

(i) lights indicating the extended centre line of the runway and/or parts of any approach lighting system; or

(ii) lights indicating the position of the runway threshold; or

(iii) lights indicating the direction or location of the runway;

or a combination of such lights as is appropriate to the runway under consideration.

Note — Guidance on installation of circling guidance lights is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Characteristics

(4) Circling guidance lights shall be fixed or flashing lights of an intensity and beam spread adequate for the conditions of visibility and ambient light in which it is intended to make visual circling approaches. The flashing lights shall be white, and the steady lights either white or gaseous discharge lights.

(5) The lights shall be designed and be installed in such a manner that they will not dazzle or confuse a pilot when approaching to land, taking off or taxiing.

(g) **RUNWAY LEAD-IN LIGHTING SYSTEMS**

Application

(1) A runway lead-in lighting system shall be provided where it is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement.

Note — Guidance on providing lead-in lighting systems is given in the ICAO. Aerodrome Design Manual (Doc 9157), Part4.

Location

(2) A runway lead-in lighting system shall consist of groups of lights positioned so as to define the desired approach path and so that one

group may be sighted from the preceding group. The interval between adjacent groups shall not exceed approximately 1 600m.

Note — Runway lead-in lighting systems may be curved, straight or a combination thereof.

(3) A runway lead-in lighting system shall extend from a point as determined by the Authority, up to a point where the approach lighting system, if provided, or the runway or the runway lighting system is in view.

Characteristics

(4) Each group of lights of a runway lead-in lighting system shall consist of at least three flashing lights in a linear or cluster configuration. The system may be augmented by steady burning lights where such lights would assist in identifying the system.

(5) The flashing lights and the steady burning lights shall be white.

(6) The flashing lights in each group shall flash in sequence towards the runway.

(h) **RUNWAY THRESHOLD IDENTIFICATION LIGHTS**

Application

(1) Runway threshold identification lights shall be installed:

(i) at the threshold of a non-precision approach runway when additional threshold conspicuity is necessary to provide other approach lighting aids; and

(ii) where a runway threshold is permanently displaced from the runway extremity or temporarily displaced from the position and additional threshold conspicuity is necessary.

Location

(2) Runway threshold identification lights shall be located symmetrically about the runway centre line, in line with the threshold and approximately 10 m outside each line of runway edge lights.

Characteristics

(3) Runway threshold identification lights shall be flashing white lights with a flash frequency between 60 and 120 per minute.

(4) The lights shall be visible only in the direction of approach to the runway.

(i) **RUNWAY EDGE LIGHTS**

Application

(1) Runway edge lights shall be provided for a runway intended for use at night or for a precision approach runway intended for use by day or night.

(2) Runway edge lights shall be provided on a runway intended for take-off with an operating minimum below an RVR of the order of 800 m by day.

Location

(3) Runway edge lights shall be placed along the full length of the runway and shall be in two parallel rows equidistant from the centerline.

(4) Runway edge lights shall be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of not more than 3m.

(5) Where the width of the area which could be declared as runway exceeds 60 m, the distance between the rows of lights shall be determined taking into account the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.

(6) The lights shall be uniformly spaced in rows at intervals of not more than 60 m for an instrument runway, and at intervals of not more than 100 m for a non-instrument runway. The lights on opposite sides of the runway axis shall be on lines at right angles to that axis. At intersections of runways, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

Characteristics

(7) Runway edge lights shall be fixed lights showing variable white, except that:

(i) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold shall show red in the approach direction; and

(ii) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, may show yellow.

(8) The runway edge lights shall show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction. When the runway edge lights are intended to provide circling guidance, they shall show at all angles in azimuth (See 12.2.5.3(f)(1)).

(9) In all angles of azimuth required in section 12.2.5.3(i)(8) of this Part, runway edge lights shall show at angles up to 15° above the horizontal with an intensity adequate for the conditions of visibility and ambient light in which use of the runway for take-off or landing is intended. In any case, the intensity shall be at least 50 cd except that at an aerodrome without extraneous lighting the intensity of the lights may be reduced to not less than 25 cd to avoid dazzling the pilot.

(10) Runway edge lights on a precision approach runway shall be in accordance with the specifications of IS:12.2.5.3, Figure A2-9 orA2-10.

(j) **RUNWAY THRESHOLD AND WING BAR LIGHTS**
(See Figure 5-22)

Application of Runway Threshold Lights

(1) Runway threshold lights shall be provided for a runway equipped with runway edge lights except on a non-instrument or non-precision approach runway where the threshold is displaced and wing bar lights are provided.

Location of Runway Threshold Lights

(2) When a threshold is at the extremity of a runway, the threshold lights shall be placed in a row at right angles to the runway axis as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity.

(3) When a threshold is displaced from the extremity of a runway, threshold lights shall be placed in a row at right angles to the runway axis at the displaced threshold.

(4) Threshold lighting shall consist of:

(i) on a non-instrument or non-precision approach runway, at least six lights;

(ii) on a precision approach runway category, I, at least the number of lights that would be required if the lights were uniformly spaced at intervals of 3 m between the rows of runway edge lights; and

(iii) on a precision approach runway category II or III, lights uniformly spaced between the rows of runway edge lights at intervals of not more than 3m.

(5) The lights prescribed in 12.2.5.3(j)(4) (i) and (ii) shall be either:

(i) equally spaced between the rows of runway edge lights, or

(ii) symmetrically disposed about the runway centre line in two groups, with the lights uniformly spaced in each group and with a gap between the groups equal to the gauge of the touchdown zone marking or lighting, where such is provided, or otherwise not more than half the distance between the rows of runway edge lights.

Application of Wing Bar Lights

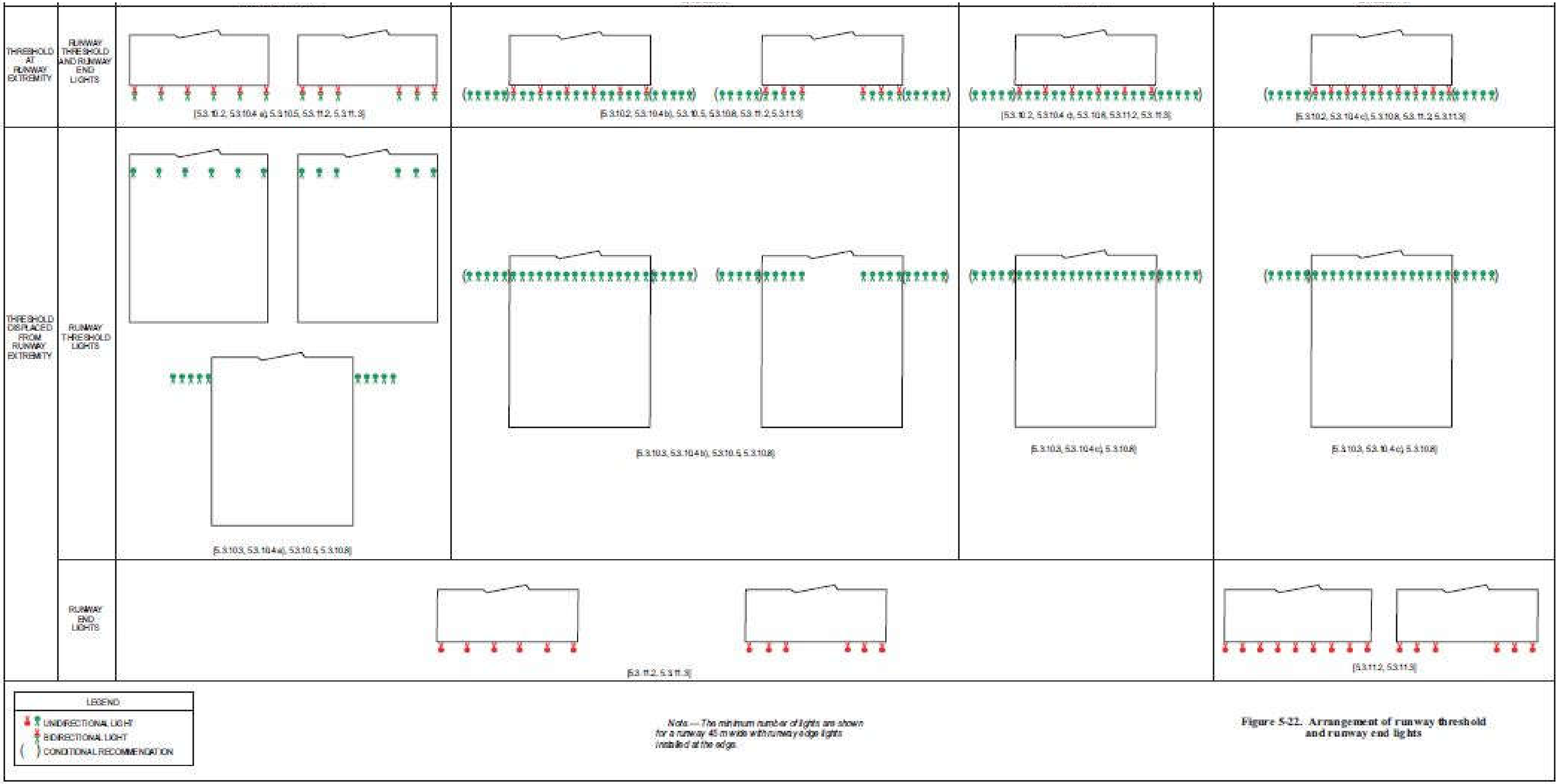
(6) Wing bar lights shall be provided on a precision approach runway when additional conspicuity is considered desirable.

(7) Wing bar lights shall be provided on a non-instrument or non-precision approach runway where the threshold is displaced and runway threshold lights are required, but are not provided.

Location of Wing Bar Lights

(8) Wing bar lights shall be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars. Each wing bar shall be formed by at least five lights extending at least 10 m outward from, and at right angles to, the line of the runway edge lights, with the innermost light of each wing bar in the line of the runway edge lights.

Figure 5- 22: Arrangement of Runway Threshold and Runway end lights



Characteristics of Runway Threshold and Wing Bar Lights

(9) Runway threshold and wing bar lights shall be fixed unidirectional lights showing green in the direction of approach to the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

(10) Runway threshold lights on a precision approach runway shall be in accordance with the specifications of IS12.2.5.3, FigureA2-3.

(11) Threshold wing bar lights on a precision approach runway shall be in accordance with the specifications of IS12.2.5.3, FigureA2-4.

(k) **RUNWAY END LIGHTS**

(See Figure 5-22)

Application

(1) Runway end lights shall be provided for a runway equipped with runway edge lights.

Note — When the threshold is at the runway extremity, fittings serving as threshold lights may be used as runway end lights.

Location

(2) Runway end lights shall be placed on a line at right angles to the runway axis as near to the end of the runway as possible and, in any case, not more than 3m outside the end.

(3) Runway end lighting shall consist of at least six lights. The lights shall be either:

(i) equally spaced between the rows of runway edge lights, or

(ii) symmetrically disposed about the runway centre line in two groups with the lights uniformly spaced in each group and with a gap between the groups of not more than half the distance between the rows of runway edge lights.

For a precision approach runway category III, the spacing between runway end lights, except between the two innermost lights if a gap is used, shall not exceed 6m.

Characteristics

(4) Runway end lights shall be fixed unidirectional lights showing red in the direction of the runway. The intensity and beam spread of the lights shall be adequate for the conditions of visibility and ambient light in which use of the runway is intended.

(5) Runway end lights on a precision approach runway shall be in accordance with the specifications of IS: 12.2.5.3, FigureA2-8

(l) **RUNWAY CENTRE LINE LIGHTS**

Application

(1) Runway centre line lights shall be provided on a precision approach runway category II or III.

(2) Runway centre line lights shall be provided on a precision approach runway category I, particularly when the runway is used by aircraft with high landing speeds or where the width between the runway edge lights is greater than 50m.

(3) Runway centre line lights shall be provided on a runway intended to be used for take-off with an operating minimum below an RVR of the order of 400m.

(4) Runway centre line lights shall be provided on a runway intended to be used for take-off with an operating minimum of an RVR of the order of 400 m or higher when used by aeroplanes with a very high take-off speed, particularly where the width between the runway edge lights is greater than 50m.

Location

(5) Runway centre line lights shall be located along the centre line of the runway, except that the lights may be uniformly offset to the same side of the runway centre line by not more than 60 cm where it is not practicable to locate them along the centre line. The lights shall be located from the threshold to the end at longitudinal spacing of approximately 15m. Where the serviceability level of the runway centre line lights specified as maintenance objectives in 12.2.10.5(g) or 12.2.10.5(k), as appropriate, can be demonstrated and the runway is intended for use in runway visual

range conditions of 350m or greater, the longitudinal spacing may be approximately 30m.

Note — Existing centre line lighting where lights are spaced at 7.5 m need not be replaced.

(6) Centre line guidance for take-off from the beginning of a runway to a displaced threshold shall be provided by:

(i) an approach lighting system if its characteristics and intensity settings afford the guidance required during take-off and it does not dazzle the pilot of an aircraft taking off; or

(ii) runway centre line lights; or

(iii) barrettes of at least 3 m length and spaced at uniform intervals of 30 m, as shown in Figure 5-23, designed so that their photometric characteristics and intensity setting afford the guidance required during take-off without dazzling the pilot of an aircraft taking off.

Where necessary, provision shall be made to extinguish those centerline lights specified in (ii) or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing. In no case shall only the single source runway centreline lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

Characteristics

(7) Runway centre line lights shall be fixed lights showing variable white from the threshold to the point 900 m from the runway end; alternate red and variable white from 900 m to 300 m from the runway end; and red from 300 m to the runway end, except that for runways less than 1 800 m in length, the alternate red and variable white lights shall extend from the mid-point of the runway usable for landing to 300 m from the runway end.

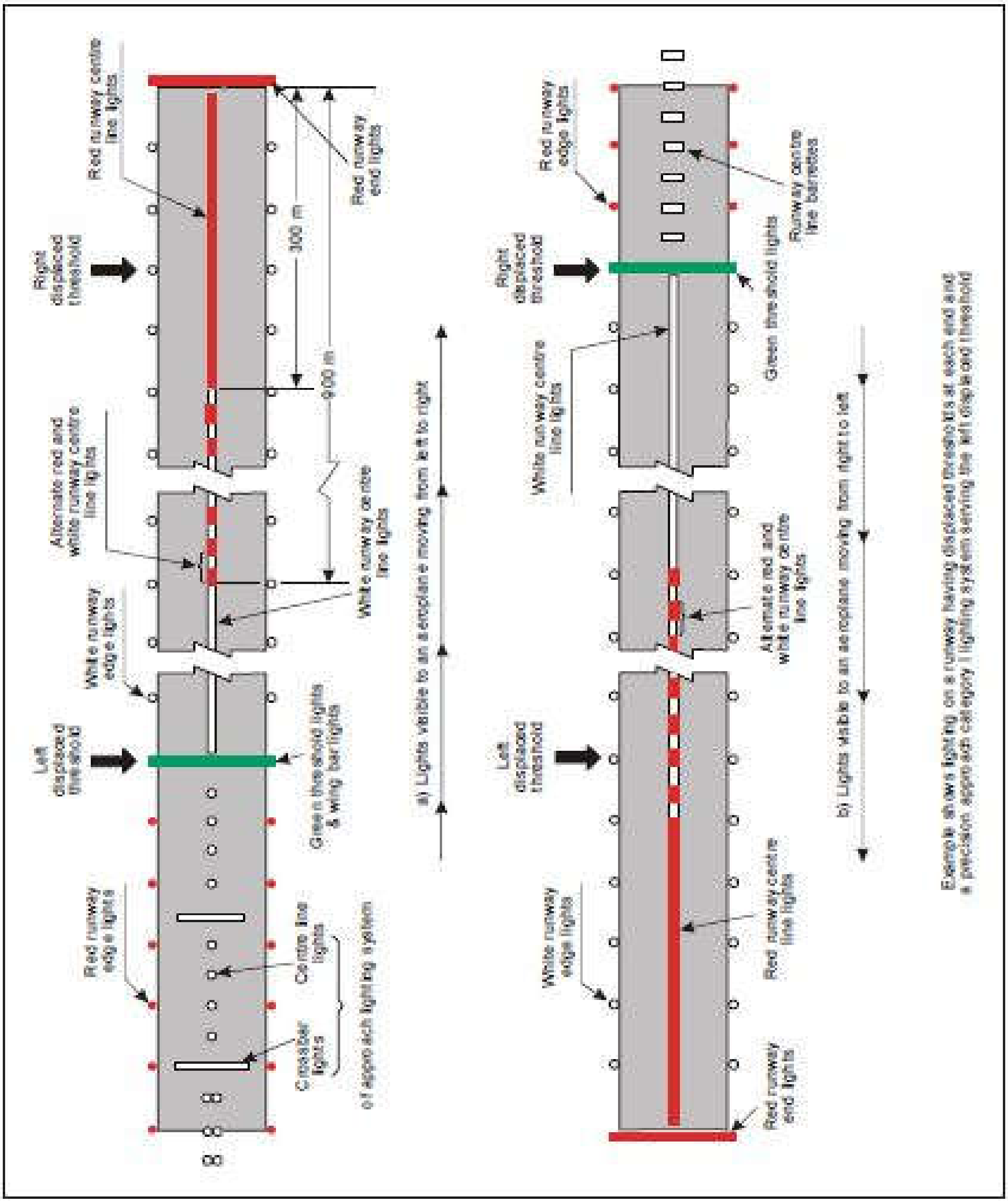


Figure 5- 23. Example of approach and runway lighting for runway and displaced thresholds

Note — Care is required in the design of the electrical system to ensure that failure of part of the electrical system will not result in a false indication of the runway distance remaining.

(8) Runway centre line lights shall be in accordance with the specifications of IS: 12.2.5.3, Figure A2-6 orA2-7.

(m) RUNWAY TOUCHDOWN ZONE LIGHTS

Application

(1) Touchdown zone lights shall be provided in the touchdown zone of a precision approach runway category II or III.

Location

(2) Touchdown zone lights shall extend from the threshold for a longitudinal distance of 900 m, except that, on runways less than 1800 m in length, the system shall be shortened so that it does not extend beyond the midpoint of the runway. The pattern shall be formed by pairs of barrettes symmetrically located about the runway centre line. The lateral spacing between the innermost lights of a pair of barrettes shall be equal to the lateral spacing selected for the touchdown zone marking. The longitudinal spacing between pairs of barrettes shall be either 30 m or 60m.

Note — To allow for operations at lower visibility minima, it may be advisable to use a 30 m longitudinal spacing between barrettes.

Characteristics

(3) A barrette shall be composed of at least three lights with a spacing between the lights of not more than1.5m.

(4) A barrette shall be not less than 3 m nor more than 4.5m in length.

(5) Touchdown zone lights shall be fixed uni-directional lights showing variable white.

(6) Touchdown zone lights shall be in accordance with the specifications of IS: 12.2.5.3, FigureA2-5.

(n) **SIMPLE TOUCHDOWN ZONE LIGHTS**

Note. — The purpose of simple touchdown zone lights is to provide pilots with enhanced situational awareness in all visibility conditions and to help enable pilots to decide whether to commence a go-around if the aircraft has not landed by a certain point on the runway. It is essential that pilots operating at aerodromes with simple touchdown zone lights be familiar with the purpose of these lights.

Application

(1) Except where TDZ lights are provided in accordance with paragraph 12.2.5.3(m) at an aerodrome where the approach angle is greater than 3.5 degrees and/or the Landing Distance Available combined with other factors increases the risk of an overrun, simple touchdown zone lights shall be provided.

Location

(2) Simple touchdown zone lights shall be a pair of lights located on each side of the runway centreline 0.3 m beyond the upwind edge of the final touchdown zone marking. The lateral spacing between the inner lights of the two pairs of lights shall be equal to the lateral spacing selected for the touchdown zone marking. The spacing between the lights of the same pair shall not be more than 1.5 m or half the width of the touchdown zone marking, whichever is greater. (See Figure 5-24.)

(3) Where provided on a runway without TDZ markings, simple touchdown zone lights shall be installed in such a position that provides the equivalent TDZ information.

Characteristics

(4) Simple touchdown zone lights shall be fixed unidirectional lights showing variable white, aligned so as to be visible to the pilot of a landing aeroplane in the direction of approach to the runway.

(5) Simple touchdown zone lights shall be in accordance with the specifications in IS 12.2.5.3, FigureA2-5.

Note. — As a good operating practice, simple touchdown zone lights are supplied with power on a separate circuit to other runway lighting so that they may be used when other lighting is switched off.

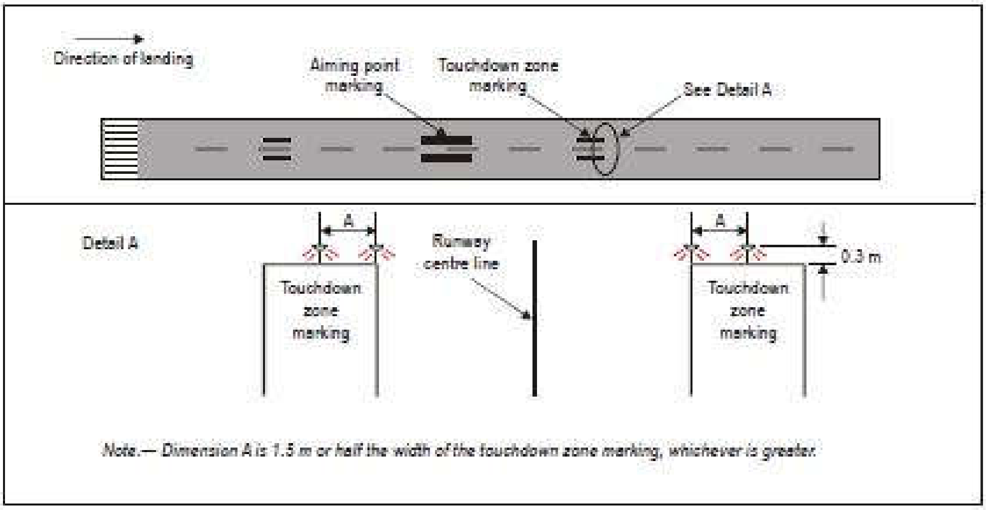


Figure 5- 24. Simple touchdown zone lighting

(o) RAPID EXIT TAXIWAY INDICATOR LIGHTS

Note. — The purpose of rapid exit taxiway indicator lights (RETILs) is to provide pilots with distance-to-go information to the nearest rapid exit taxiway on the runway, to enhance situational awareness in low visibility conditions and enable pilots to apply braking action for more efficient roll-out and runway exit speeds. It is essential that pilots operating at aerodromes with runway(s) displaying rapid exit taxiway indicator lights be familiar with the purpose of these lights.

Application

(1) Rapid exit taxiway indicator lights shall be provided on a runway intended for use in runway visual range conditions less than a value of 350 m and/or where the traffic density is heavy.

Note. — See Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section14.

(2) Rapid exit taxiway indicator lights shall not be displayed in the event of any lamp failure or other failure that prevents the display of the light pattern depicted in Figure 5- 25, in full.

Location

(3) A set of rapid exit taxiway indicator lights shall be located on the runway on the same side of the runway centre line as the associated rapid exit taxiway, in the configuration shown in Figure 5-25. In each set, the lights shall be located 2 m apart and the light nearest to the runway centre line shall be displaced 2 m from the runway centreline.

(4) Where more than one rapid exit taxiway exists on a runway, the set of rapid exit taxiway indicator lights for each exit shall not overlap when displayed.

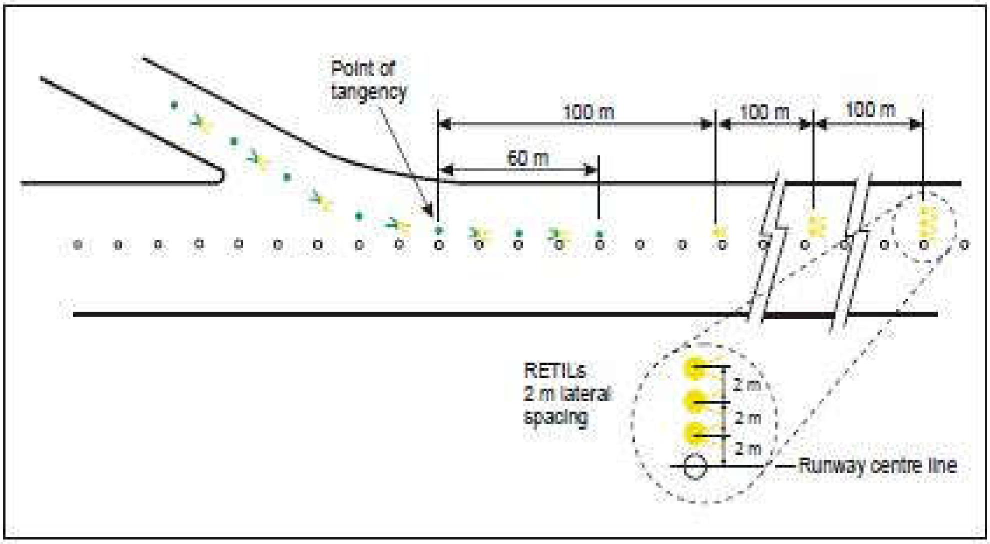


Figure 5- 25. Rapid exit taxiway indicator lights (RETILS)

Characteristics

(5) Rapid exit taxiway indicator lights shall be fixed unidirectional yellow lights, aligned so as to be visible to the pilot of a landing aeroplane in the

direction of approach to the runway. See Figure 5-25 for an illustration of rapid exit taxiway indicator lights (RETILs)

(6) Rapid exit taxiway indicator lights shall be in accordance with the specifications in ICAO Annex 14 Volume I Appendix 2, Figure A2-6 or Figure A2-7, as appropriate.

(7) Rapid exit taxiway indicator lights shall be supplied with power on a separate circuit to other runway lighting so that they may be used when other lighting is switched off.

(p) STOPWAY LIGHTS

Application

(1) Stopway lights shall be provided for a stopway intended for use at night.

Location

(2) Stopway lights shall be placed along the full length of the stopway and shall be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights. Stopway lights shall also be provided across the end of a stopway on a line at right angles to the stopway axis as near to the end of the stopway as possible and, in any case, not more than 3 m outside the end.

Characteristics

(3) Stopway lights shall be fixed unidirectional lights showing red in the direction of the runway.

(q) TAXIWAY CENTRE LINE LIGHTS

Application

(1) Taxiway centre line lights shall be provided on an exit taxiway, facility and apron intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

(2) Taxiway centre line lights shall be provided on a taxiway intended for use at night in runway visual range conditions of 350 m or greater, and particularly on complex taxiway intersections and exit taxiways, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

Note — Where there may be a need to delineate the edges of a taxiway, e.g. on a rapid exit taxiway, narrow taxiway, this may be done with taxiway edge lights or markers.

(3) Taxiway centre line lights shall be provided on an exit taxiway, taxiway and apron in all visibility conditions where specified as components of an advanced surface movement guidance and control system in such a manner as to provide continuous guidance between the runway centre line and aircraft stands.

(4) Taxiway centre line lights shall be provided on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350 m, except that these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.

Note — See 12.2.8.2(c) for provisions concerning the interlocking of runway and taxiway lighting systems.

(5) Taxiway centre line lights shall be provided in all visibility conditions on a runway forming part of a standard taxi-route where specified as components of an advanced surface movement guidance and control system.

Characteristics

(6) Except as provided for in 12.2.5.3(q)(8) taxiway centre line lights on a taxiway other than an exit taxiway and on a runway forming part of a

standard taxi-route shall be fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway.

(7) Taxiway centre line lights on an exit taxiway shall be fixed lights. Alternate taxiway centre line lights shall show green and yellow from their beginning near the runway centre line to the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway; and thereafter all lights shall show green (See Figure 5-25). The first light in the exit centerline shall always be green and the light nearest to the perimeter shall always show yellow.

Note 1 — Care is necessary to limit the light distribution of green lights on or near a runway so as to avoid possible confusion with threshold lights.

Note 2 — For yellow filter characteristics see Appendix A2-1, 2.2.

Note 3 — The size of the ILS/MLS critical/sensitive area depends on the characteristics of the associated ILS/MLS and other factors. Guidance is provided in ICAO Annex 10, Volume I, Attachments C and G.

Note 4 — See 12.2.5.4(c) for specifications on runway vacated signs.

(8) Where it is necessary to denote the proximity to a runway, taxiway centre line lights shall be fixed lights showing alternating green and yellow from the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway, to the runway and continue alternating green and yellow until:

(i) their end point near the runway centre line; or

(ii) in the case of the taxiway centre line lights crossing the runway, to the opposite perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway.

Note 1. — Care is necessary to limit the light distribution of green lights on or near a runway so as to avoid possible confusion with threshold lights.

Note 2. — The provisions of 12.2.5.3(q)(8) can form part of effective runway incursion prevention measures.

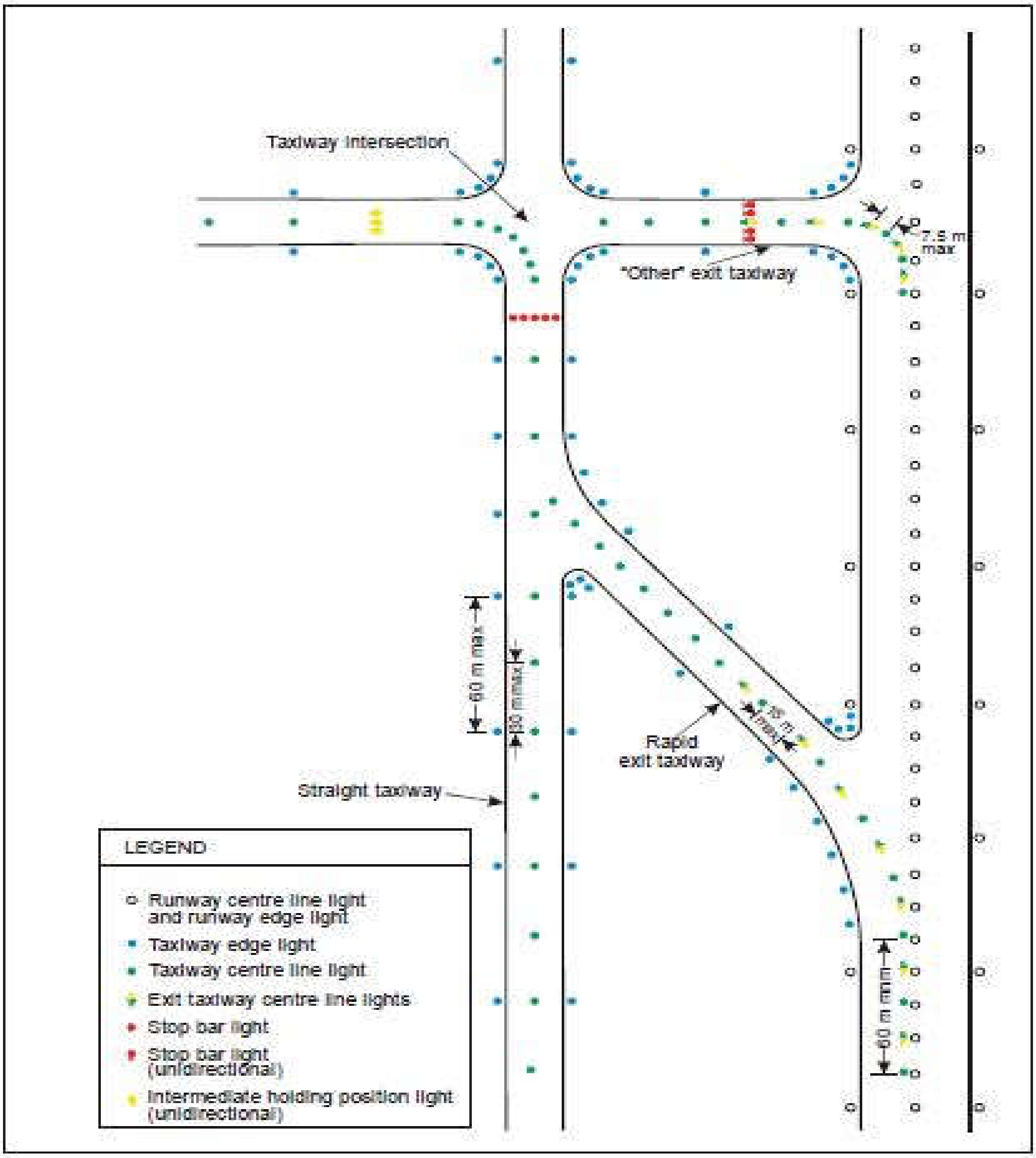


Figure 5- 26. Taxiway lighting

(9) Taxiway centre line lights shall be in accordance with the specifications of:

(i) IS: 12.2.5.3, Figure A2-12, A2-12, or A2-12 for taxiways intended for use in runway visual range conditions of less than a value of 350 m; and

(ii) IS: 12.2.5.3, Figure A2-15 or A2-16 for other taxiways.

(10) Where higher intensities are required, from an operational point of view, the taxiway centre line lights on rapid exit taxiways intended for use in runway visual range conditions less than a value of 350m shall be in accordance with the specifications of IS: 12.2.5.3, Figure A2-12. The number of levels of brilliancy setting for these lights shall be the same as that for the runway centre line lights.

(11) Where taxiway centre line lights are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, taxiway centre line lights shall be in accordance with the specifications of IS12.2.5.3, Figure A2- 17, A2-18 orA2-19.

Note — High-intensity centre line lights shall only be used in case of an absolute necessity and following a specific study.

Location

(12) Taxiway centre line lights shall normally be located on the taxiway centre line marking, except that they may be offset by not more than 30cm where it is not practicable to locate them on the marking.

Taxiway Centre Line Lights on Taxiways

Location

(13) Taxiway centre line lights on a straight section of a taxiway shall be spaced at longitudinal intervals of not more than 30 m, except that:

(i) larger intervals not exceeding 60 m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing;

(ii) Intervals less than 30 m shall be provided on short straight sections; and

(iii) on a taxiway intended for use in RVR conditions of less than a value of 350 m, the longitudinal spacing shall not exceed15m.

(14) Taxiway centre line lights on a taxiway curve shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiway curve. The lights shall be spaced at intervals such that a clear indication of the curve is provided.

(15) On a taxiway intended for use in RVR conditions of less than a value of 350 m, the lights on a curve shall not exceed a spacing of 15m and on a curve of less than 400 m radius the lights shall be spaced at intervals of not greater than 7.5m. This spacing shall extend for 60m before and after the curve.

Note 1 — Spacing's on curves that have been found suitable for a taxiway intended for use in RVR conditions of 350 m or greater are:

Curve Radius	**Line Spacing**
up to 400 m	7.5m
401 m to 899 m	15m
900 m or greater	30m

Taxiway Centre Line Lights on Rapid Exit Taxiways Location

(16) Taxiway centre line lights on a rapid exit taxiway shall commence at a point at least 60 m before the beginning of the taxiway centre line curve and continue beyond the end of the curve to a point on the centre line of the taxiway where an aeroplane can be expected to reach normal taxiing speed. The lights on that portion parallel to the runway centre line shall

always be at least 60 cm from any row of runway centre line lights, as shown in Figure5-27.

(17) The lights shall be spaced at longitudinal intervals of not more than 15m, except that, where runway centre line lights are not provided, a greater interval not exceeding 30 m may be used.

Taxiway Centre Line Lights on Other Exit Taxiways Location

(18) Taxiway centre line lights on exit taxiways other than rapid exit taxiways shall commence at the point where the taxiway centre line marking begins to curve from the runway centre line, and follow the curved taxiway centre line marking at least to the point where the marking leaves the runway. The first light shall be at least 60 cm from any row of runway centre line lights, as shown in Figure 5-27.

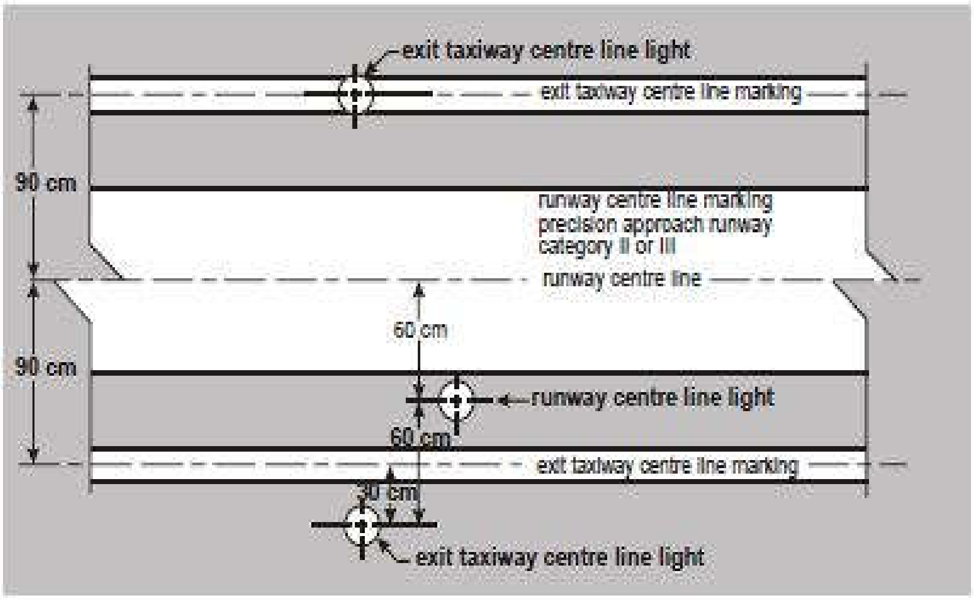
(19) The lights shall be spaced at longitudinal intervals of not more than 7.5m.

Taxiway Centre Line Lights on

Runways Location

(20) Taxiway centre line lights on a runway forming part of a standard taxi-route and intended for taxiing in runway visual range conditions less than a value of 350m shall be spaced at longitudinal intervals not exceeding 15m.

Figure 5- 27. Offset runway and taxiway centre line lights



Tolerances for offset runway centre line lights and taxiway centre line lights to maintain 60 cm separation.

(r) **TAXIWAY EDGE LIGHTS**

Application

(1) Taxiway edge lights shall be provided at the edges of a runway turn pad, holding bay, apron, etc. intended for use at night and on a taxiway not provided with taxiway centre line lights and intended for use at night, except that taxiway edge lights need not be provided where, considering the nature of the operations, adequate guidance can be achieved by surface illumination or other means.

Note — See 12.2.5.5(e) for taxiway edge markers.

(2) Taxiway edge lights shall be provided on a runway forming part of a standard taxi- route and intended for taxiing at night where the runway is not provided with taxiway centreline lights.

Note — See 12.2.8.2(c) for provisions concerning the inter-locking of runway and taxiway lighting systems.

Location

(3) Taxiway edge lights on a straight section of a taxiway and on a runway forming part of a standard taxi-route shall be spaced at uniform longitudinal intervals of not more than 60m. The lights on a curve shall be spaced at intervals less than 60m so that a clear indication of the curve is provided.

Note — Guidance on the spacing of taxiway edge lights on curves is given in the Aerodrome Design Manual (Doc 9157), Part4.

(4) Taxiway edge lights on a holding bay, apron, etc. shall be spaced at uniform longitudinal intervals of not more than 60m.

(5) Taxiway edge lights on a runway turn pad shall be spaced at uniform longitudinal intervals of not more than30m

(6) The lights shall be located as near as practicable to the edges of the taxiway, holding bay, apron or runway, etc. or outside the edges at a distance of not more than3m.

Characteristics

(7) Taxiway edge lights shall be fixed lights showing blue. The lights shall show up to at least 75° above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction. At an intersection, exit or curve the lights shall be shielded as far as practicable so that they cannot be seen in angles of azimuth in which they may be confused with other lights.

(8) The intensity of taxiway edge lights shall be at least 2 cd from 0° to 6° vertical, and 0.2 cd at any vertical angles between 6° and75°.

(s) RUNWAY TURN PAD LIGHTS

Application

(1) Runway turn pad lights shall be provided for continuous guidance on a runway turn pad intended for use in runway visual range conditions less than a value of 350 m, to enable an aeroplane to complete a 180-degree turn and align with the runway centre line.

(2) Runway turn pad lights shall be provided on a runway turn pad intended for use at night.

Location

(3) Runway turn pad lights shall normally be located on the runway turn pad marking, except that they may be offset by not more than 30cm where it is not practicable to locate them on the marking.

(4) Runway turn pad lights on a straight section of the runway turn pad marking shall be spaced at longitudinal intervals of not more than15m.

(5) Runway turn pad lights on a curved section of the runway turn pad marking shall not exceed a spacing of 7.5m.

Characteristics

(6) Runway turn pad lights shall be unidirectional fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or approaching the runway turn pad.

(7) Runway turn pad lights shall be in accordance with the specifications of IS 12.2.5.3, Figure A2-13, A2-12 or A2-15, as appropriate.

(t) STOP BARS

Application

Note 1 — A stop bar is intended to be controlled either manually or automatically by the air traffic services.

Note 2 — Runway incursions may take place in all visibility or weather conditions. The provision of stop bars at runway holding positions and their use at night in visibility conditions greater than 550 m RVR can form part of effective runway incursion prevention measures.

(1) A stop bar shall be provided at every runway-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 550 m, except where:

(i) appropriate aids and procedures are available to assist in preventing inadvertent incursions of traffic onto the runway; or

(ii) operational procedures exist to limit, in runway visual range conditions less than a value of 550 m, the number of:

(A) aircraft on the maneuvering area to one at a time; and

(B) vehicles on the maneuvering area to the essential minimum.

(2) *Where there is more than one stop bar associated with a taxiway/runway intersection, only one shall be illuminated at any given time.*

(3) *A stop bar shall be provided at an intermediate holding position when it is desired to supplement markings with lights and to provide traffic control by visual means.*

Location

(4) *Stop bars shall be located across the taxiway at the point where it is desired that traffic stop. Where the additional lights specified in 12.2.5.3(t)(6) are provided, these lights shall be located not less than 3 m from the taxiway edge.*

Characteristics

(5) *Stop bars shall consist of lights spaced at uniform intervals of no more than 3 m across the taxiway, showing red in the intended direction(s) of approach to the intersection or runway-holding position.*

Note. — Where necessary to enhance conspicuity of an existing stop bar, extra lights are installed uniformly

(6) *A pair of elevated lights shall be added to each end of the stop bar where the in- pavement stop bar lights might be obscured from a pilot's view, for example, by snow or rain, or where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft.*

(7) *Stop bars installed at a runway-holding position shall be unidirectional and shall show red in the direction of approach to the runway.*

(8) *Where the additional lights specified in 12.2.5.3(t)(6) of this Part are provided, these lights shall have the same characteristics as the lights in the stop bar, but shall be visible to approaching aircraft up to the stop bar position.*

(9) *The intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications in IS 12.2.5.3, Figures A2-12 through A2-16, as appropriate.*

(10) *Where stop bars are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, the intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications of IS 12.2.5.3, Figure A2-17, A2-18 orA2-19.*

Note — High-intensity stop bars shall only be used in case of an absolute necessity and following a specific study.

(11) Where a wide beam fixture is required, the intensity in red light and beam spreads of stop bar lights shall be in accordance with the specifications of IS12.2.5.3, Figure A2-17 orA2-19.

(12) The lighting circuit shall be designed so that:

(i) stop bars located across entrance taxiways are selectively switchable;

(ii) stop bars located across taxiways intended to be used only as exit taxiways are switchable selectively or in groups;

(iii) when a stop bar is illuminated, any taxiway centre line lights installed beyond the stop bar shall be extinguished for a distance of at least 90 m; and

(iv) stop bars are interlocked with the taxiway centre line lights so that when the centre line lights beyond the stop bar are illuminated the stop bar is extinguished and vice versa.

Note — Care is required in the design of the electrical system to ensure that all of the lights of a stop bar will not fail at the same time. Guidance *on this issue is given in the ICAO Aerodrome Design Manual (Doc 9157), Part5.*

(u) **INTERMEDIATE HOLDING POSITION LIGHTS**

Note — See 12.2.5.2(k) of this Part for specifications on intermediate holding position marking.

Application

(1) Except where a stop bar has been installed, intermediate holding position lights shall be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 350m.

(2) Intermediate holding position lights shall be provided at an intermediate holding position where there is no need for stop-and-go signals as provided by a stop bar.

Location

(3) Intermediate holding position lights shall be located along the intermediate holding position marking at a distance of 0.3 m prior to the marking.

Characteristics

(4) Intermediate holding position lights shall consist of three fixed unidirectional lights showing yellow in the direction of approach to the intermediate holding position with a light distribution similar to taxiway centre line lights if provided. The lights shall be disposed symmetrically about and at right angle to the taxiway centre line, with individual lights spaced 1.5 m apart.

(v) **DE-ICING/ANTI-ICING FACILITY EXIT LIGHTS (RESERVED)**

(w) **RUNWAY GUARD LIGHTS**

Note —Runway incursions may take place in all visibility and weather condition. The use of runway guard lights at runway holding positions can form part of effective runway incursion prevention measures. Runway guard lights is to warn pilots, and drivers of vehicles when they are operating on taxiways, that they are about to enter an active runway. There are two standard configurations of runway guard lights as illustrated in Figure5-29.

Application

(1) Runway guard lights, Configuration A, shall be provided at each taxiway/ runway intersection associated with a runway intended for use in:

(i) runway visual range conditions less than a value of 550 m where a stop bar is not installed; and

(ii) runway visual range conditions of values between 550 m and 1200 m where the traffic density is heavy.

Note 1. — Runway guard lights, Configuration B may supplement Configuration A when deemed necessary.

Note 2. — Guidance on the design, operation and the location of runway guard lights Configuration B is given in the Aerodrome Design Manual (Doc 9157), Part 4.

(2) As part of runway incursion prevention measures, runway guard lights, Configuration A or B, shall be provided at each taxiway/runway intersection where runway incursion hot spots have been identified, and used under all weather conditions during day and night.

(3) Configuration B runway guard lights shall not be collocated with a stop bar.

(4) here more than one runway-holding positions exist at a runway/taxiway intersection, only the set of runway guard lights associated with the operational runway-holding position shall be illuminated.

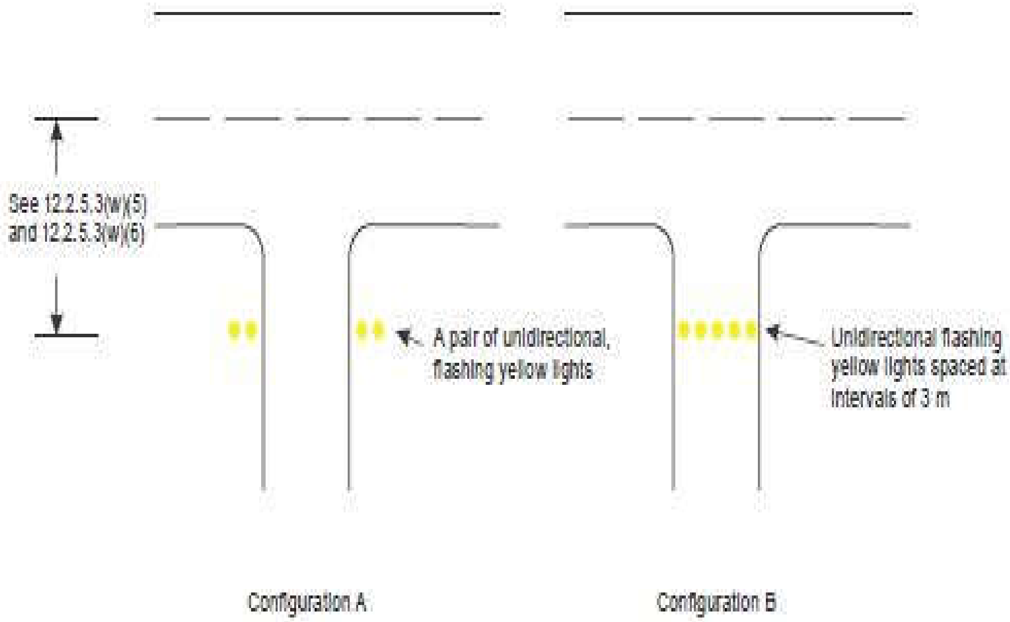


Figure 5- 28. Runway guard lights

Location

(5) Runway guard lights, Configuration A, shall be located at each side of the taxiway on the holding side of runway holding position marking.

(6) Runway guard lights, Configuration B, shall be located across the taxiway on the holding side of runway holding position marking.

Characteristics

(7) Runway guard lights, Configuration A, shall consist of two pairs of yellow lights.

(8) Where there is a need to enhance the contrast between the on and off state of runway guard lights, Configuration A, intended for use during the day, a visor of sufficient size to prevent sunlight from entering the lens without interfering with the function of the fixture shall be located above each lamp.

Note — Some other device or design, e.g. specially designed optics, maybe used in lieu of the visor.

(9) Runway guard lights, Configuration B, shall consist of yellow lights spaced at intervals of 3 m across the taxiway.

(10) The light beam shall be unidirectional and shall show yellow in the direction of approach to the runway - holding position.

Note. — For guidance on orientation and aiming of runway guard lights, see the Aerodrome Design Manual (Doc 9157) Part 4.

(11) The intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in IS:12.2.5.3, FigureA2-24.

(12) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in IS:12.2.5.3, FigureA2-25.

(13) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications in IS:12.2.5.3, FigureA2-25.

Note — Higher light intensities may be required to maintain ground movement at a certain speed in low visibilities.

(14) The intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in IS:12.2.5.3, FigureA2-12.

(15) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in IS:12.2.5.3, FigureA2-20.

(16) Where runway guard lights are specified as components of an advanced surface movement guidance and control system where higher light intensities are required, the intensity in yellow light and beam spreads of lights of Configuration B shall be in accordance with the specifications in IS:12.2.5.3, FigureA2-20.

(17) The lights in each unit of Configuration A shall be illuminated alternately.

(18) For Configuration B, adjacent lights shall be alternately illuminated and alternative lights shall be illuminated in unison.

(19) The lights shall be illuminated between 30 and 60 cycles per minute and the light suppression and illumination periods shall be equal and opposite in each light.

Note — The optimum flash rate is dependent on the rise and fall times of the lamps used. Runway guard lights, Configuration A, installed on 6.6 ampere series circuits have been found to look best when operated at 45 to 50 flashes per minute per lamp. Runway guard lights, Configuration B, installed on 6.6 ampere series circuits have been found to look best when operated at 30 to 32 flashes per minute per lamp.

(x) **APRON FLOODLIGHTING**

(See also sections 12.2.5.3(q)(1) and 12.2.5.3(r)(1))

Application

(1) Apron floodlighting shall be provided on an apron and on a designated isolated aircraft parking position intended to be used at night.

Note 1 — Not applicable.

Note 2 — The designation of an isolated aircraft parking position is specified in 12.2.3.14.

Note 3 — Guidance on apron floodlighting is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

Location

(2) Apron floodlights shall be located so as to provide adequate illumination on all apron service areas, with a minimum of glare to pilots of aircraft in flight and on the ground, aerodrome and apron controllers, and personnel on the apron. The arrangement and aiming of floodlights shall be such that an aircraft stand receives light from two or more directions to minimize shadows.

Characteristics

(3) The spectral distribution of apron floodlights shall be such that the colours used for aircraft marking connected with routine servicing, and for surface and obstacle marking, can be correctly identified.

(4) The average illuminance shall be at least the following: Aircraft stand:

— horizontal illuminance — 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and

— vertical illuminance — 20 lux at a height of 2m above the apron in relevant directions.

Other apron areas:

— horizontal illuminance — 50 per cent of the average illuminance on the aircraft stands with a uniformity ratio (average to minimum) of not more than 4 to 1.

(y) **VISUAL DOCKING GUIDANCE SYSTEM**

Application

(1) A visual docking guidance system shall be provided when it is intended to indicate, by a visual aid, the precise positioning of an aircraft on an aircraft stand and other alternative means, such as marshallers, are not practicable.

Note — The factors to be considered in evaluating the need for a visual docking guidance system are in particular: the number and type(s) of aircraft using the aircraft stand, weather conditions, space available on the apron and the precision required for maneuvering into the parking position due to aircraft servicing installation, passenger loading bridges, etc. See the ICAO Aerodrome Design Manual (Doc 9157), Part 4 — visual Aids for guidance on the selection of suitable systems.

Characteristics

(2) The system shall provide both azimuth and stopping guidance.

(3) The azimuth guidance unit and the stopping position indicator shall be adequate for use in all weather, visibility, background lighting and pavement conditions for which the system is intended both by day and night, but shall not dazzle the pilot.

Note — Care is required in both the design and on-site installation of the system to ensure that reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.

(4) The azimuth guidance unit and the stopping position indicator shall be of a design such that:

(i) a clear indication of malfunction of either or both is available to the pilot; and

(ii) they can be turned off.

(5) The azimuth guidance unit and the stopping position indicator shall be located in such a way that there is continuity of guidance between the aircraft stand markings, the aircraft stand maneuvering guidance lights, if present, and the visual docking guidance system.

(6) The accuracy of the system shall be adequate for the type of loading bridge and fixed aircraft servicing installations with which it is to be used.

(7) The system shall be usable by all types of aircraft for which the aircraft stand is intended, preferably without selective operation.

(8) If selective operation is required to prepare the system for use by a particular type of aircraft, then the system shall provide an identification of the selected aircraft type to both the pilot and the system operator as a means of ensuring that the system has been set properly.

Azimuth Guidance Unit Location

(9) The azimuth guidance unit shall be located on or close to the extension of the stand centre line ahead of the aircraft so that its signals are visible from the cockpit of an aircraft throughout the docking maneuver and aligned for use at least by the pilot occupying the left seat.

(10) The azimuth guidance unit shall be aligned for use by the pilots occupying both the left and right seats.

Characteristics

(11) The azimuth guidance unit shall provide unambiguous left/right guidance which enables the pilot to acquire and maintain the lead-in line without over controlling.

(12) When azimuth guidance is indicated by colour change, green shall be used to identify the centre line and red for deviations from the centreline.

Stopping Position Indicator

Location

(13) The stopping position indicator shall be located in conjunction with, or sufficiently close to, the azimuth guidance unit so that a pilot can observe both the azimuth and stop signals without turning the head.

(14) The stopping position indicator shall be usable at least by the pilot occupying the left seat.

(15) The stopping position indicator shall be usable by the pilots occupying both the left and right seats.

Characteristics

(16) The stopping position information provided by the indicator for a particular aircraft type shall account for the anticipated range of variations in pilot eye height and/or viewing angle.

(17) The stopping position indicator shall show the stopping position for the aircraft for which guidance is being provided, and shall provide closing rate information to enable the pilot to gradually decelerate the aircraft to a full stop at the intended stopping position.

(18) The stopping position indicator shall provide closing rate information over a distance of at least 10m.

(19) When stopping guidance is indicated by colour change, green shall be used to show that the aircraft can proceed and red to show that the stop point has been reached except that for a short distance prior to the stop point a third colour may be used to warn that the stopping point is close.

(z) **ADVANCED VISUAL DOCKING GUIDANCE SYSTEM**

Application

Note 1. — Advanced visual docking guidance systems (A-VDGS) include those systems that, in addition to basic and passive azimuth and stop position information, provide pilots with active (usually sensor-based) guidance information, such as aircraft type indication (in accordance with Doc 8643 — Aircraft Type Designators*), distance-to-go information and closing speed. Docking guidance information is usually provided on a single display unit.*

Note 2. — An A-VDGS may provide docking guidance information in three stages: the acquisition of the aircraft by the system, the azimuth alignment of the aircraft, and the stopping position information.

(1) An A-VDGS shall be provided where it is operationally desirable to confirm the correct aircraft type for which guidance is being provided and/or to indicate the stand centre line in use, where more than one is provided for.

(2) The A-VDGS shall be suitable for use by all types of aircraft for which the aircraft stand is intended.

(3) The A-VDGS shall be used only in conditions in which its operational performance is specified.

Note 1. — The use of the A-VDGS in conditions such as weather, visibility and background lighting, both by day and night, would need to be specified.

Note 2. — Care is required in both the design and on-site installation of the system to ensure that glare, reflection of sunlight, or other light in the vicinity, does not degrade the clarity and conspicuity of the visual cues provided by the system.

(4) The docking guidance information provided by an A-VDGS shall not conflict with that provided by a conventional visual docking guidance system on an aircraft stand if both types are provided and are in operational use. A method of indicating that the A-VDGS is not in operational use or is unserviceable shall be provided.

Location

(5) The A-VDGS shall be located such that unobstructed and unambiguous guidance is provided to the person responsible for, and persons assisting, the docking of the aircraft throughout the docking maneuver.

Note. — Usually the pilot-in-command is responsible for the docking of the aircraft. However, in some circumstances, another person could be responsible and this person may be the driver of a vehicle that is towing the aircraft.

Characteristics

(6) The A-VDGS shall provide, at minimum, the following guidance information at the appropriate stage of the docking maneuver:

(i) an emergency stop indication;

(ii) the aircraft type and model for which the guidance is provided;

(iii) an indication of the lateral displacement of the aircraft relative to the stand centre line;

(iv) the direction of azimuth correction needed to correct a displacement from the stand centreline;

(v) an indication of the distance to the stop position;

(vi) an indication when the aircraft has reached the correct stopping position; and

(vii) a warning indication if the aircraft goes beyond the appropriate stop position.

(7) The A-VDGS shall be capable of providing docking guidance information for all aircraft taxi speeds encountered during the docking maneuver.

Note. — See the Aerodrome Design Manual *(Doc 9157), Part 4, for an indication of the maximum aircraft speeds relative to distance to the stopping position.*

(8) The time taken from the determination of the lateral displacement to its display shall not result in a deviation of the aircraft, when operated in normal conditions, from the stand centre line greater than 1m.

(9) The information on displacement of the aircraft relative to the stand centre line and distance to the stopping position, when displayed, shall be provided with the accuracy specified in Table5-4.

(10) Symbols and graphics used to depict guidance information shall be intuitively representative of the type of information provided.

Note. — The use of colour would need to be appropriate and need to follow signal convention, i.e. red, yellow and green mean hazard, caution and normal/correct conditions, respectively. The effects of colour contrasts would also need to be considered.

(11) Information on the lateral displacement of the aircraft relative to the stand centre line shall be provided at least 25 m prior to the stop position.

Note. — The indication of the distance of the aircraft from the stop position may be colour- coded and presented at a rate and distance proportional to the actual closure rate and distance of the aircraft approaching the stop point.

(12) Continuous closure distance and closure rate shall be provided from at least 15 m prior to the stop position.

(13) Where provided, closure distance displayed in numerals shall be provided in metre integers to the stop position and displayed to 1 decimal place at least 3 m prior to the stop position.

Table 5- 4. A-VDGS recommended displacement accuracy

Guidance information	Maximum deviation at stop position (stop area)	Maximum deviation at 9 m from stop position	Maximum deviation at 15 m from stop position	Maximum deviation at 25 m from stop position
Azimuth	±250 mm	±340 mm	±400 mm	±500 mm
Distance	±500 mm	±1 000 mm	±1 300 mm	Not specified

(14) Throughout the docking maneuver, an appropriate means shall be provided on the A- VDGS to indicate the need to bring the aircraft to an immediate halt. In such an event, which includes a failure of the A-VDGS, no other information shall be displayed.

(15) Provision to initiate an immediate halt to the docking procedure shall be made available to personnel responsible for the operational safety of the stand.

(16) The word “stop” in red characters shall be displayed when an immediate cessation of the docking maneuver is required.

(aa) AIRCRAFT STAND MANEUVERING GUIDANCE LIGHTS

Application

(1) Aircraft stand maneuvering guidance lights shall be provided to facilitate the positioning of an aircraft on an aircraft stand on a paved apron facility intended for use in poor visibility conditions, unless adequate guidance is provided by other means.

Location

(2) Aircraft stand maneuvering guidance lights shall be collocated with the aircraft stand markings.

Characteristics

(3) Aircraft stand maneuvering guidance lights, other than those indicating a stop position, shall be fixed yellow lights, visible throughout the segments within which they are intended to provide guidance.

(4) The lights used to delineate lead-in, turning and lead-out lines shall be spaced at intervals of not more than 7.5m on curves and 15 m on straight sections.

(5) The lights indicating a stop position shall be fixed, unidirectional lights, showing red.

(6) The intensity of the lights shall be adequate for the condition of visibility and ambient light in which the use of the aircraft stand is intended.

(7) The lighting circuit shall be designed so that the lights may be switched on to indicate that an aircraft stand is to be used and switched off to indicate that it is not to be used.

(ab) ROAD-HOLDING POSITION LIGHT

Application

(1) A road-holding position light shall be provided at each road-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions less than a value of 350m.

(2) A road-holding position light shall be provided at each road-holding position serving a runway when it is intended that the runway will be used in runway visual range conditions of values between 350 m and 550m.

Location

(3) A road-holding position light shall be located adjacent to the holding position marking 1.5 m (± 0.5 m) from one edge of the road, i.e. left or right as appropriate to the local traffic regulations.

Note — See 12.2.9.9 for the mass and height limitations and frangibility requirements of navigation aids located on runway strips.

Characteristics

(4) The road-holding position light shall comprise:

(i) a controllable red (stop)/green (go) traffic light; or

(ii) a flashing red-light.

Note — It is intended that the lights specified in sub-paragraph a) be controlled by the air traffic services.

(5) The road-holding position light beam shall be unidirectional and aligned so as to be visible to the driver of a vehicle approaching the holding position.

(6) The intensity of the light beam shall be adequate for the conditions of visibility and ambient light in which the use of the holding position is intended, but shall not dazzle the driver.

Note — The commonly used traffic lights are likely to meet the requirements in sections 12.2.5.3(ab) (5) and12.2.5.3(ab) (6).

(7) The flash frequency of the flashing-red light shall be between 30 and 60 flashes per minute.

(ac) NO-ENTRY BAR

Note — Runway incursions may take place in all visibility or weather conditions. The use of no-entry bars can form part of effective runway incursion prevention measures.

Application

(1) A no-entry bar shall be provided across a taxiway which is intended to be used as an exit only taxiway to assist in preventing inadvertent access of traffic to that taxiway.

Location

(2) A no-entry bar shall be located across the taxiway at the end of an exit only taxiway where it is desired to prevent traffic from entering the taxiway in the wrong direction.

(3) A no-entry bar should be collocated with a no-entry sign and/or a no-entry marking.

Characteristics

(4) A no-entry bar shall consist of unidirectional lights spaced at uniform intervals of no more than 3 m showing red in the intended direction(s) of approach to the runway.

Note. — Where necessary to enhance conspicuity, extra lights are installed uniformly.

(5) A pair of elevated lights shall be added to each end of the no-entry bar where the in- pavement no entry bar lights might be obscured from a pilot's view, for example, by snow or rain, or where a pilot may be required to stop the aircraft in a position so close to the lights that they are blocked from view by the structure of the aircraft.

(6) The intensity in red light and beam spreads of no-entry bar lights shall be in accordance with the specifications in IS 12.2.5.3, Figures A2-12 through A2-16, as appropriate.

(7) Where no-entry bars are specified as components of an advanced surface movement guidance and control system and where, from an operational point of view, higher intensities are required to maintain ground movements at a certain speed in very low visibilities or in bright daytime conditions, the intensity in red light and beam spreads of no-entry bar lights shall be in accordance with the specifications of IS 12.2.5.3, Figure A2-17, A2-18 or A2-19.

Note. — High-intensity no-entry bars are typically used only in case of an absolute necessity and following a specific study.

(8) Where a wide beam fixture is required, the intensity in red light and beam spreads of no-entry bar lights shall be in accordance with the specifications of IS:12.2.5.3, Figure A2-17 or A2-19.

(9) Taxiway centre line lights installed beyond the no-entry bar, looking in the direction of the runway, shall not be visible when viewed from the taxiway.

(ad) RUNWAY STATUS LIGHTS

Introductory Note. — Runway status lights (RWSL) is a type of autonomous runway incursion warning system (ARIWS). The two basic visual components of RWSL are runway entrance lights (RELs) and take-off hold lights(THLs). Either may be installed by itself, but the two components are designed to be complementary to each other.

Location

(1) Where provided, RELs shall be offset 0.6 m from the taxiway centre line on the opposite side to the taxiway centre line lights and begin 0.6 m before the runway- holding position extending to the edge of the runway. An additional single light shall be placed on the runway 0.6 m from the runway centerline and aligned with the last two taxiway RELs.

Note. — Where two or more runway-holding positions are provided, the runway-holding position referred is that closest to the runway.

(2) RELs shall consist of at least five light units and shall be spaced at a minimum of 3.8 m and a maximum of 15.2 m longitudinally, depending upon the taxiway length involved, except for a single light installed near the runway centreline.

(3) Where provided, THLs shall be offset 1.8m on each side of the runway centre line lights and extend, in pairs, starting at a point 115m from the beginning of the runway and, thereafter, every 30m for at least 450m.

Note. — Additional THLs may be similarly provided at the starting point of the take-off roll.

Characteristics

(4) Where provided, RELs shall consist of a single line of fixed in pavement lights showing red in the direction of aircraft approaching the runway.

(5) RELs shall illuminate as an array at each taxiway/runway intersection where they are installed less than 2 seconds after the system determines a warning is needed.

(6) Intensity and beam spread of RELs shall be in accordance with the specifications of IS:12.2.5.3, Figures A2-12 andA2-14.

Note. — Consideration for reduced beam width may be required for some REL lights at acute angled runway/taxiway intersections to ensure the RELs are not visible to aircraft on the runway.

(7) Where provided, THLs shall consist of two rows of fixed in pavement lights showing red facing the aircraft taking off.

(8) THLs shall illuminate as an array on the runway less than 2 seconds after the system determines a warning is needed.

(9) Intensity and beam spread of THLs shall be in accordance with the specifications of IS:12.2.5.3, Figure A2-16.

(10) RELs and THLs shall be automated to the extent that the only control over each system will be to disable one or both systems.

12.2.5.4 SIGNS

(a) **GENERAL**

Note — Signs shall be either fixed message signs or variable message signs. Guidance on signs is contained in the ICAO Aerodrome Design Manual

(Doc 9157), Part 4.

Application

(1) Signs shall be provided to convey a mandatory instruction, information on a specific location or destination on a movement area or to provide other information to meet the requirements of 12.2.9.8(a).

Note — See 12.2.5.2(q) for specifications on information marking.

(2) A variable message sign shall be provided where:

(i) the instruction or information displayed on the sign is relevant only during a certain period of time; and/or

(ii) there is a need for variable pre-determined information to be displayed on the sign to meet the requirements of 12.2.9.8(a).

Characteristics

(3) Signs shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and the engine pods of jet aircraft. The installed height of the sign shall not exceed the dimension shown in the appropriate column of Table5-5.

Table 5-5: Location Distance for Taxiing Guidance Signs Including Runway Exit Signs

Code number	Sign height (mm) Legend	Face (min.)	Installed (max.)	Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
1 or 2	200	300	700	5–11 m	3–10 m
1 or 2	300	450	900	5–11 m	3–10 m
3 or 4	300	450	900	11–21 m	8–15 m
3 or 4	400	600	1 100	11–21 m	8–15 m

Table 5- 5: Location Distance for Taxiing Guidance Signs Including Runway Exit Signs

(4) Signs shall be rectangular, as shown in Figures 5-30 and 5-31 with the longer side horizontal.

Code number	Sign height (mm) Legend	Face (min.)	Installed (max.)	Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
1 or 2	200	300	700	5–11 m	3–10 m
1 or 2	300	450	900	5–11 m	3–10 m
3 or 4	300	450	900	11–21 m	8–15 m
3 or 4	400	600	1 100	11–21 m	8–15 m

(5) The only signs on the movement area utilizing red shall be mandatory instruction signs.

(6) The inscriptions on a sign shall be in accordance with the provisions of IS12.2.5.4.

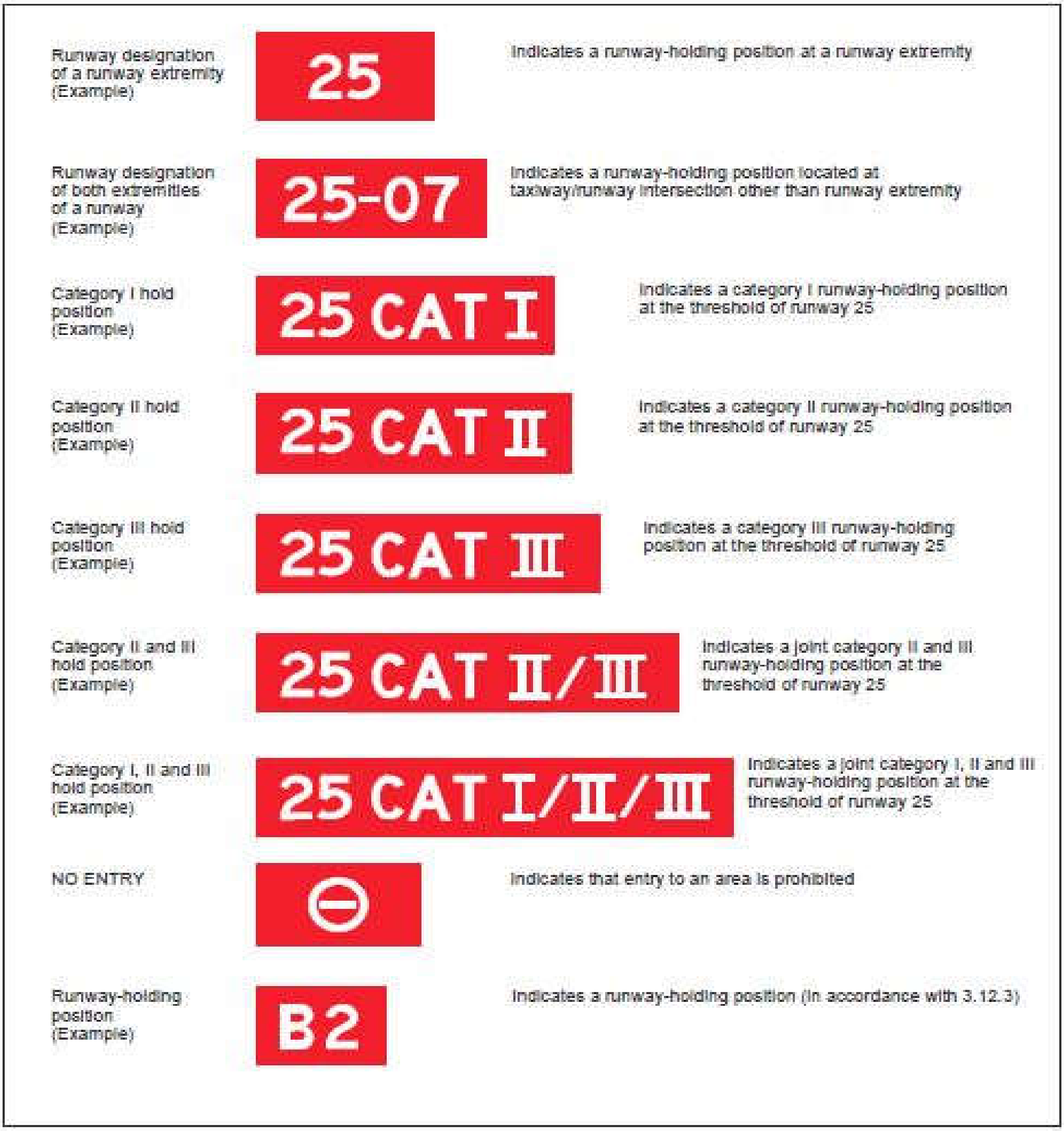


Figure 5- 30. Mandatory instruction signs

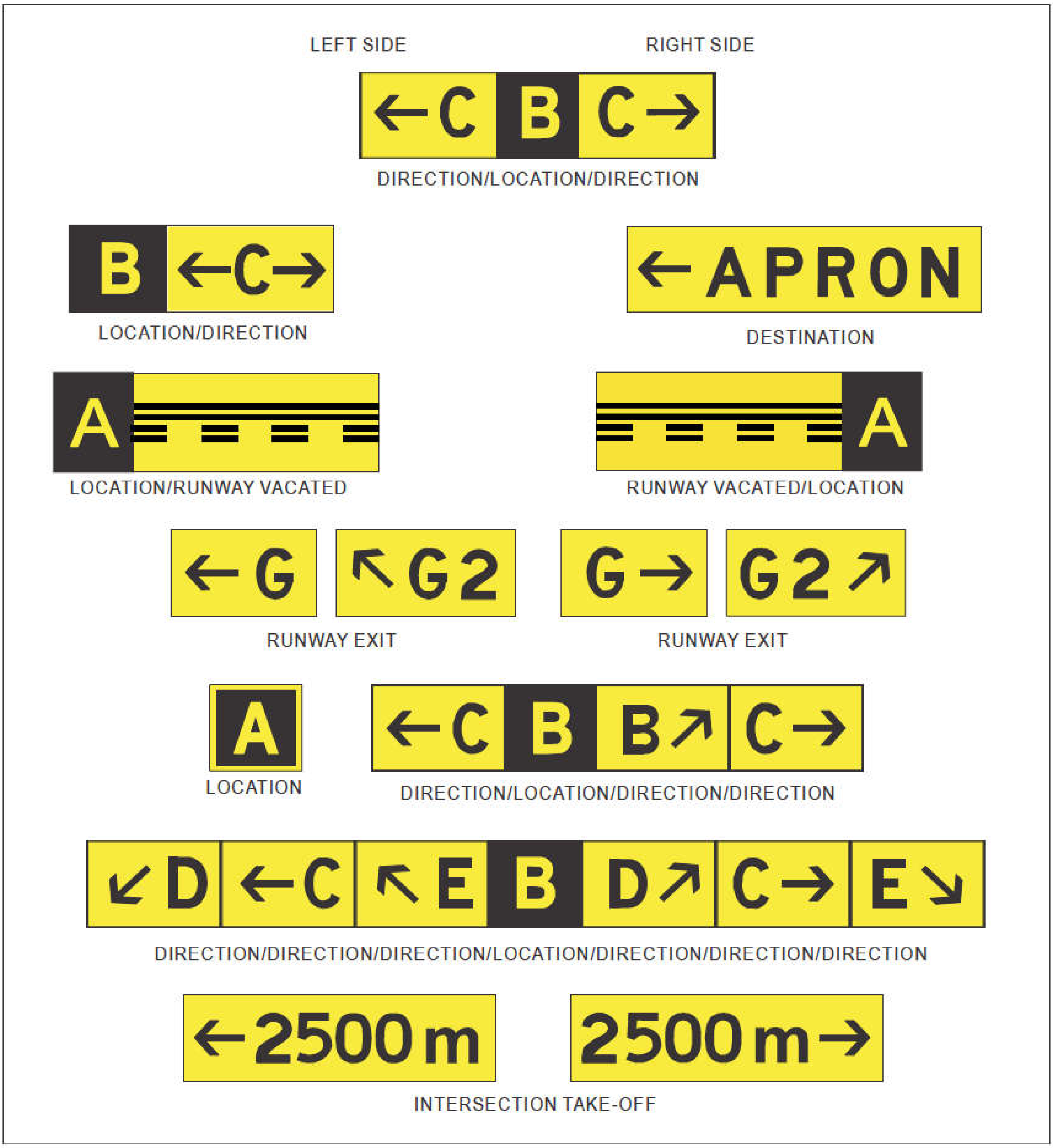


Figure 5- 31. Information signs

(7) Signs shall be illuminated in accordance with the provisions of IS 12.2.5.4 when intended for use:

(i) in runway visual range conditions less than a value of 800 m; or

(ii) at night in association with instrument runways; or

(iii) at night in association with non-instrument runways where the code number is 3 or 4.

(8) Signs shall be retro reflective and/or illuminated in accordance with the provisions of IS 12.2.5.4 when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

(9) A variable message sign shall show a blank face when not in use.

(10) In case of failure, a variable message sign shall not provide information that could lead to unsafe action from a pilot or a vehicle driver.

(11) The time interval to change from one message to another on a variable message sign shall be as short as practicable and shall not exceed 5secs.

(b) **MANDATORY INSTRUCTION SIGNS**

Note — See Figure 5-30 for pictorial representation of mandatory instruction signs and Figure 5-32 for examples of locating signs at taxiway/runway intersections.

Application

(1) A mandatory instruction sign shall be provided to identify a location beyond which an aircraft taxiing or vehicle shall not proceed unless authorised by the aerodrome control tower.

(2) Mandatory instruction signs shall include runway designation signs, category I, II or III holding position signs, runway- holding position signs, road -holding position signs and NO ENTRY signs.

Note — See 12.2.5.4(g) for specifications on road holding position signs.

(3) A pattern “A” runway- holding position marking shall be supplemented at a taxiway/runway intersection or a runway/runway intersection with a runway designation sign.

(4) A pattern “B” runway- holding position marking shall be supplemented with a category I, II or III holding position sign.

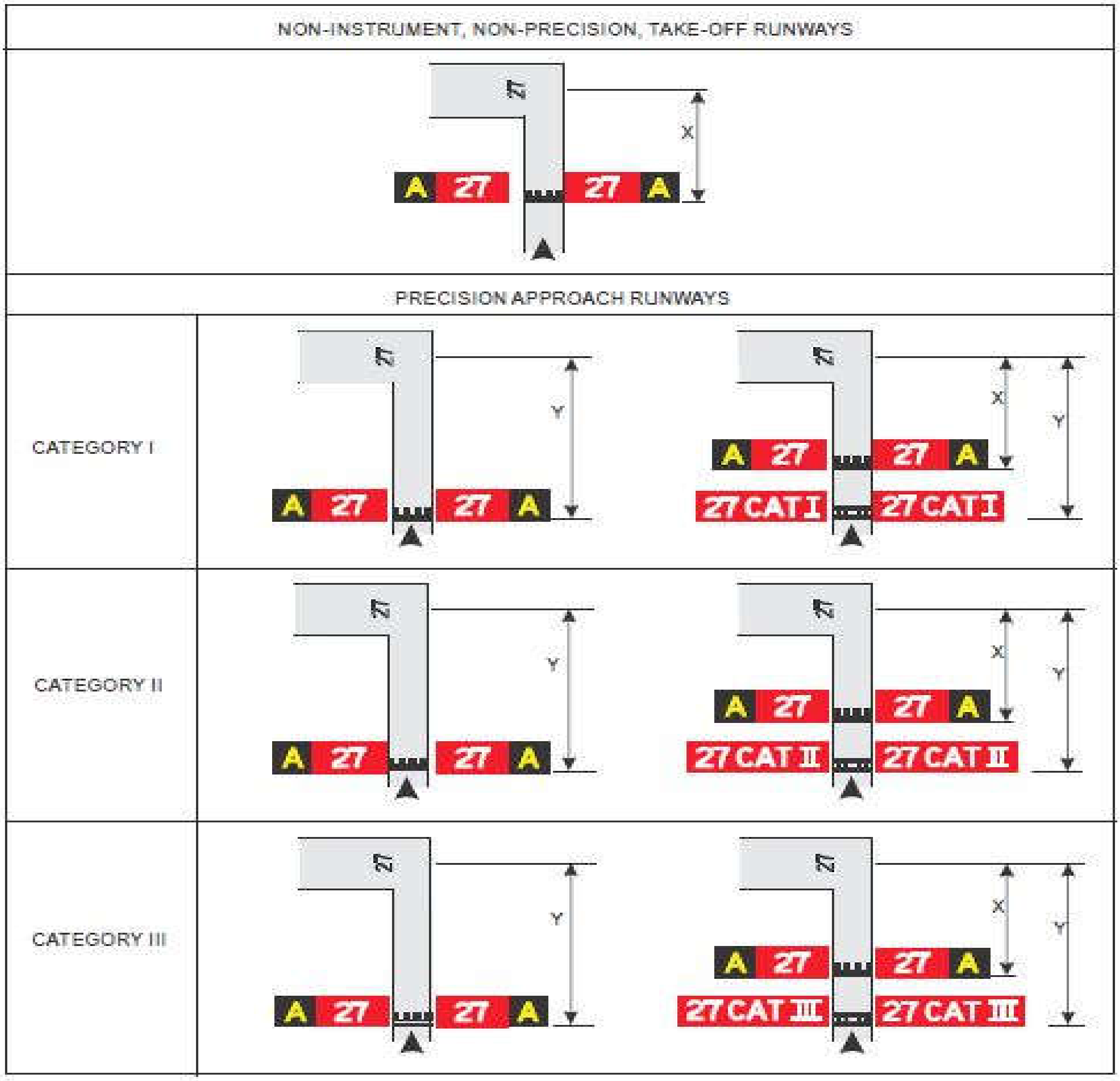
(5) A pattern “A” runway-holding position marking at a runway-holding position established in accordance with 12.2.3.12(c) of this subpart shall be supplemented with a runway-holding position sign.

Note — See 12.2.5.2(j) for specifications on runway- holding position marking.

(6) A runway designation sign at a taxiway/runway intersection shall be supplemented with a location sign in the outboard (farthest from the taxiway) position, as appropriate.

Note — See 12.2.5.4(c) for characteristics of location signs.

(7) A ‘NO ENTRY’ sign shall be provided when entry into an area is prohibited.



Note.— Distance X is established in accordance with Table 3-2. Distance Y is established at the edge of the ILS/MLS critical/sensitive area.

Figure 5- 32. Examples of sign positions at taxiway/runway intersections

Location

(8) A runway designation signs at a taxiway/runway intersection or a runway/ runway intersection shall be located on each side of the runway-holding position marking facing the direction of approach to the runway.

(9) A category I, II or III holding position sign shall be located on each side of the runway- holding position marking facing the direction of the approach to the critical area.

(10) A 'NO ENTRY' sign shall be located at the beginning of the area to which entrance is prohibited on each side of the taxiway as viewed by the pilot.

(11) A runway-holding position sign shall be located on each side of the runway-holding position established in accordance with 12.2.3.12(c), facing the approach to the obstacle limitation surface or ILS/MLS critical/sensitive area, as appropriate.

Characteristics

(12) A mandatory instruction sign shall consist of an inscription in white on a red background.

(13) Where, owing to environmental or other factors, the conspicuity of the inscription on a mandatory instruction sign needs to be enhanced, the outside edge of the white inscription shall be supplemented by a black outline measuring 10 mm in width for runway code numbers 1 and 2, and 20 mm in width for runway code numbers 3 and 4.

(14) The inscription on a runway designation sign shall consist of the runway designations of the intersecting runway properly oriented with respect to the viewing position of the sign, except that a runway designation sign installed in the vicinity of a runway extremity may show the runway designation of the concerned runway extremity only.

(15) The inscription on a category I, II, III joint II/III or joint I/II/III holding position sign shall consist of the runway designator followed by CAT I, CAT II, CAT III, CAT II/III or CAT I/II/III, as appropriate.

(16) The inscription on a 'NO ENTRY' sign shall be in accordance with Figure5-30.

(17) The inscription on a runway-holding position sign at a runway-holding position established in accordance with 12.2.3.12(c) shall consist of the taxiway designation and a number.

(18) Where installed, the following inscriptions/ symbol of Figure 5-30 shall be used:

(c) **INFORMATION SIGNS**

Note — See Figure 5-31 for pictorial representations of information signs.

Application

(1) An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing (direction or destination) information.

(2) Information signs shall include: direction signs, location signs, destination signs, runway exit signs, runway vacated signs and intersection take-off signs.

(3) A runway exit sign shall be provided where there is an operational need to identify a runway exit.

(4) A runway vacated sign shall be provided where the exit taxiway is not provided with taxiway centre line lights and there is a need to indicate to a pilot leaving a runway the perimeter of the ILS/MLS critical/sensitive area or the lower edge of the inner transitional surface whichever is farther from the runway centreline.

Note — See 12.2.5.3(q) for specifications on colour coding taxiway centre line lights.

(5) An intersection take-off sign shall be provided when there is an operational need to indicate the remaining take-off run available (TORA) for intersection take-offs.

(6) Where necessary, a destination sign shall be provided to indicate the direction to a specific destination on the aerodrome, such as cargo area, general aviation, etc.

(7) A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.

(8) A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

(9) A location sign shall be provided at an intermediate holding position.

(10) A location sign shall be provided in conjunction with a runway designation sign except at a runway/runway intersection.

(11) A location sign shall be provided in conjunction with a direction sign, except that it may be omitted where an aeronautical study indicates that it is not needed.

(12) Where necessary, a location sign shall be provided to identify taxiways exiting an apron or taxiways beyond an intersection.

(13) Where a taxiway ends at an intersection such as a ‘‘T’’ and it is necessary to identify this, a barricade, direction sign and/or other appropriate visual aid shall be used.

Location

(14) Except as specified in 12.2.5.4(c) (16) and 12.2.5.4(c) (24) of this Part information signs shall, wherever practicable, be located on the left-hand side of the taxiway in accordance with Table 5-5.

(15) At a taxiway intersection, information signs shall be located prior to the intersection and in line with the intermediate holding position marking. Where there is no intermediate holding position marking, the signs shall be installed at least 60m from the centre line of the intersecting taxiway where the code number is 3 or 4 and at least 40 m where the code number is 1 or 2.

Note — A location sign installed beyond a taxiway intersection may be installed on either side of a taxiway.

(16) A runway exit sign shall be located on the same side of the runway as the exit is located (i.e. left or right) and positioned in accordance with Table5-5.

(17) A runway exit sign shall be located prior to the runway exit point in line with a position at least 60 m prior to the point of tangency where the code number is 3 or 4, and at least 30 m where the code number is 1 or2.

(18) A runway vacated sign shall be located at least on one side of the taxiway. The distance between the sign and the centre line of a runway shall be not less than the greater of the following:

(i) the distance between the centre line of the runway and the perimeter of the ILS/MLS critical/sensitive area; or

(ii) the distance between the centre line of the runway and the lower edge of the inner transitional surface.

(19) Where provided in conjunction with a runway vacated sign, the taxiway location sign shall be positioned outboard of the runway vacated sign.

(20) An intersection take-off sign shall be located at the left-hand side of the entry taxiway. The distance between the sign and the centre line of the runway shall be not less than 60 m where the code number is 3 or 4 and not less than 45 m where the code number is 1 or 2.

(21) A taxiway location sign installed in conjunction with a runway designation sign shall be positioned outboard of the runway designation sign.

(22) A destination sign shall not be co-located with a location or direction sign.

(23) An information sign other than a location sign shall not be co-located with a mandatory instruction sign.

(24) A direction sign, barricade and/or other appropriate visual aid used to identify a “T” intersection shall be located on the opposite side of the intersection facing the taxiway.

Characteristics

(25) An information sign other than a location sign shall consist of an inscription in black on a yellow background.

(26) A location sign shall consist of an inscription in yellow on a black background and where it is a stand-alone sign shall have a yellow border.

(27) The inscription on a runway exit sign shall consist of the designator of the exit taxiway and an arrow indicating the direction to follow.

(28) The inscription on a runway vacated sign shall depict the pattern A runway-holding position marking as shown in Figure 5-30.

(29) The inscription on an intersection take-off sign shall consist of a numerical message indicating the remaining take-off run available in metres plus an arrow, appropriately located and oriented, indicating the direction of the take-off as shown in Figure 5-31.

(30) The inscription on a destination sign shall comprise an alpha, alphanumerical or numerical message identifying the destination plus an arrow indicating the direction to proceed as shown in Figure 5-31.

(31) The inscription on a direction sign shall comprise an alpha or alphanumerical message identifying the taxiway(s) plus an arrow or arrows appropriately oriented as shown in Figure 5-31.

(32) The inscription on a location sign shall comprise the designation of the location taxiway, runway or other pavement the aircraft is on or is entering and shall not contain arrows.

(33) Where it is necessary to identify each of a series of intermediate holding positions on the same taxiway, the location sign shall consist of the taxiway designation and a number.

(34) Where a location sign and direction signs are used in combination:

(i) all direction signs related to left turns shall be placed on the left side of the location sign and all direction signs related to right turns shall be placed on the right side of the location sign, except that where the junction consists of one intersecting taxiway, the location sign may alternatively be placed on the left hand side;

(ii) the direction signs shall be placed such that the direction of the arrows departs increasingly from the vertical with increasing deviation of the corresponding taxiway;

(iii) an appropriate direction sign shall be placed next to the location sign where the direction of the location taxiway changes significantly beyond the intersection; and

(iv) adjacent direction signs shall be delineated by a vertical black line as shown in Figure5-31.

(35) A taxiway shall be identified by a designator that is used only once on an aerodrome comprising a single letter, two letters or a combination of a letter or letters followed by a number.

(36) When designating taxiways, the use of words such as “inner” and “outer” should be avoided wherever possible.

(37) When designating taxiways, the use of the letters I, O or X and the use of words such as inner and outer shall be avoided wherever possible to avoid confusion with the numerals 1, 0 and closed marking.

(38) The use of numbers alone on the maneuvering area shall be reserved for the designation of runways.

(39) Apron stand designators shall not be the same as taxiway designators.

(d) VOR AERODROME CHECKPOINT SIGN

Application

(1) When a VOR aerodrome check-point is established, it shall be indicated by a VOR aerodrome check-point marking and sign.

Note — See 12.2.5.2(l) for VOR aerodrome check-point marking.

Location

(2) A VOR aerodrome check-point sign shall be located as near as possible to the check- point and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome check-point marking.

Characteristics

(3) A VOR aerodrome check-point sign shall consist of an inscription in black on a yellow background.

(4) The inscriptions on a VOR check-point sign shall be in accordance with one of the alternatives shown in Figure 5-33 in which:

VOR	*is an abbreviation identifying this as a VOR check-point;*
116.3	*is an example of the radio frequency of the VOR concerned;*
127°	*is an example of the VOR bearing to the nearest degree which shall be indicated at the VOR checkpoint; and*
4.3NM	*is an example of the distance in nautical miles to a DME collocated with the VOR concerned.*

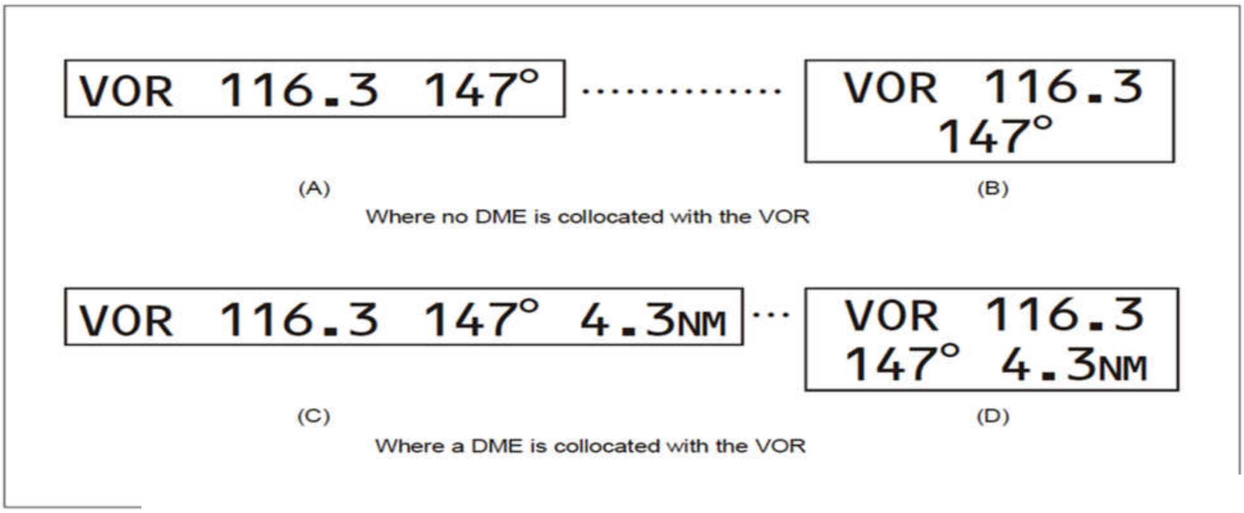


Figure 5- 33.VOR aerodrome checkpoint sign

Note — Tolerances for the bearing value shown on the sign are given in ICAO Annex 10, Volume I, Attachment E. It will be noted that a check-point can only be used operationally when periodic checks show it to be consistently within ± 2 degrees of the stated bearing.

(e) **AERODROME IDENTIFICATION SIGN**

Application

(1) An aerodrome identification sign shall be provided at an aerodrome where there is insufficient alternative means of visual identification.

Location

(2) The aerodrome identification sign shall be placed on the aerodrome as to be legible, at all angles above the horizontal.

Characteristics

(3) The aerodrome identification sign shall consist of the name of the aerodrome.

(4) The colour selected for the sign shall give adequate conspicuity when viewed against its background.

(5) The characters shall have a height of not less than 3m.

(f) **AIRCRAFT STAND IDENTIFICATION SIGNS**

Application

(1) An aircraft stand identification marking shall be supplemented with an aircraft stand identification sign where feasible.

Location

(2) An aircraft stand identification sign shall be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.

Characteristics

(3) An aircraft stand identification sign shall consist of an inscription in black on a yellow background.

(g) **ROAD-HOLDING POSITION SIGN**

(1) A road-holding position sign shall be provided at all road entrances to a runway.

Location

(2) The road-holding position sign shall be located 1.5 m from one edge of the road (left or right as appropriate to the local traffic regulations) at the holding position.

Characteristics

(3) A road-holding position sign shall consist of an inscription in white on a red background.

(4) The inscription on a road-holding position sign shall be in the national language, be in conformity with the local traffic regulations and include the following:

(i) a requirement to stop; and

(ii) where appropriate:

(A) a requirement to obtain ATC clearance; and

(B) location designator.

Note — Examples of road-holding position signs are contained in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

(5) A road-holding position sign intended for night use shall be retro reflective or illuminated.

12.2.5.5 MARKERS

(a) GENERAL

Markers shall be frangible. Those located near a runway or taxiway shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

Note 1 — Anchors or chains, to prevent markers which have broken from their mounting from blowing away, are sometimes used.

Note 2 — Guidance on frangibility of markers is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 6.

(b) UNPAVED RUNWAY EDGE MARKERS

Application

(1) Markers shall be provided when the extent of an unpaved runway is not clearly indicated by the appearance of its surface compared with that of the surrounding ground.

Location

(2) Where runway lights are provided, the markers shall be incorporated in the light fixtures. Where there are no lights, markers of flat rectangular or conical shape shall be placed so as to delimit the runway clearly.

Characteristics

(3) The flat rectangular markers shall have a minimum size of 1m by 3m and shall be placed with their long dimension parallel to the runway centre line. The conical markers shall have a height not exceeding 50cm.

(c) **STOPWAY EDGE MARKERS**

Application

(1) Stopway edge markers shall be provided when the extent of a stopway is not clearly indicated by its appearance compared with that of the surrounding ground.

Characteristics

(2) The stopway edge markers shall be sufficiently different from any runway edge markers used to ensure that the two types of markers cannot be confused.

Note — Markers consisting of small vertical boards camouflaged on the reverse side, as viewed from the runway, have proved operationally acceptable.

(d) **EDGE MARKERS FOR SNOW-COVERED RUNWAYS (RESERVED)**

(e) **TAXIWAY EDGE MARKERS**

Application

(1) Taxiway edge markers shall be provided on a taxiway where the code number is 1or 2 and taxiway centre line or edge lights or taxiway centre line markers are not provided.

Location

(2) Taxiway edge markers shall be installed at least at the same locations as would the taxiway edge lights had they been used.

Characteristics

(3) A taxiway edge marker shall be retro reflective blue.

(4) The marked surface as viewed by the pilot shall be a rectangle and shall have a minimum viewing area of 150cm^2.

(5) Taxiway edge markers shall be frangible. Their height shall be sufficiently low to preserve clearance for propellers and for the engine pods of jet aircraft.

(f) **TAXIWAY CENTRE LINE MARKERS**

Application

(1) Taxiway centre line markers shall be provided on a taxiway where the code number is 1 or 2 and taxiway centre line or edge lights or taxiway edge markers are not provided.

(2) Taxiway centre line markers shall be provided on a taxiway where the code number is 3 or 4 and taxiway centre line lights are not provided if there is a need to improve the guidance provided by the taxiway centre line marking.

Location

(3) Taxiway centre line markers shall be installed at least at the same location as would taxiway centre line lights had they been used.

Note — See 12.2.5.3(q) (12) for the spacing of taxiway centre line lights.

(4) Taxiway centre line markers shall normally be located on the taxiway centre line marking except that they may be offset by not more than 30 cm where it is not practicable to locate them on the marking.

Characteristics

(5) A taxiway centre line marker shall be retro reflective green.

(6) The marked surface as viewed by the pilot shall be a rectangle and shall have a minimum viewing area of $20cm^2$.

(7) Taxiway centre line markers shall be so designed and fitted as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the markers themselves.

(g) **UNPAVED TAXIWAY EDGE MARKERS**

Application

(1) Where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground, markers shall be provided.

Location

(2) Where taxiway lights are provided, the markers shall be incorporated in the light fixtures. Where there are no lights, markers of conical shape shall be placed so as to delimit the taxiway clearly.

(h) **BOUNDARY MARKERS**

Application

(1) Boundary markers shall be provided at an aerodrome where the landing area has no runway.

Location

(2) Boundary markers shall be spaced along the boundary of the landing area at intervals of not more than 200m, if the type shown in Figure 5-34

is used, or approximately 90 m, if the conical type is used with a marker at any corner.

Characteristics

(3) Boundary markers shall be of a form similar to that shown in Figure 5-34, or in the form of a cone not less than 50 cm high and not less than 75cm in diameter at the base. The markers shall be coloured to contrast with the background against which they will be seen. A single colour, orange or red, or two contrasting colours, orange and white or alternatively red

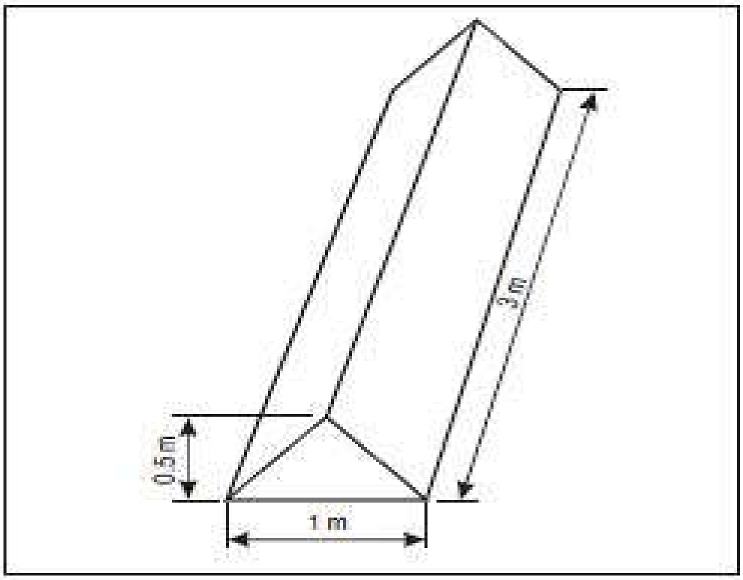


Figure 5- 34. Boundary markers

and white, shall be used, except where such colours merge with the background.

12.2.6 VISUAL AIDS FOR DENOTING OBSTACLES

12.2.6.1 OBJECTS TO BE MARKED AND/OR LIGHTED

Note - The marking and/or lighting of obstacles is intended to reduce hazards to aircraft by indicating the presence of the obstacles. It does not necessarily reduce operating limitations which may be imposed by an obstacle.

Note 2. — An autonomous aircraft detection system may be installed on or near an obstacle (or group of obstacles such as wind farms), designed to operate the lighting only when the system detects an aircraft approaching the obstacle, in order to reduce light exposure to local residents. Guidance on the design and installation of an autonomous aircraft detection system is available in the Aerodrome Design Manual (Doc 9157), Part 4. The availability of such guidance is not intended to imply that such a system has to be provided.

(a) Objects within the lateral boundaries of the obstacle limitation surfaces

(1) Vehicles and other mobile objects, excluding aircraft, on the movement area of an aerodrome are obstacles and shall be marked and, if the vehicles and aerodrome are used at night or in conditions of low visibility, lighted, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

(2) Elevated aeronautical ground lights within the movement area shall be marked so as to be conspicuous by day. Obstacle lights shall not be installed on elevated ground lights or signs in the movement area.

(3) All obstacles within the distance specified in Table 3-1, column 11 or 12 of this Part, from the centre line of a taxiway, an apron taxiway or aircraft stand taxi-lane shall be marked and, if the taxiway, apron taxiway or aircraft stand taxi-lane is used at night, lighted.

(4) A fixed obstacle that extends above a take-off climb surface within 3000m of the inner edge of the take-off climb surface shall be marked and, if the runway is used at night, lighted, except that:

(i) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(ii) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed150m;

(iii) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(iv) lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

(5) A fixed object, other than an obstacle, adjacent to a take-off climb surface shall be marked and, if the runway is used at night, lighted if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when:

(i) the object is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed 150m; or

(ii) the object is lighted by high-intensity obstacle lights by day.

(6) A fixed obstacle that extends above an approach surface within 3,000m of inner edge or above the transitional surface shall be marked and, if the runway is used at night, lighted, except that:

(i) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(ii) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed150m;

(iii) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(iv) the lighting may be omitted where the obstacle is a lighthouse and an aeronautical study indicates the lighthouse light to be sufficient.

(7) A fixed obstacle that extends above a horizontal surface shall be marked and, if the aerodrome is used at night, lighted except that:

(i) such marking and lighting may be omitted when:

(A) the obstacle is shielded by another fixed obstacle; or

(B) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths; or

(C) an aeronautical study shows the obstacle not to be of operational significance;

(ii) the marking may be omitted when the obstacle is lighted by medium-intensity obstacle lights, Type A, by day and its height above the level of the surrounding ground does not exceed150m;

(iii) The marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day; and

(iv) the lighting may be omitted where the obstacle is a light house and an aeronautical study indicates the lighthouse light to be sufficient.

(8) A fixed object that extends above an obstacle protection surface shall be marked and, if the runway is used at night, lighted.

Note - See 12.2.5.3(e) for information on the obstacle protection surface.

(9) Other objects inside the obstacle limitation surfaces shall be marked and/or lighted if an aeronautical study indicates that the object could constitute a hazard to aircraft (this includes objects adjacent to visual routes e.g. waterway or highway).

Note. — See note accompanying 12.2.4.4(b)

(10) Overhead wires, cables, etc., crossing a river, valley or highway shall be marked and their supporting towers marked and lighted if an aeronautical study indicates that the wires or cables could constitute a hazard to aircraft, except that the marking of the supporting towers may be omitted when they are lighted by high-intensity obstacle lights by day.

(b) Objects outside the lateral boundaries of the obstacle limitation surfaces

(1) Obstacles in accordance with paragraph 12.2.4.3(b) shall be marked and lighted, except that the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day.

(2) Other objects outside the obstacle limitation surfaces shall be marked and/or lighted if an aeronautical study indicates that the object could constitute a hazard to aircraft (this includes objects adjacent to visual routes e.g. waterway, highway).

(3) Overhead wires, cables, etc., crossing a river, waterway, valley or highway shall be marked and their supporting towers marked and lighted if an aeronautical study indicated that the wire or cables could constitute a hazard to aircraft.

12.2.6.2 MARKING AND/OR LIGHTING OF OBJECTS

(a) General

(1) The presence of objects which must be lighted, as specified in 12.2.6.1, shall be indicated by low-, medium- or high-intensity obstacle lights, or a combination of such lights.

(2) Low-intensity obstacle lights, Types A B, C, D, and E medium-intensity obstacle lights, Types A, B and C, high- intensity obstacle lights Type A and B, shall be in accordance with the specifications in Table 6-1 and IS:12.2.1.2.

(3) The number and arrangement of low-, medium- or high-intensity obstacle lights at each level to be marked shall be such that the object is indicated from every angle in azimuth. Where a light is shielded in any direction by another part of the object, or by an adjacent object, additional lights shall be provided on that adjacent object or the part of the object that is shielding the light, in such a way as to retain the general definition of the

object to be lighted. If the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

(b) Mobile Objects

Marking

(1) All mobile objects to be marked shall be coloured or display flags.

Marking by Colour

(2) When mobile objects are marked by colour, a single conspicuous colour, preferably red or yellowish green for emergency vehicles and yellow for service vehicles shall be used.

Marking by Flag

(3) Flags used to mark mobile objects shall be displayed around, on top of, or around the highest edge of, the object. Flags shall not increase the hazard presented by the object they mark.

(4) Flags used to mark fixed objects shall not be less than 0.9 m on each side and shall consists of a chequered pattern, each square having sides of not less than 0.3m. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white shall be used, except where such colors merge with the background.

Table 6- 1. Characteristics of obstacle lights

1	2	3	4	5	6	7
			Peak intensity (cd) at given Background Luminance (b)			
Light Type	Colour	Signal type/ (flash rate)	Day (Above 500 cd/m²)	Twilight (50-500 cd/m²)	Night (Below 50 cd/m²)	Light Distribution Table
Low-intensity, Type A (fixed obstacle)	Red	Fixed	N/A	N/A	10	Table 6-2
Low-intensity, Type B (fixed obstacle)	Red	Fixed	N/A	N/A	32	Table 6-2
Low-intensity, Type C (mobile obstacle)	Yellow/Blue (a)	Flashing (60-90 fpm)	N/A	40	40	Table 6-2
Low-intensity, Type D (follow-me vehicle)	Yellow	Flashing (60–90 fpm)	N/A	200	200	Table 6-2
Low-intensity, Type E	Red	Flashing (c)	N/A	N/A	32	Table 6-2 (Type B)
Medium-intensity, Type A	White	Flashing (20–60 fpm)	20 000	20 000	2 000	Table 6-3
Medium-intensity, Type B	Red	Flashing (20–60 fpm)	N/A	N/A	2 000	Table 6-3
Medium-intensity, Type C	Red	Fixed	N/A	N/A	2 000	Table 6-3
High-intensity, Type A	White	Flashing (40–60 fpm)	200 000	20 000	2 000	Table 6-3
High-intensity, Type B	White	Flashing (40–60 fpm)	100 000	20 000	2 000	Table 6-3

a) See 12.2.6.2(b)(6)
b) For flashing lights, effective intensity as determined in accordance with the *Aerodrome Design Manual* (Doc 9157), Part 4.
c) For wind turbine application, to flash at the same rate as the lighting on the nacelle.

Table 6- 2. Light distribution for low-intensity obstacle lights

	Minimum intensity (a)	Maximum intensity (a)	Vertical beam spread (f)	
			Minimum beam spread	Intensity
Type A	10 cd (b)	N/A	10°	5 cd
Type B	32 cd (b)	N/A	10°	16 cd
Type C	40 cd (b)	400 cd	12° (d)	20 cd
Type D	200 cd (c)	400 cd	N/A (e)	N/A

Note.— This table does not include recommended horizontal beam spreads. 12.2.6.2(a)(3) requires 360° coverage around an obstacle.Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as theshape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

a) 360° horizontal. For flashing lights, the intensity is read into effective intensity, as determined in accordance with the *Aerodrome Design Manual* (Doc 9157), Part 4.
b) Between 2 and 10° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
c) Between 2 and 20° vertical. Elevation vertical angles are referenced to the horizontal when the light is levelled.
d) Peak intensity should be located at approximately 2.5° vertical.
e) Peak intensity should be located at approximately 17° vertical.
f) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned in the "intensity" column.

Table 6- 3. Light distribution for medium- and high- intensity obstacle lights according to benchmark intensities of Table 6-1

Benchmark intensity	Minimum requirements					Recommendations				
	Vertical elevation angle (b)			Vertical beam spread (c)		Vertical elevation angle (b)			Vertical beam spread (c)	
	0°		-1°			0°	-1°	-10°		
	Minimum average intensity (a)	Minimum intensity (a)	Minimum intensity (a)	Minimum beam spread	Intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum intensity (a)	Maximum beam spread	Intensity (a)
200 000	200 000	150 000	75 000	3°	75 000	250 000	112 500	7 500	7°	75 000
100 000	100 000	75 000	37 500	3°	37 500	125 000	56 250	3 750	7°	37 500
20 000	20 000	15 000	7 500	3°	7 500	25 000	11 250	750	N/A	N/A
2 000	2 000	1 500	750	3°	750	2 500	1 125	75	N/A	N/A

Note.— This table does not include recommended horizontal beam spreads. 12.2.6.2(a)(3) requires 360° coverage around an obstacle.Therefore, the number of lights needed to meet this requirement will depend on the horizontal beam spreads of each light as well as theshape of the obstacle. Thus, with narrower beam spreads, more lights will be required.

a) 360° horizontal. All intensities are expressed in Candela. For flashing lights, the intensity is read into effective intensity, as determined in accordance with the *Aerodrome Design Manual* (Doc 9157), Part 4.
b) Elevation vertical angles are referenced to the horizontal when the light unit is levelled.
c) Beam spread is defined as the angle between the horizontal plane and the directions for which the intensity exceeds that mentioned in the "intensity" column.

Note.— An extended beam spread may be necessary under specific configuration and justified by an aeronautical study.

Lighting

(5) Low-intensity obstacle lights, Type C, shall be displayed on vehicles and other mobile objects excluding aircraft.

Note – See Annex 2 for lights to be displayed by aircraft

(6) Low-intensity obstacle lights, Type C, displayed on vehicles associated with emergency or security shall be flashing-blue and those displayed on other vehicles shall be flashing-yellow.

(7) Low-intensity obstacle lights, Type D, shall be displayed on follow-me vehicles

(8) Low-intensity obstacle lights on objects with limited mobility such as aerobridges shall be fixed-red, and as a minimum be in accordance with the specification for low- intensity obstacle lights, type A in table 6-1. The intensity of the lights shall be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would normally be viewed.

(c) Fixed Objects

Note – The fixed objects of wind turbines are addressed separately in paragraph 12.2.6.2(d) and the fixed objects of overhead wires cables etc and supporting towers are addressed separately in paragraph 12.2.6.2(e)

Marking

(1) All fixed objects to be marked shall, whenever practicable, be coloured, but if this is not practicable, markers or flags shall be displayed on or above them, except that objects that are sufficiently conspicuous by their shape, size or colour need not be otherwise marked.

Marking by colour

(2) An object shall be coloured to show a chequered pattern if it has essentially unbroken surfaces and its projection on any vertical plane equals or exceeds 4.5m in both dimensions. The pattern shall consist of

rectangles of not less than 1.5m and not more than 3m on a side, the corners being of the darker colour. The colours of the pattern shall contrast each with the other and with the background against which they will be seen. Orange and white or alternatively red and white shall be used, except where such colours merge with the background. (See Figure 6-1)

(3) An object shall be coloured to show alternating contrasting bands if:

(i) it has essentially unbroken surfaces and has one dimension, horizontal or vertical, greater than 1.5m, and the other dimension, horizontal or vertical, less than 4.5m; or

(ii) it is of skeletal type with either a vertical or a horizontal dimension greater than 1.5m.

The bands shall be perpendicular to the longest dimension and have a width approximately 1/7 of the longest dimension or 30m, whichever is less. The colours of the bands shall contrast with the background against which they will be seen. Orange and white shall be used, except where such colours are not conspicuous when viewed against the background. The bands on the extremities of the object shall be of the darker colour. (See Figures 6-1 and 6-2)

Note - Table 6-4 shows a formula for determining bandwidth and for having an odd number of bands, thus permitting both the top and bottom bands to be of the darker colour.

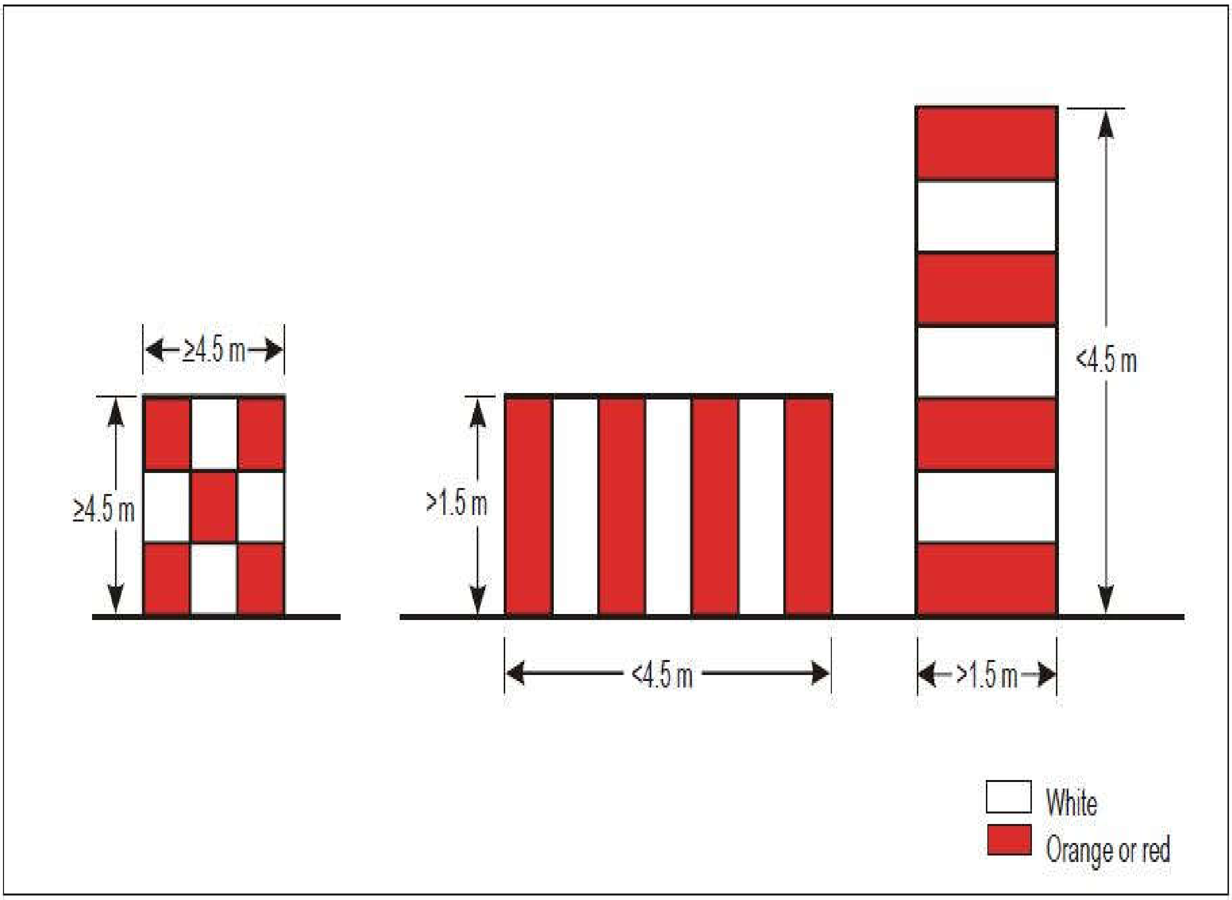


Figure 6- 1. Basic marking patterns

Table 6- 4. Marking band widths

Longest dimension Greater than	Longest dimension Not exceeding	Band width
1.5 m	210 m	1/7 of longest dimension
210 m	270 m	1/9 " " "
270 m	330 m	1/11 " " "
330 m	390 m	1/13 " " "
390 m	450 m	1/15 " " "
450 m	510 m	1/17 " " "
510 m	570 m	1/19 " " "
570 m	630 m	1/21 " " "

(4) An object shall be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5m. Orange or red shall be used, except where such colours merge with the background.

Note - Against some backgrounds it may be found necessary to use a different colour from orange or red to obtain sufficient contrast.

Marking by flags

(5) Flags used to mark fixed objects shall be displayed around, on top of, or around the highest edge of, the object. When flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15 m. Flags shall not increase the hazard presented by the object they mark.

(6) Flags used to mark fixed objects shall not be less than 0.6 m on each side.

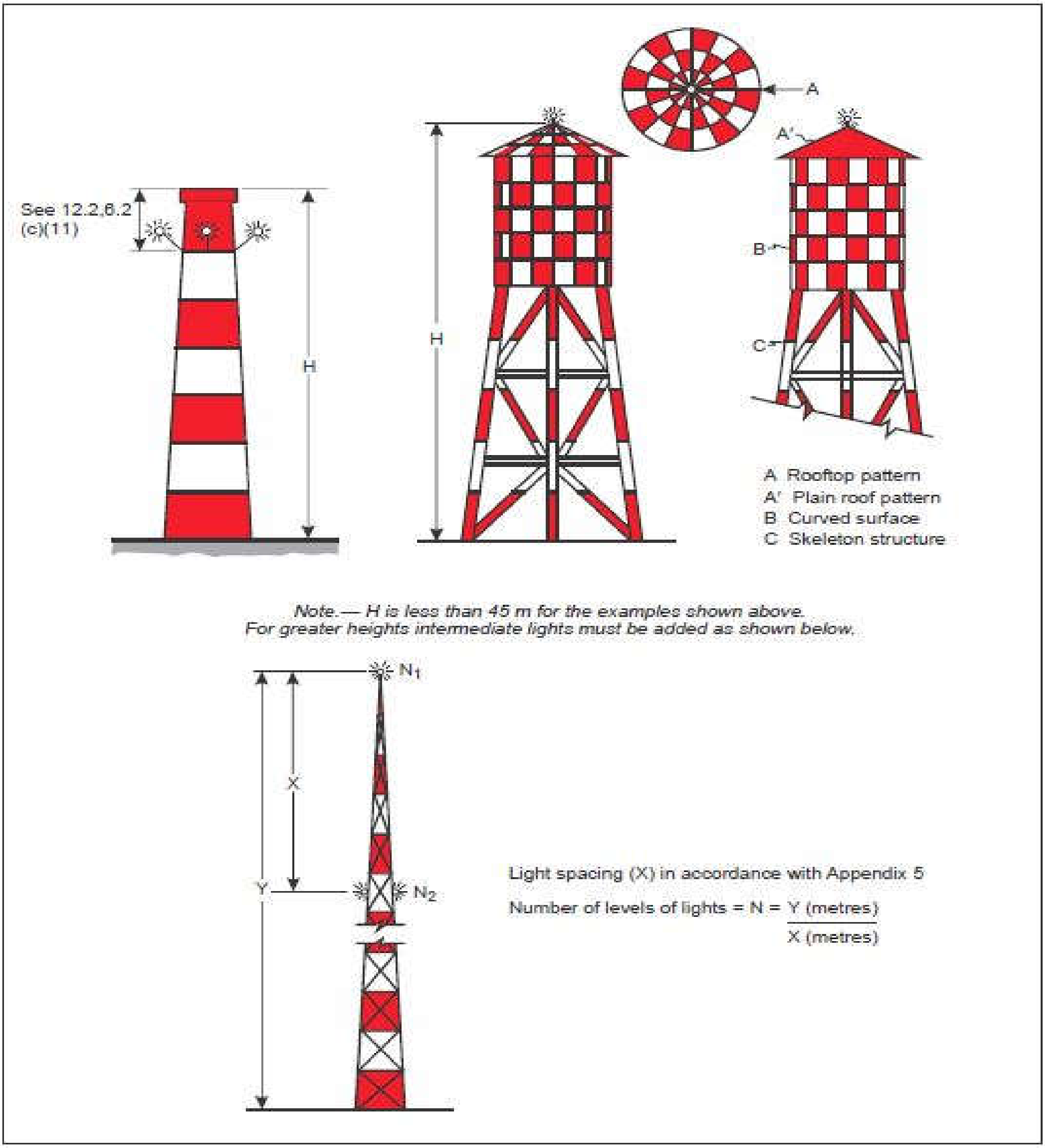


Figure 6- 2. Examples of marking of tall structures

(7) Flags used to mark fixed objects shall be orange in color or a combination of two triangular sections, one orange and the other white or one red and the other white, except that where such colours merge with the background, other conspicuous colours shall be used.

Marking by Markers

(8) Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they marked is not increased.

(9) A marker shall be of one colour. When installed, white and red, or white and orange marker shall be displayed alternately. The colours selected shall contrast with the background against which it will be seen.

Lighting

(10) In case of an object to be lighted, one or more low-, medium-, or high-intensity lights shall be located as close as practicable to the top of the object.

Note – Recommendations on how a combination of low-, medium-, and/or high-intensity lights on obstacles shall be displayed are given in IS: 12.2.6.2.

(11) In the case of chimney or other structure of like function, the top lights shall be placed sufficiently below the top so as to minimize contamination by smoke etc. (See Figures 6-2).

(12) In the case of a tower or antenna structure indicated by high-intensity obstacle lights by day with an appurtenance, such as a rod or antenna, greater than 12 m where it is not practicable to locate a high-intensity obstacle light on the top of the appurtenance, such a light shall be located at the highest practicable point and, if practicable, a medium-intensity obstacle light, Type A, mounted on the top.

(13) In the case of an extensive object or of a group of closely spaced objects to be lighted that are:

(i) penetrating a horizontal OLS or located outside of an OLS, the top lights shall be so arranged as to at least indicate the points or edges of the objects highest in relation to the obstacle limitation surface or above the ground, and, so as to indicate the general definition and the extent of the objects; and

(ii) penetrating a sloping OLS the top lights shall be so arranged as to at least indicate the points or edges of the object highest in relation to the obstacle limitation surface, so as to indicate the general definition and extent of the objects. If two or more edges are of the same height, the edge nearest the landing area shall be marked.

(14) When the obstacle limitation surface concerned is sloping and the highest point above the obstacle limitation is not the highest point of the object, additional obstacle lights shall be placed on the highest point of the object.

(15) Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and

(i) low-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45m.

(ii) medium-intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900m

(16) High intensity obstacle lights, Type A. medium-intensity obstacle lights, Type A and B, located on an object shall flash simultaneously.

(17) The installation setting angles for high-intensity obstacle lights, Type A, shall be in accordance with Table6-5.

Note – High intensity obstacle lights are intended for day use as well as for night us. Care is needed to ensure that these lights do not create disconcerting dazzle. Guidance on the design operation and location of high intensity obstacle lights is given in ICAO Aerodrome Design Manual Part4

(18) Where the use of high-intensity obstacle lights, Type A, or medium-intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10,000 m radius) or cause significant environmental concerns, a dual obstacle lighting system shall be provided. This system shall be composed of high- intensity obstacle lights, Type A, as appropriate, for daytime and twilight use and medium-intensity obstacle lights, Type B or C, for night-use.

Lighting of Objects with a Height less than 45m above Ground Level

(19) Low-intensity obstacle lights, Type A or B, shall be used where the object is a less extensive one and its height above the surrounding ground is less than45m.

(20) Where the use of low-intensity obstacle lights, Type A or B, would be inadequate or an early special warning is required, then medium- or high-intensity obstacle lights shall be used.

(21) Low-intensity obstacle lights, Type B, shall be used either alone or in combination with medium-intensity obstacle lights, Type B, in accordance with12.2.6.2(c) (22).

(22) Medium-intensity obstacle lights, Type A, B or C, shall be used where the object is an extensive one. Medium-intensity obstacle lights, Type A and C, shall be used alone, whereas medium-intensity obstacle lights, Type B, shall be used either alone or in combination with low-intensity obstacle lights, Type B.

Note – A group of buildings is regarded as an extensive object.

Lighting of Objects with a Height 45m to a height less than 150m above Ground Level

(23) Medium-intensity obstacle lights, Type A, B or C, shall be used. Medium-intensity obstacle lights, Type A and C, shall be used alone, whereas medium-intensity obstacle lights, Type B, shall be used either alone or in combination with low-intensity obstacle lights, Type B.

(24) Where an object is indicated by medium-intensity obstacle lights, Type A, and the top of the object is more than 105 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105m.

(25) Where an object is indicated by medium-intensity obstacle lights, Type B, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be alternately low-intensity obstacle lights, Type B, and medium-intensity obstacle lights, Type B, and shall be spaced as equally as practicable

between top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 7m.

(26) Where an object is indicated by medium-intensity obstacle lights, Type C, and the top of the object is more than 45 m above the level of the surrounding ground or the elevation of tops of nearby buildings (when the object to be marked is surrounded by buildings), additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 7m.

(27) Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in 12.2.6.2(c)(10) except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels

Lighting of Objects with a Height less than 150m above Ground Level

(28) High-intensity obstacle lights, Type A, shall be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150 m and an aeronautical study indicates such lights to be essential for the recognition of the object by day.

(29) Where high-intensity obstacle lights, Type A, are used, they shall be spaced at uniform intervals not exceeding 105 m between the ground level and the top light(s) specified in 12.2.6.2(c) (10), except that where an object to be marked is surrounded by buildings, the elevation of the tops of the buildings may be used as the equivalent of the ground level when determining the number of light levels.

(30) Where, in the opinion of the appropriate authority, the use of high – intensity obstacle lights, Type A, at night may dazzle pilots in the vicinity of an aerodrome (with approximately 10,000m radius) or cause significant environmental concern, medium- intensity obstacle lights, shall be used alone, whereas medium-intensity obstacle lights, Type B, shall be used either alone or in combination with low-intensity obstacle lights, Type B.

(31) Where an object is indicated by medium-intensity obstacle lights, Type A, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 105m.

(32) Where an object is indicated by medium-intensity obstacle lights, Type B, additional lights shall be provided at intermediate levels. These additional

intermediate lights shall be alternately low-intensity obstacle lights, type B, and medium intensity obstacle lights, Type B, and shall be spaced as equally as practicable between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52m.

(33) Where an object is indicated by medium-intensity obstacle lights, Type C, additional lights shall be provided at intermediate levels. These additional intermediate lights shall be spaced as equally as practicable, between the top lights and ground level or the level of tops of nearby buildings, as appropriate, with the spacing not exceeding 52m.

(d) Wind Turbines

(1) A wind turbine shall be marked and/or lighted if it is determined to be an obstacle.

Note 1. — Additional lighting or markings may be provided where in the opinion of the Authority such lighting or markings are deemed necessary.

Note 2. — See 12.2.4.3(a) and 12.2.4.3(b).

Markings

(2) The rotor blades, nacelle and upper 2/3 of the supporting mast of wind turbines shall be painted white, unless otherwise indicated by an aeronautical study.

Lighting

(3) When lighting is deemed necessary in the case of a wind farm, i.e. a group of two or more wind turbines, the wind farm shall be regarded as an extensive object and the lights shall be installed:

(i) to identify the perimeter of the windfarm;

(ii) respecting the maximum spacing, in accordance with 12.2.6.2(c)(15), between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used;

(iii) so that, where flashing lights are used, they flash simultaneously throughout the windfarm;

(iv) so that, within a wind farm, any wind turbines of significantly higher elevation are also identified wherever they are located; and

(v) at locations prescribed in (i), (ii) and (iv), respecting the following criteria:

(A) for wind turbines of less than 150 m in overall height (hub height plus vertical blade height), medium intensity lighting on the nacelle shall be provided;

(B) for wind turbines from 150 m to 315 m in overall height, in addition to the medium intensity light installed on the nacelle, a second light serving as an alternate shall be provided in case of failure of the operating light. The lights shall be installed to assure that the output of either light is not blocked by the other; and

(C) in addition, for wind turbines from 150 m to 315 m in overall height, an intermediate level at half the nacelle height of at least 3 low intensity Type E lights, as specified in 12.2.6.2(a)(3) shall be provided. If an aeronautical study shows that low intensity type E lights are not suitable, low-intensity type A or B lights may be used.

Note. — The above 12.2.6.2(d)(3)(v) does not address wind turbines of more than 315 m of overall height. For such wind turbines, additional marking and lighting may be required as determined by an aeronautical study.

(4) The obstacle lights shall be installed on the nacelle in such a manner as to provide an unobstructed view for aircraft approaching from any direction.

(5) Where lighting is deemed necessary for a single wind turbine or short line of wind turbines, the installation shall be in accordance with 12.2.6.2(d)(3)(v) or as determined by an aeronautical study.

(e) Overhead Wires, Cables, etc. and Supporting Towers Marking

Marking

(1) The wires, cables, etc. to be marked shall be equipped with markers; the supporting tower shall be coloured.

Marking by Colours

(2) The supporting towers of overhead wires, cables etc. that require marking shall be marked in accordance with 12.2.6.2(c)(1) to 12.2.6.2(c)(4), except that the marking of the supporting towers may be omitted when they are lighted by high-intensity obstacle lights by day.

Marking by Markers

(3) Markers displayed on or adjacent to objects shall be located in conspicuous positions so as to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1000 m for an object to be viewed from the air and 300 m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object. The shape of markers shall be distinctive to the extent necessary to ensure that they are not mistaken for markers employed to convey other information, and they shall be such that the hazard presented by the object they marked is not increased.

(4) A marker displayed on an overhead wire, cable, etc., shall be spherical and have a diameter of not less than 60cm.

(5) The spacing between two consecutive markers or between a marker and a supporting tower shall be appropriate to the diameter of the marker, but in no case shall the spacing exceed:

(i) 30 m where the marker diameter is 60 cm progress4ely increasing with the diameter of the marker to

(ii) 35 m where the marker diameter is 80 cm and further progressively increasing to a maximum of

(iii) 40 m where the marker diameter is of at least 130cm.

Where multiple wires, cables, etc. are involved, a marker shall be located not lower than the level of the highest wire at the point marked.

(6) A marker shall be of one colour. When installed, white and red, or white and orange marker shall be displayed alternately. The colours selected shall contrast with the background against which it will be seen.

(7) When it has been determined that an Overhead wire, cable, etc., needs to be marked but it is not practicable to install markers on the wire, cable, etc., then high-intensity obstacle lights, Type B, shall be provided on their supporting towers.

Lighting

(8) High-intensity obstacle lights, Type B, shall be used to indicate the presence of a tower supporting overhead wires, cables, etc., where:

(i) an aeronautical study indicates such lights to be essential for the recognition of the presence of wires, cables, etc. or

(ii) it has not been found practicable to install markers on the wires, cables, etc.

(9) Where high-intensity obstacle lights, Type B, are used, they shall be located at three levels:

(i) at the top of the tower;

(ii) at the lowest level of the catenary of the wires or cables; and

(iii) at approximately midway between these two levels.

Note – In some cases, this may require locating of the lights off the tower.

(10) High-intensity obstacle lights, Type B, indicating the presence of a tower supporting overhead wires, cables, etc., shall flash sequentially; first the middle light, second the top light and last, the bottom light. The intervals between flashes of the lights shall approximate the following ratios:

Flash interval between	**Ratio of cycle**
middle and top light	*1/13*
top and bottom light	*2/13*
bottom and middle light	*10/13*

Note – High intensity obstacle lights are intended for day use as well as night use. Care is needed to ensure that these lights do not create disconcerting dazzle Guidance on the design, operation and the location of high intensity obstacle lights is given in the Aerodrome Design Manual (Doc 9157 Part 4).

(11) Where, in the opinion of the Authority, the use of high-intensity obstacle lights, Type B, at night may dazzle pilots in the vicinity of an aerodrome (within approximately 10,000 m radius) or cause significant environmental concerns, a dual obstacle lighting system shall be provided. This system shall be composed of high-intensity obstacle lights, Type B, or medium intensity obstacle lights, Type B for daytime and twilight use and medium-intensity obstacle lights, Type B, for night-use. Where medium intensity lights are used they shall be installed at the same level as the high intensity obstacle light Type B.

(12) The installation setting angles for high-intensity obstacle lights, Type B, shall be in accordance with Table 6-5.

Table 6- 5- Installation Setting Angles for High-Intensity Obstacle Lights

Height of light unit above terrain (AGL)		Angle of the peak of the beam above the horizontal
Greater than	Not exceeding	
151 m		0°
122 m	151 m	1°
92 m	122 m	2°
	92 m	3°

12.2.7 VISUAL AIDS FOR DENOTING RESTRICTED USE AREAS

12.2.7.1 CLOSED RUNWAYS AND TAXIWAYS, OR PARTS THEREOF

(a) A closed marking shall be displayed on a runway or taxiway, or portion thereof, which is permanently closed to the use of all aircraft.

(b) A closed marking shall be displayed on a temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is of short duration (less than 3 days) and adequate warning by air traffic services is provided.

Location

(c) On a runway, a closed marking shall be placed at each end of the runway or portion thereof, declared closed, and additional markings shall be so placed that the maximum interval between markings does not exceed 300m. On a taxiway a closed marking shall be placed at least at each end of the taxiway or portion thereof closed.

Characteristics

(d) The closed marking shall be of the form and proportions as detailed in Figure 7-1, Illustration a), when displayed on a runway, and shall be of the form and proportions as detailed in Figure 7-1, Illustration b), when displayed on a taxiway.

The marking shall be white when displayed on a runway and shall be yellow when displayed on a taxiway.

Note 1 – When an area is temporarily closed, frangible barriers or markings utilizing materials other than paint or other suitable means may be used to identify the closed area.

Note 2 – Procedures pertaining to the planning, coordination, monitoring and safety management of works in progress on the movement area are specified in the PANS-Aerodromes NCAA-AC-ARD 036 .

(e) When a runway or taxiway or portion thereof is permanently closed, all normal runway and taxiway markings shall be obliterated.

(f) Lighting on a closed runway or taxiway or portion thereof shall not be operated, except as required for maintenance purposes.

(g) In addition to closed markings, when the runway or taxiway or portion thereof closed is intercepted by a usable runway or taxiway which is used at night, unserviceability lights shall be placed across the entrance to the closed area at intervals not exceeding 3m (See paragraph12.2.7.4(d)).

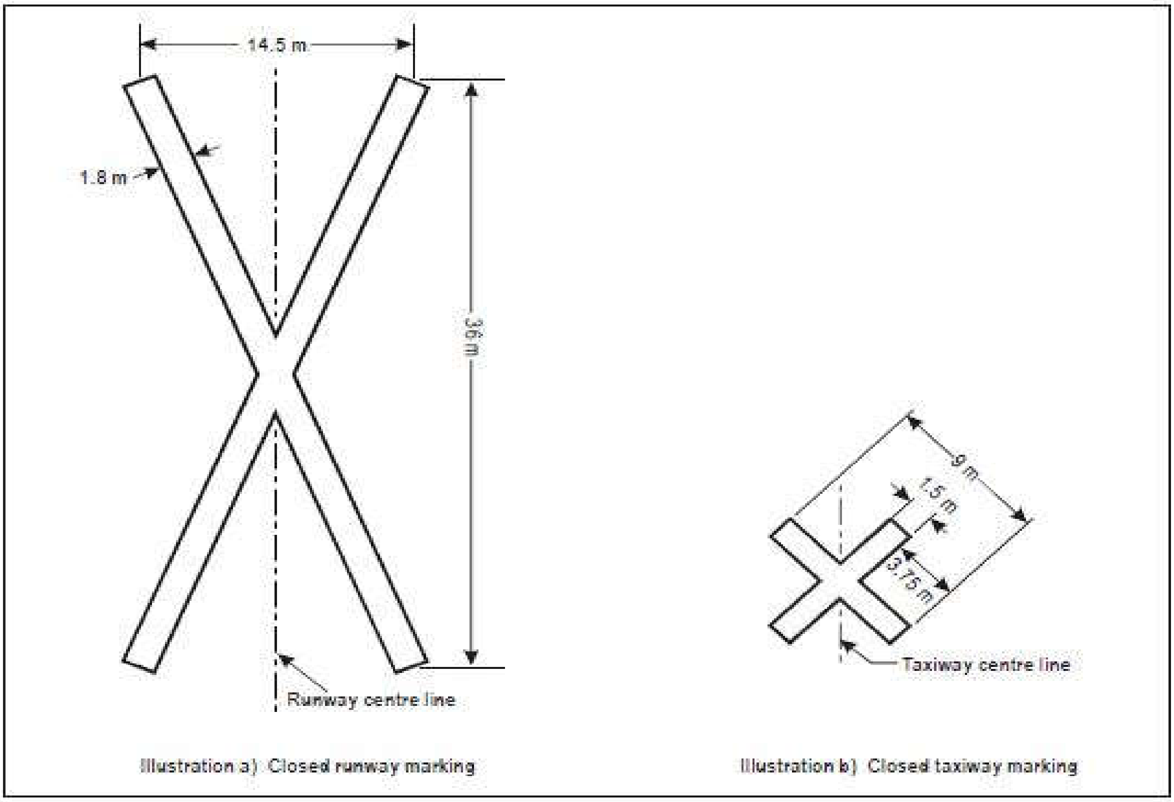


Figure 7- 1. Closed runway and taxiway markings

12.2.7.2 NON-LOAD-BEARING SURFACES

Application

(a) Shoulders for taxiways, runway turn pads, holding bays and aprons and other non-Load- bearing surfaces, which cannot readily be distinguished from load-bearing surfaces and which, if used by aircraft, might result in damage to the aircraft shall have the boundary between such areas and the load-bearing surface marked by a taxi side stripe marking.

Note – The marking of runway sides is specified in paragraph 12.2.5.2(g)

Location

(b) A taxi side stripe marking shall be placed along the edge of the load-bearing pavement, with the outer edge of the marking approximately on the edge of the load-bearing pavement.

Characteristics

(c) A taxi side stripe marking shall consist of a pair of solid lines, each 15cm wide and spaced 15cm apart and the same colour as the taxiway centre line marking.

Note – Guidance on providing additional transverse stripes at an intersection or a small area on the apron is given in the ICAO Aerodrome Design Manual (Doc 9157) Part4.

12.2.7.3 PRE-THRESHOLD AREA

Application

(a) When the surface before a threshold is paved and exceeds 60m in length and is not suitable for normal use by aircraft, the entire length before the threshold shall be marked with a chevron marking.

Location

(b) A chevron marking shall point in the direction of the runway and be placed as shown in Figure 7-2

Characteristics

(c) A chevron marking shall be of conspicuous colour and contrast with the colour used for the runway markings; it shall preferably be yellow. It shall have an over-all width of at least 0.9m.

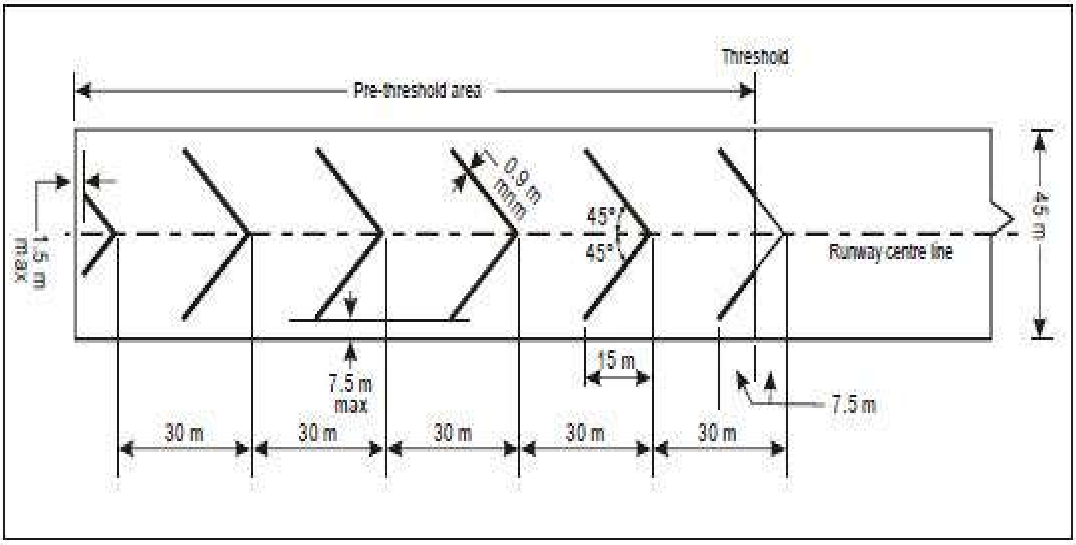


Figure 7- 2. Pre-threshold marking

12.2.7.4 UNSERVICEABLE AREAS

Application

(a) Unserviceability markers shall be displayed wherever any portion of a taxiway, apron or holding bay is unfit for the movement of aircraft but it is still possible for aircraft to bypass the area safely. Unserviceability markers shall also be displayed at the entrances to a permanently or temporarily closed runway or taxiway, or part thereof. On a movement area used at night, unserviceability lights shall be used.

Note 1 – Unserviceability markers and lights are used for such purposes as warning pilots of a hole in a taxiway or apron pavement or outlining a portion of pavement, such as on an apron, that is under repair. They are not suitable for use when a portion of a runway becomes unserviceable, nor on a taxiway when a major portion of the width becomes unserviceable. In such instances, the runway or taxiway is normally closed.

Note 2 – Procedures pertaining to the planning coordination, monitoring and safety management of works in progress on the movement area are specified in NCAA-AC-ARD006 (Aerodrome Works Safety Plan).

Location

(b) Unserviceability markers and lights shall be placed at intervals sufficiently close so as to delineate the unserviceable area.

Note – Guidance on the location of unserviceability lights is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD036), Section 13.

Characteristics of Unserviceable Markers

(c) Unserviceability markers shall consist of conspicuous upstanding devices such as flags, cones or marker boards.

Characteristics of Unserviceability Lights

(d) An unserviceability light shall consist of a red fixed light. The light shall have an intensity sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general level of illumination against which it would normally be viewed. In no case shall the intensity be less than 10 cd of red light.

Characteristics of Unserviceability Cones

(e) An unserviceability cone shall be at least 0.5m in height and red, orange or yellow or any one of these colours in combination with white.

Characteristics of Unserviceability Flags

(f) An unserviceability flag shall be at least 0.5m square and red, orange or yellow or any one of these colours in combination with white.

Characteristics of Unserviceability Marker Boards

(g) An unserviceable marker board shall be at least 0.5m in height and 0.9m in length, with alternate red and white or orange and white vertical stripes.

12.2.8 ELECTRICAL SYSTEMS

12.2.8.1 ELECTRICAL POWER SUPPLY SYSTEMS FOR AIR NAVIGATION FACILITIES

Introductory Note. — The safety of operations at aerodromes depends on the quality of the supplied power. The total electrical power supply system may include connections to one or more external sources of electric power supply, one or more local generating facilities and to a distribution network including transformers and switchgear. Many other aerodrome facilities supplied from the same system need to be taken into account while planning the electrical power system at aerodromes.

(a) Adequate primary power supply shall be available at aerodromes for the safe functioning of air navigation facilities.

(b) The design and provision of electrical power systems for aerodrome visual and radio navigation aids shall be such that an equipment failure will not leave the pilot with inadequate visual and non-visual guidance or misleading information.

Note: The design and installation of the electrical systems need to take into consideration factors that can lead to malfunction, such as electromagnetic disturbances, line losses, power quality, etc. Additional guidance is given in the Aerodrome Design Manual (Doc 9157), Part 5.

(c) Electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(d) The time interval between failure of primary source of power and the complete restoration of the services required by section 12.2.8.1(j) shall be as short as practicable, except that for visual aids associated with non – precision, precision approach or take – off runways the requirements of Table 8-1 for maximum switch-over times shall apply.

Note: A definition of switch-over time is given in subsection 12.1.1.2

(e) The provision of a definition of switch-over time shall not require the replacement of an existing secondary power supply before 1st January 2010. However, for a secondary power supply installed after 4th November 1999, the electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are capable of meeting the requirements of Table 8-1 for maximum switch-over times as defined in subsection 12.1.1.2

Visual aids

Application

(f) For a precision approach runway, a secondary power supply capable of meeting the requirements of Table 8-1 for the appropriate category of precision approach runway shall be provided. Electric power supply connections to those facilities for which secondary power is required shall be so arranged that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(g) For a runway meant for take-off in runway visual range conditions less than a value of 800 m, a secondary power supply capable of meeting the relevant requirements of Table 8-1 shall be provided.

(h) At an aerodrome where the primary runway is a non-precision approach runway, a secondary power supply capable of meeting the requirements of Table 8-1 shall be provided except that a secondary power supply for visual aids need not be provided for more than one non-precision approach runway.

(i) At an aerodrome where the primary runway is a non-instrument runway, a secondary power supply capable of meeting the requirements of paragraph 12.2.8.1(d) shall be provided, except that a secondary power supply for visual aids need not be provided when an emergency lighting system in accordance with the specification of paragraph 12.2.5.3(b) is provided and capable of being deployed in 15minutes.

(j) The following aerodrome facilities shall be provided with a secondary power supply capable of supplying power when there is a failure of the primary power supply:

(1) the signalling lamp and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;

Note — The requirement for minimum lighting may be met by other than electrical means.

(2) all obstacle lights which, in the opinion of the Authority, are essential to ensure the safe operation of aircraft;

(3) approach, runway and taxiway lighting as specified in paragraph 12.2.8.1(f) to12.2.8.1(i);

(4) meteorological equipment;

(5) essential security lighting, if provided in accordance with paragraph 12.2.9.11;

(6) essential equipment and facilities for the aerodrome responding emergency agencies;

(7) floodlighting on a designated isolated aircraft parking position if provided in accordance with paragraph 12.2.5.3(x)(1); and

(8) illumination of apron areas over which passengers may walk.

Note. — Specifications for secondary power supply for radio navigation aids and ground elements of communications systems are given in ICAO Annex 10, Volume I, Section2.

(k) Requirements for a secondary power supply shall be met by either of the following:

(1) independent public power, which is a source of power supplying the aerodrome service from a substation other than the normal substation through a transmission line following a route different from the normal power supply route and such that the possibility of a simultaneous failure of the normal and independent public power supplies is extremely remote; or

(2) standby power unit(s), which are engine generators, batteries, etc., from which electric power can be obtained.

Note — Guidance on secondary power supply is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 5— Electrical Systems.

Table 8- 1- Secondary Power Supply Requirements (See 12.2.8.1(d))

Runway	Lighting aids requiring power	Maximum switchover time
Non- instrument	visual approach slope indicators[a]	
	Runway edge[b]	See 12.2.8.1(d)and
	Runway threshold[b]	12.2.8.1(i)
Non-Precision approach	Approach lighting system	15 seconds
	visual approach slope indicators[a,d]	15 seconds
	Runway edge[d]	15 seconds
	Runway threshold[d]	15 seconds
Precision approach category I	Approach lighting system	15 seconds
	Runway edge[d]	15 seconds
	visual approach slope indicators[a,d]	15 seconds
	Runway threshold[d]	15 seconds
Precision approach category II/III	Inner 300m of the Approach lighting system	1 seconds
	Other parts of the approach lighting system	15 seconds
	Obstacle[a]	15 seconds
	Runway edge	15 seconds
	Runway threshold	1 second
	Runway end	1 second
	Runway centre line	1 second
	Runway touchdown zone	1 second
	All stop bars	1 second
	Essential taxiway	15 seconds

Runway meant for Takeoff in runway visual range conditions less than a value of 800m.	Runway edge	15 seconds[c]
	Runway end	1 second
	Runway centre line	1 second
	All stop bars	1 second
	Essential taxiway[a]	15 seconds
	Obstacle[a]	15 seconds

a. Supplied with secondary power when their operation is essential to the safety of flight operation.
b. See, 12.2.5.5(c)(2) of this Part regarding the use of emergency lighting.
c. One second where no runway centre line lights are provided.
d. One second where approaches are over hazardous or precipitous terrain.

12.2.8.2 SYSTEM DESIGN

(a) For a runway meant for use in runway visual range conditions less than a value of 550 m, the electrical systems for the power supply, lighting and control of the lighting systems included in Table 8-1 shall be so designed that an equipment failure will not leave the pilot with inadequate visual guidance or misleading information.

Note — Guidance on means of providing this protection is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 5 — Electrical Systems.

(b) Where the secondary power supply of an aerodrome is provided by the use of duplicate feeders, such supplies shall be physically and electrically separated so as to ensure the required level of availability and independence.

(c) Where a runway forming part of a standard taxi-route is provided with runway lighting and taxiway lighting, the lighting systems shall be interlocked to preclude the possibility of simultaneous operation of both forms of lighting.

12.2.8.3 MONITORING

Note — Guidance on this subject is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 5— Electrical Systems.

(a) A system of monitoring shall be employed to indicate the operational status of the lighting systems.

(b) Where lighting systems are used for aircraft control purposes, such systems shall be monitored automatically so as to provide an indication of any fault which may affect the control functions. This information shall be automatically relayed to the air traffic services unit.

(c) Where a change in the operational status of lights has occurred, an indication shall be provided within two seconds for a stop bar at a runway holding position and within five seconds for all other types of visual aids.

(d) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table 8-1 shall be monitored automatically so as to provide an indication when the serviceability level of any element falls below the minimum serviceability level specified in paragraphs 12.2.10.5(g) to 12.2.10.5(k) as appropriate. This information shall be immediately relayed to the maintenance crew.

(e) For a runway meant for use in runway visual range conditions less than a value of 550 m, the lighting systems detailed in Table 8-1 of this Part shall be monitored automatically to provide an indication when the serviceability level of any element falls below the minimum level specified by the appropriate authority below which operations shall not continue. This information shall be automatically relayed to the air traffic services unit and displayed in a prominent position.

Note — Guidance on air traffic control interface and visual aids monitoring is included in the ICAO Aerodrome Design Manual (Doc 9457), Part 5 — Electrical Systems.

12.2.9 AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATIONS

12.2.9.1 AERODROME EMERGENCY PLANNING

General

Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity. The objective of aerodrome emergency planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations. The aerodrome emergency plan sets forth the procedures for coordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency. Additional Standards on Aerodrome Emergency Plan are contained in Section 3. Guidance material to assist the aerodrome operator in establishing aerodrome emergency planning is given in the ICAO Airport Services Manual (Doc 9137), Part 7.

(a) An aerodrome emergency plan shall be established at an aerodrome, commensurate with the aircraft operations and other activities conducted at the aerodrome

(b) The aerodrome emergency plan shall provide for the coordination of the actions to be taken in an emergency occurring at an aerodrome or in its vicinity.

Note 1. —Example of emergencies: Aircraft emergencies, sabotage including bomb threats, unlawfully seized aircraft, dangerous goods occurrences, building fires, natural disasters, public health emergencies and fires on the ground

Note 2. — Examples of public health emergencies are increased risk of travelers or cargo spreading a serious communicable disease internationally through air transport and severe outbreak of a communicable disease potentially affecting a large proportion of aerodrome staff.

(c) The plan shall coordinate the response or participation of all existing agencies which, in the opinion of the Authority could be of assistance in responding to an emergency.

Note 1 — Examples of agencies are:

- *on the aerodrome: air traffic control unit, rescue and firefighting services, aerodrome administration, medical and ambulance services, aircraft operators, security services, and police;*

- *off the aerodrome: fire departments, police, medical and ambulance services, hospitals, military, and harbour patrol or coast guard.*

Note 2. — Public health services include planning to minimize adverse effects to the community from health-related events and deal with population health issues rather than provision of health services to individuals.

(d) The plan shall provide for cooperation and coordination with the rescue coordination centre as necessary.

(e) The aerodrome emergency plan document should include at least the following:

(1) types of emergencies planned for;

(2) agencies involved in the plan;

(3) responsibility and role of each agency, the emergency operations centre and the command post, for each type of emergency;

(4) information on names and telephone numbers of offices or people to be contacted in the case of a particular emergency; and

(5) a grid map of the aerodrome and its immediate vicinity.

Note — 12.1.4.12 contain standards on the content of the Aerodrome Emergency Plan.

(f) The plan shall observe Human Factors principles to ensure optimum response by all existing agencies participating in emergency operations.

Note 1— Guidance material on Human Factors principles can be found in Human Factors Training Manual (Doc 9683).

Note 2. — General principles and procedures on the training of aerodrome personnel, including training programmes and competence checks, are specified in the PANS- Aerodromes NCAA-AC-ARD 036 .

Emergency Operations Centre and Command Post

(g) A fixed Emergency Operations Centre and a mobile command post shall be available for use during an emergency.

(h) The Emergency Operations Centre shall be a part of the aerodrome facilities and shall be responsible for the overall coordination and general direction of the response to an emergency.

(i) The command post shall be a facility capable of being moved rapidly to the site of an emergency, when required, and shall undertake the local coordination of those agencies responding to the emergency.

(j) A person shall be assigned to assume control of the Emergency Operations Centre and, when appropriate, another person the mobile command post.

Communication System

(k) Adequate communication systems linking the command post and the Emergency Operations Centre with each other and with the participating agencies shall be provided in accordance with the plan and consistent with the particular requirements of the aerodrome.

Aerodrome Emergency Exercise

Note — Requirements on Aerodrome Emergency Exercise is in subpart 1 of these Regulations

(l) The plan shall contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

Note. — The plan includes all participating agencies and associated equipment.

(m) The plan shall be tested by conducting:

(1) a full-scale aerodrome emergency exercise at intervals not exceeding two years and partial emergency exercises in the intervening year to ensure that any deficiencies found during the full-scale aerodrome emergency exercise have been corrected; or

(2) a series of modular tests commencing in the first year and concluding in a full-scale aerodrome emergency exercise at intervals not exceeding three years; and reviewed thereafter, or after an actual emergency, so as to correct any deficiency found during such exercises or actual emergency

Note 1. — The purpose of a full-scale exercise is to ensure the adequacy of the plan to cope with different types of emergencies. The purpose of a partial exercise is to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system. The purpose of modular tests is to enable concentrated effort on specific components of established emergency plans.

Note 2. — Guidance material on airport emergency planning is available in the Airport Services Manual (Doc 9137), Part 7.

Emergencies in Difficult Environments

(n) The plan shall include the ready availability of and coordination with appropriate specialist rescue services to be able to respond to emergencies where an aerodrome is located close to water and/swampy areas and where a significant portion of approach or departure operations takes place over these areas.

(o) At those aerodromes located close to water and/or swampy areas, or difficult terrain, the aerodrome emergency plan shall include the establishment, testing and assessment at regular intervals of a predetermined response for the specialist rescue services.

(p) An assessment of the approach and departure areas within 1 000 m of the runway threshold shall be carried out to determine the options available for intervention.

Note. — Guidance material on assessing approach and departure areas within 1000 m of runway thresholds can be found in Chapter 13 of the Airport Services Manual (Doc 9137), Part 1.

12.2.9.2 RESCUE AND FIREFIGHTING

General

Introductory Note. — The principal objective of a rescue and firefighting service is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The rescue and firefighting service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid. The rescue may require the use of equipment and personnel other than those assessed primarily for rescue and firefighting purposes. The most important factors bearing on effective rescue in a survivable aircraft accident are: the training received, the effectiveness of the equipment and the speed with which personnel and equipment designated for rescue and firefighting purposes can be put into use.

Requirements to combat building and fuel farm fires, or to deal with foaming of runways, are not taken into account

Application

(a) Rescue and firefighting equipment and services shall be provided at an aerodrome when serving commercial air transport operations.

Note — Public or private organisations, suitably located and equipped, may be designated to provide the rescue and firefighting service. It is intended that the fire station housing these organisations be normally located on the aerodrome, although an off-aerodrome location is not precluded provided the response time can be met.

(b) Where an aerodrome is located close to water/swampy areas or difficult terrain, and where a significant portion of approach or departure operations takes place over these areas, specialist rescue services and firefighting equipment appropriate to the hazard and risk shall be available.

Note 1 — Special firefighting equipment need not be provided for water areas; this does not prevent the provision of such equipment if it would be of practical use, such as when the areas concerned include reefs or islands.

Note 2 — The objective is to plan and deploy the necessary life-saving flotation equipment as expeditiously as possible in a number commensurate with the largest aeroplane normally using the aerodrome.

Note 3 — Additional guidance is available in Chapter 13 of the Airport Services Manual (Doc 9137), Part 1.

Level of Protection to be Provided

(c) The level of protection provided at an aerodrome for rescue and firefighting shall be appropriate to the aerodrome category determined using the principles in 12.2.9.2(e) and 12.2.9.2(f), except that, where the number of movements of the aeroplanes in the highest category normally using the aerodrome is less than 700 in the busiest consecutive three months, the level of protection provided shall be not less than one category below the determined category.

Note — Either a take-off or landing constitutes a movement.

(d) The level of protection provided at an aerodrome for rescue and firefighting shall be equal to the aerodrome category determined using the principles in 12.2.9.2(e) and 12.2.9.2(f).

(e) The aerodrome category shall be determined from Table 9-1 of this Regulations and shall be based on the longest aeroplanes normally using the aerodrome and their fuselage width.

Note — To categorize the aeroplanes using the aerodrome, first evaluate their overall length and second, their fuselage width.

(f) If, after selecting the category appropriate to the longest aeroplane's overall length, that aeroplane's fuselage width is greater than the maximum width in

Table 9-1, column 3 for that category, then the category for that aeroplane shall actually be one category higher.

Note 1. — See guidance in the Airport Services Manual *(Doc 9137), Part 1, for categorizing aerodromes, including those for all-cargo aircraft operations, for rescue and firefighting purposes.*

Note 2. — Principles and procedures on training, including training programmes and competence checks, are specified in the PANS-Aerodromes NCAA-AC-ARD 036 .
Further guidance on the training of personnel, rescue equipment for difficult environments, and other facilities and services for rescue and firefighting is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA- AC-ARD037), Section 17, and in the Airport Services Manual (Doc 9137), Part 1.

Table 9- 1 - Aerodrome Category for Rescue and Fire Fighting

Aerodrome Category	Aeroplane overall length (2)	Maximum fuselage width
1	0 m up to but not including 9 m	2m
2	9 m up to but not including 12 m	2m
3	12 m up to but not including 18 m	3m
4	18 m up to but not including 24 m	4m
5	24 m up to but not including 28 m	4m
6	28 m up to but not including 39 m	5m
7	39 m up to but not including 49 m	5m
8	49 m up to but not including 61 m	7m
9	61 m up to but not including 76 m	7m
10	76 m up to but not including 90 m	8m

(g) During anticipated periods of reduced activity, the level of protection available shall be no less than that needed for the highest category of aeroplane planned to use the aerodrome during that time irrespective of the number of movements;

Extinguishing Agents

(h) Both principal and complementary agents shall be provided at an aerodrome.

Note — Descriptions of the agents may be found in the ICAO Airport Services Manual (Doc 9137), Part 1.

(i) The principal extinguishing agents shall be:

(1) a foam meeting the minimum performance level A; or

(2) a foam meeting the minimum performance level B; or

(3) a foam meeting the minimum performance level C; or

(4) a combination of these agents;

except that the principal extinguishing agent for aerodromes in categories 1 to 3 shall preferably meet performance level B or C foam.

Note — Information on the required physical properties and fire extinguishing performance criteria needed for a foam to achieve an acceptable performance level A, B or C rating is given in the ICAO Airport Services Manual (Doc 9137), Part 1.

(j) The complementary extinguishing agent shall be a dry chemical powder suitable for extinguishing hydrocarbon fires.

Note 1 — When selecting dry chemical powders for use with foam, care must be exercised to ensure compatibility.

Note 2 — Alternate complementary agents having equivalent firefighting capability may be utilized. Additional information on extinguishing agents is given in the ICAO Airport Services Manual (Doc 9137), Part 1.

(k) The amounts of water for foam production and the complementary agents to be provided on the rescue and fire fighting vehicles shall be in accordance with the aerodrome category determined under 12.2.9.2(c), 12.2.9.2(d), 12.2.9.2(e), 12.2.9.2(f) and Table 9-2, except that for aerodrome categories 1 and 2 up to 100 per cent of the water may be substituted with complementary agent; or

For the purpose of agent substitution, 1 kg of complementary agent shall be taken as equivalent to 1.0L.

Note 1 — The amounts of water specified for foam production are predicated on an application rate of 8.2 L/min/m^2 for a foam meeting performance level A, 5.5 L/min/m^2 for a foam meeting performance level B and 3.75L/min/m^2 for foam meeting performance Level C.

Note 2 – When any other complementary agent is used, the substitution ratios need to be checked.

(l) At aerodromes where operations by aeroplanes larger than the average size in a given category are planned, the quantities of water shall be recalculated and the amount of water for foam production and the discharge rates for foam solution shall be increased accordingly.

Note. — Guidance on the determination of quantities of water and discharge rates based on the largest overall length of aeroplane in a given category is available in Section 2 of the Airport Services Manual (Doc 9137), Part 1.

Table 9- 2. Minimum usable amounts of extinguishing agents

	Foam meeting performance level A		Foam meeting performance level B		Foam meeting performance level C		Complementary agents	
Aerodrome category	Water (L)	Discharge rate foam solution/ minute (L)	Water (L)	Discharge rate foam solution/ minute (L)	Water (L)	Discharge rate foam solution/ minute (L)	Dry chemical powders (kg)	Discharge Rate (kg/second)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1	350	350	230	230	160	160	45	2.25
2	1 000	800	670	550	460	360	90	2.25
3	1 800	1 300	1 200	900	820	630	135	2.25
4	3 600	2 600	2 400	1 800	1 700	1 100	135	2.25
5	8 100	4 500	5 400	3 000	3 900	2 200	180	2.25
6	11 800	6 000	7 900	4 000	5 800	2 900	225	2.25
7	18 200	7 900	12 100	5 300	8 800	3 800	225	2.25
8	27 300	10 800	18 200	7 200	12 800	5 100	450	4.5
9	36 400	13 500	24 300	9 000	17 100	6 300	450	4.5
10	48 200	16 600	32 300	11 200	22 800	7 900	450	4.5

Note.— The quantities of water shown in columns 2, 4 and 6 are based on the average overall length of aeroplanes in a given category.

(m) The quantity of foam concentrates separately provided on vehicles for foam production shall be in proportion to the quantity of water provided and the foam concentrate selected.

(n) The amount of foam concentrate provided on a vehicle shall be sufficient to produce at least two loads of foam solution.

(o) Supplementary water supplies, for the expeditious replenishment of rescue and fire fighting vehicles at the scene of an aircraft accident, shall be provided.

(p) When a combination of different performance level foams are provided at an aerodrome, the total amount of water to be provided for foam production shall be calculated for each foam type and the distribution of these quantities shall be documented for each vehicle and applied to the overall rescue and firefighting requirement

(q) The discharge rate of the foam solution shall not be less than the rates shown in Table 9-2.

(r) The complementary agents shall comply with the appropriate specifications of the International Organisation for Standardisation (ISO). *

(s) The discharge rate of complementary agents shall be not less than the value shown in Table 9-2.

(t) Dry chemical powders shall only be substituted with an agent that has equivalent or better firefighting capabilities for all types of fires where complementary agent is expected to be used.

Note. — Guidance on the use of complementary agents can be found in the Airport Services Manual *(Doc 9127), Part 1.*

(u) A reserve supply of foam concentrate, equivalent to 200 per cent of the quantities identified in Table 9-2, shall be maintained on the aerodrome for vehicle replenishment purposes.

Note. — Foam concentrate carried on fire vehicles in excess of the quantity identified in Table 9-2 can contribute to the reserve.

(v) A reserve supply of complementary agent, equivalent to 100 per cent of the quantity identified in Table 9-2, shall be maintained on the aerodrome for vehicle replenishment purposes. Sufficient propellant gas shall be included to utilize this reserve complementary agent.

(w) Category 1 and 2 aerodromes that have replaced up to 100 per cent of the water with complementary agent shall hold a reserve supply of complementary agent of 200 per cent.

(x) Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply in 12.2.9.2(u), 12.2.9.2(v) and 12.2.9.2(w) shall be increased as determined by a risk assessment.

Note. — See the Airport Services Manual (Doc 9127), Part 1 for guidance on the conduct of a risk analysis to determine the quantities of reserve extinguishing agents.

Rescue Equipment

(y) Rescue equipment commensurate with the level of aircraft operations shall be provided on the rescue and fire fighting vehicle(s).

* See ISO Publication 7202(Powder).

Note. — Guidance on the rescue equipment to be provided at an aerodrome is given in the Airport Services Manual (Doc 9137), Part 1.

Response Time

(z) The operational objective of the rescue and firefighting service shall be to achieve a response time not exceeding three minutes, to any point of each operational runway, in optimum visibility and surface conditions.

(aa) **Reserved**

(ab) The operational objective of the rescue and firefighting service shall be to achieve a response time not exceeding three minutes, to any other part of the movement area in optimum visibility and surface conditions.

Note 1 — Response time is considered to be the time between the initial call to the rescue and firefighting service, and the time when the first responding vehicle(s) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table 9-2.

Note 2 — Optimum visibility and surface conditions are defined as daytime, good visibility, no precipitation with normal response route free of surface contamination e.g. water.

(ac) To meet the operational objective as nearly as possible in less than optimum conditions of visibility, especially during low visibility operations, suitable guidance, equipment and/or procedures for rescue and firefighting services shall be provided.

Note. — Additional guidance is available in the ICAO Airport Services Manual (Doc 9137), Part 1.

(ad) Any vehicles other than the first responding vehicle(s) required to deliver the amounts of extinguishing agents specified in Table 9-2 shall ensure continuous agent application and shall arrive no more than four minutes from the initial call.

(ae) **Reserved**

(af) A system of preventive maintenance of rescue and fire fighting vehicles shall be employed to ensure effectiveness of the equipment and compliance with the specified response time throughout the life of the vehicle.

Emergency Access Roads

(ag) Emergency access roads shall be provided on an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times. Particular attention shall be given to the provision of ready access to approach areas up to 1000 m from the threshold, or at least within the aerodrome boundary. Where a fence is provided, the need for convenient access to outside areas shall be taken into account.

Note — Aerodrome service roads may serve as emergency access roads when they are suitably located and constructed.

(ah) Emergency access roads shall be capable of supporting the heaviest vehicles which will use them, and be usable in all weather conditions. Roads within 90 m of a runway shall be surfaced to prevent surface erosion and the transfer of debris to the runway. Sufficient vertical clearance shall be provided from overhead obstructions for the largest vehicles.

(ai) When the surface of the road is indistinguishable from the surrounding area, edge markers shall be placed at intervals of about 10 m.

Fire Stations

(aj) All rescue and fire fighting vehicles shall normally be housed in a fire station. Satellite fire stations shall be provided whenever the response time cannot be achieved from a single fire station.

(ak) The fire station shall be located so that the access for rescue and fire fighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.

Communication and Alerting Systems

(al) A discrete communication system shall be provided linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and fire fighting vehicles.

(am) An alerting system for rescue and firefighting personnel, capable of being operated from that station, shall be provided at a fire station, any other fire station on the aerodrome and the aerodrome control tower.

Number of Rescue and Fire Fighting vehicles

(an) The minimum number of rescue and fire fighting vehicles provided at an aerodrome shall be in accordance with the following tabulation:

Aerodrome Category	Rescue and fire fighting vehicles
1	*1*
2	*1*
3	*1*
4	*1*
5	*1*
6	*2*
7	*2*
8	*3*
9	*3*
10	*3*

Note — Guidance on minimum characteristics of rescue and firefighting vehicles is given in the ICAO Airport Services Manual (Doc 9137), Part 1.

Personnel

(ao) All rescue and firefighting personnel shall be properly trained to perform their duties in an efficient manner and shall participate in live fire drills commensurate with the types of aircraft and type of rescue and firefighting equipment in use at the aerodrome, including pressure-fed fuel fires.

Details of training requirements are contained in IS 12.2.9.2

Note 1 — Guidance to assist the aerodrome operator in providing proper training is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA- AC-ARD037), Advisory *Circular-NCAA-AC_ARD005 "Assessing Competence of ARFF Training Organizations and ARFF Personnel, Section 17; ICAO Airport Services Manual (Doc 9137), Part 1; and ICAO Training Manual, Part E-2.*

Note 2 — Fires associated with fuel discharged under very high pressure from a ruptured fuel tank are known as "pressure-fed fuel fires".

(ap) The rescue and firefighting personnel training programme shall include training in human performance, including team coordination.

Note. — Guidance material to design training programmes on human performance and team coordination can be found in the Human Factors Training Manual (Doc 9683).

(aq) During flight operations, sufficient trained and competent personnel shall be designated to be readily available to ride the rescue and firefighting vehicles and to operate the equipment at maximum capacity. These personnel shall be deployed in a way that ensures that minimum response times can be achieved and that continuous agent application at the appropriate rate can be fully maintained. Consideration shall also be given for personnel to use hand lines, ladders and other rescue and firefighting equipment normally associated with aircraft rescue and firefighting operations.

(ar) In determining the minimum number of rescue and firefighting personnel required, a task resource analysis shall be completed and the level of staffing documented in the Aerodrome Manual.

Note 1. — Guidance on the use of a task resource analysis can be found in the Airport Services Manual (Doc 9137), Part 1.

Note 2- Minimum requirement on number of rescue and firefighting personnel is given in IS 12.2.9.2

(as) All responding rescue and firefighting personnel shall be provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner.

12.2.9.3 DISABLED AIRCRAFT REMOVAL

Note — Guidance on removal of a disabled aircraft, including recovery equipment, is given in the ICAO Airport Services Manual (Doc 9137), Part 5.

(a) An aerodrome operator shall establish a plan for the removal of an aircraft disabled on, or adjacent to, the movement area of an aerodrome and designate a coordinator to implement the plan, when necessary.

(b) The disabled aircraft removal plan shall be based on the characteristics of the aircraft that may normally be expected to operate at the aerodrome, and include among other things:

(1) a list of equipment and personnel on, or in the vicinity of, the aerodrome which would be available for such purpose; and

(2) arrangements for the rapid receipt of aircraft recovery equipment kits available from other aerodromes.

12.2.9.4 WILDLIFE STRIKE HAZARD REDUCTION

Note. —The presence of wildlife (birds and animals) on, or in the vicinity of an aerodrome poses a serious threat to aircraft operational safety.

Note — Additional Requirements on this subject is in IS 12.2.9.4

(a) The wildlife strike hazard on, or in the vicinity of, an aerodrome shall be assessed through:

(1) the establishment of a national procedure for recording and reporting wildlife strikes to aircraft;

(2) the collection of information from aircraft operators, aerodrome personnel and other sources on the presence of wildlife on or around the aerodrome constituting a potential hazard to aircraft operations; and

(3) an ongoing evaluation of the wildlife hazard by competent personnel.

Note. — See Nig.CARs 14.4.

(b) Wildlife strike reports shall be collected and forwarded to ICAO for inclusion in ICAO Bird Strike Information System (IBIS) database.

Note. — The IBIS is designed to collect and disseminate information on wildlife strikes to aircraft. Information on the system is included in the Manual on the ICAO Bird Strike Information System (IBIS) *(Doc 9332)*.

(c) The aerodrome operator shall take action to decrease the risk to aircraft operations by adopting measures to minimize the likelihood of collisions between wildlife and aircraft.

Note. —Procedures on the management of wildlife hazards on and in the vicinity of an aerodrome, including the establishment of a wildlife hazard management programme (WHMP), wildlife risk assessment, land-use management and personnel training, are specified in the PANS-Aerodromes NCAA-AC-ARD 036.
Part II, Chapters 1 and 6. Further guidance is given in the Airport Services Manual (Doc 9137), Part 3.

(d) The aerodrome operator shall take action to eliminate or to prevent the establishment of garbage disposal dumps or any other source which may

attract wildlife to the aerodrome, or its vicinity, unless an appropriate wildlife assessment indicates that they are unlikely to create conditions conducive to a wildlife hazard problem. Where the elimination of existing sites is not possible, the aerodrome operator shall ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable.

(e) Aerodrome operator shall give due consideration to aviation safety concerns related to land developments in the vicinity of the aerodrome that may attract wildlife.

12.2.9.5 APRON MANAGEMENT SERVICE

(a) When warranted by the Volume of traffic and operating conditions, an appropriate apron management service shall be provided on an apron by an aerodrome ATS unit, by another aerodrome operating authority, by the aerodrome operator, or by a cooperative combination of these, in order to:

(1) regulate movement with the objective of preventing collisions between aircraft, and between aircraft and obstacles;

(2) regulate entry of aircraft into, and coordinate exit of aircraft from, the apron with the aerodrome control tower; and

(3) ensure safe and expeditious movement of vehicles and appropriate regulation of other activities.

(b) When the aerodrome control tower does not participate in the apron management service, procedures shall be established to facilitate the orderly transition of aircraft between the apron management unit and the aerodrome control tower.

Note. — Procedures on apron safety are specified in the PANS-Aerodromes NCAA-AC-ARD 036.
Guidance on an apron management service is given in NCAA-AC-ARD019 (Apron Control and Management Services), and in the NCAA-AC-ARD008 (Surface Movement Guidance and Control Systems,).

(c) An apron management service shall be provided with radiotelephony communications facilities.

(d) Where low visibility procedures are in effect, persons and vehicles operating on an apron shall be restricted to the essential minimum.

Note — Guidance on related special procedures is given in the ICAO Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).

(e) An emergency vehicle responding to an emergency shall be given priority over all other surface movement traffic.

(f) A vehicle operating on an apron shall:

(1) give way to an emergency vehicle; an aircraft taxiing, about to taxi, or being pushed or towed; and

(2) give way to other vehicles in accordance with local regulations.

(g) An aircraft stand shall be visually monitored to ensure that the recommended clearance distances are provided to an aircraft using the stand.

Note. — Procedures on the training of operational personnel and on apron safety and operations, are specified in the PANS-Aerodromes NCAA-AC-ARD 036.Part II, chapter 1 and 7.

12.2.9.6 GROUND SERVICING OF AIRCRAFT

(a) Fire extinguishing equipment suitable for at least initial intervention in the event of a fuel fire and personnel trained in its use shall be readily available during the ground servicing of an aircraft, and there shall be a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill.

(b) When aircraft refueling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

(1) the use of a sufficient number of exits for expeditious evacuation; and

(2) a ready escape route from each of the exits to be used in an emergency.

12.2.9.7 AERODROME VEHICLE OPERATIONS

Note 1. — Procedures on the establishment of an airside driver permit scheme and vehicle/equipment safety requirements, including detailed personnel training, are specified in the NCAA-AC-ARD009 (Ground Vehicle Operations).

Note 2. — Guidance on aerodrome vehicle operations is contained in Advisory Circular NCAA-AC-ARD009 (Ground Vehicle Operations).

Note 3. — It is intended that roads located on the movement area be restricted to the exclusive use of aerodrome personnel and other authorized persons, and that access to the public buildings by an unauthorized person will not require use of such roads.

(a) A vehicle shall be operated:

(1) on a manoeuvring area only as authorised by the aerodrome control tower; and

(2) on an apron only as authorised by the appropriate designated authority.

(b) The driver of a vehicle on the movement area shall comply with all mandatory instructions conveyed by markings and signs unless otherwise authorised by:

(1) the aerodrome control tower when on the manoeuvring area; or

(2) the appropriate designated authority when on the apron.

(c) The driver of a vehicle on the movement area shall comply with all mandatory instructions conveyed by lights.

(d) The driver of a vehicle on the movement area shall be appropriately trained for the tasks to be performed and shall comply with the instructions issued by:

(1) the aerodrome control tower, when on the manoeuvring area; and

(2) the appropriate designated authority, when on the apron.

(e) The driver of a radio-equipped vehicle shall establish satisfactory two-way radio communication with the aerodrome control tower before entering the manoeuvring area and with the appropriate designated authority before

entering the apron. The driver shall maintain a continuous listening watch on the assigned frequency when on the movement area.

12.2.9.8 SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEMS

Application

(a) A surface movement guidance and control system shall be provided at an aerodrome.

Note — Guidance on surface movement guidance and control systems is contained in the NCAA-AC-ARD008 (Surface Movement Guidance and Control Systems,)

Characteristics

(b) The design of a surface movement guidance and control system shall take into account:

(1) the density of air traffic;

(2) the visibility conditions under which operations are intended;

(3) the need for pilot orientation;

(4) the complexity of the aerodrome layout; and

(5) movements of vehicles.

(c) The visual aid components of a surface movement guidance and control system, i.e. markings, lights and signs shall be designed to conform with the relevant specifications in 12.2.5.2, 12.2.5.3 and 12.2.5.4, respectively.

(d) A surface movement guidance and control system shall be designed to assist in the prevention of inadvertent incursions of aircraft and vehicles onto an active runway.

(e) The system shall be designed to assist in the prevention of collisions between aircraft, and between aircraft and vehicles or objects, on any part of the movement area.

Note — Guidance on control of stop bars through induction loops and on a visual taxiing guidance and control system is contained in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

(f) Where a surface movement guidance and control system is provided by selective switching of stop bars and taxiway centre line lights, the following requirements shall be met:

(1) taxiway routes which are indicated by illuminated taxiway centre line lights shall be capable of being terminated by an illuminated stop bar;

(2) the control circuits shall be so arranged that when a stop bar located ahead of an aircraft is illuminated the appropriate section of taxiway centre line lights beyond it is suppressed; and

(3) the taxiway centre line lights are activated ahead of an aircraft when the stop bar is suppressed.

Note 1 — See12.2.5.3(q) and 12.2.5.3(t) for specifications on taxiway centre line lights and stop bars, respectively.

Note 2 — Guidance on installation of stop bars and taxiway centre line lights in surface movement guidance and control systems is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 4.

(g) Surface movement radar for the manoeuvring area shall be provided at an aerodrome intended for use in runway visual range conditions less than a value of 350 m.

(h) Surface movement radar for the manoeuvring area shall be provided at an aerodrome other than that in 12.2.9.8(g) when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.

Note — Guidance on the use of surface movement radar is given in the NCAA-AC-ARD008 (Surface Movement Guidance and Control Systems,).*and in the ICAO Air Traffic Services Planning Manual (Doc 9426).*

12.2.9.9 SITING OF EQUIPMENT AND INSTALLATIONS ON OPERATIONAL AREAS

Note 1 — Requirements for obstacle limitation surfaces are specified in 12.2.4.2.

Note 2 — The design of light fixtures and their supporting structures, light units of visual approach slope indicators, signs, and markers, is specified in 12.2.5.3(a),12.2.5.3(e), 12.2.5.4(a) and 12.2.5.5(a), respectively. Guidance on the frangible design of visual and non-visual aids for navigation is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 6

(a) Unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation shall be:

(1) on a runway strip, a runway end safety area, a taxiway strip or within the distances specified in Table 3-1, column 11, if it would endanger an aircraft; or

(2) on a clearway if it would endanger an aircraft in the air.

(b) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located:

(1) on that portion of a runway strip within:

(i) 75 m of the runway centre line where the code number is 3 or 4; or

(ii) 45 m of the runway centre line where the code number is 1 or 2; or

(2) on a runway end safety area, a taxiway strip or within the distances specified in Table 3-1; or

(3) on a clearway and which would endanger an aircraft in the air; shall be frangible and mounted as low as possible.

(c) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located on the non-graded portion of a runway strip shall be regarded as an obstacle and shall be frangible and mounted as low as possible.

Note — Guidance on the siting of navigation aids is contained in the ICAO Aerodrome Design Manual (Doc 9157), Part 6.

(d) Unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation shall be located within 240 m from the end of the strip and within:

(1) 60 m of the extended centre line where the code number is 3 or 4; or

(2) 45 m of the extended centre line where the code number is 1 or 2;

of a precision approach runway category, I, II or III.

(e) Any equipment or installation required for air navigation or for aircraft safety purposes which must be located on or near a strip of a precision approach runway category I, II or III and which:

(1) is situated within 240 m from the end of the strip and within:

(i) 60 m of the extended runway centre line where the code number is 3 or 4; or

(ii) 45 m of the extended runway centre line where the code number is 1 or 2; or

(2) penetrates the inner approach surface, the inner transitional surface or balked landing surface; shall be frangible and mounted as low as possible.

(f) Any equipment or installation required for air navigation or for aircraft safety purposes which is an obstacle of operational significance in accordance with

12.2.4.2(d), 12.2.4.2(k), 12.2.4.2(t) or 12.2.4.2(aa) shall be frangible and mounted as low as possible.

12.2.9.10 FENCING

Application

(a) A fence or other suitable barrier shall be provided on an aerodrome to prevent the entrance to the movement area of animals large enough to be a hazard to aircraft.

(b) A fence or other suitable barrier shall be provided on an aerodrome to deter the inadvertent or premeditated access of an unauthorized person onto a non-public area of the aerodrome.

Note 1. — This is intended to include the barring of sewers, ducts, tunnels, etc., where necessary to prevent access.

Note 2. — Special measures may be required to prevent the access of an unauthorized person to runways or taxiways which overpass public roads.

(c) Suitable means of protection shall be provided to deter the inadvertent or premeditated access of unauthorized persons into ground installations and facilities essential for the safety of Civil aviation located off the aerodrome.

Location

(d) The fence or barrier shall be located so as to separate the movement area and other facilities or zones on the aerodrome 6tal to the safe operation of aircraft from areas open to public access.

(e) When greater security is thought necessary, a cleared area shall be provided on both sides of the fence or barrier to facilitate the work of patrols and to make trespassing more difficult. Consideration shall be given to the provision of a perimeter road inside the aerodrome fencing for the use of both maintenance personnel and security patrols.

12.2.9.11 SECURITY LIGHTING

(a) At an aerodrome where it is necessary for security reasons, a fence or other barrier provided for the protection of international civil aviation and its facilities shall be illuminated at a minimum essential level. Consideration shall be given to locating lights so that the ground area on both sides of the fence or barrier, particularly at access points, is illuminated.

12.2.9.12 AUTONOMOUS RUNWAY INCURSION WARNING SYSTEM

Note 1. — The inclusion of detailed specification for an ARIWS in this section is not intended to imply that an ARIWS has to be provided at an aerodrome.

Note 2. — The implementation of an ARIWS is a complex issue deserving careful consideration by aerodrome operators, air traffic services, the Authority, and in coordination with the aircraft operators.

Note 3. — Advisory Circular “Supplementary Guidance Material to Aerodrome Regulation” (NCAA-AC-ARD037), Section 20 provides a description of an autonomous runway incursion warning system (ARIWS) and information on its use.

(a) Where an ARIWS is installed at an aerodrome:

(1) it shall provide autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or vehicle operator;

(2) it shall function and be controlled independently of any other visual system on the aerodrome;

(3) its visual aid components, i.e. lights, shall be designed to conform with the relevant specifications in 12.2.5.3; and

(4) failure of part or all of it shall not interfere with normal aerodrome operations. To this end, provision shall be made to allow the ATC unit to partially or entirely shut down the system.

Note 1. — An ARIWS may be installed in conjunction with enhanced taxiway centre line markings, stop bars or runway guard lights.

Note 2. — It is intended that the system(s) be operational under all weather conditions, including low visibility.

Note 3. — An ARIWS may share common sensory components of an SMGCS or A- SMGCS, however, it operates independently of either system.

Where an ARIWS is installed at an aerodrome, information on its characteristics and status shall be provided to the appropriate aeronautical information services for promulgation in the AIP with the description of the aerodrome surface movement guidance and control system and markings as specified in Nig.CARs 14.4,

Note – Detailed specifications concerning the AIP are contained in PANS-AIM (Doc 10066)

12.2.9.13 OTHER SPECIAL SERVICES

An aerodrome operator shall establish procedures to deal with fuel spillage, hot-works and other special services associated with fire risks.

Note – Guidance is available in handbook on fuelling and defuelling and safety regulation and recommended practices for aviation oil depots within Nigerian airports.

12.2.9.14 RUNWAY INCURSION PREVENTION

(a) The aerodrome operator shall establish and implement runway safety programmes designed to remove hazards and minimize residual risk of runway incursions, to reduce active failures and severity of their consequences.

(b) The aerodrome operator’s runway safety programme shall begin with the establishment of a runway safety team. The runway safety team shall comprise relevant specialist, persons or organisations whose functions or activities have a bearing with operational activities at the aerodrome.

(c) The runway incursion prevention programme shall seek to identify hazards associated with runway incursion by paying attention to the following, among other local factors:

(1) aerodrome visual aids i.e aeronautical ground lighting, markings and signs;
(2) complexity of the aerodrome layout;
(3) Volume of traffic;
(4) capacity-enhancing procedures;
(5) movement of vehicles;
(6) Aerodrome works
(7) ATC and Pilot practices;

(d) The runway incursion prevention programme shall employ the principles of safety management in minimising all the risk arising from identified hazards of runway incursion.

(e) Methods and procedures acceptable to the Authority for compliance with the requirement for establishment of runway safety team are contained in NCAA-AC-ARD020(Runway Incursion prevention measures) issued by the Authority.

12.2.10 AERODROME MAINTENANCE

12.2.10.1 GENERAL

(a) A maintenance programme, including preventive maintenance shall be established at an aerodrome to maintain facilities in a condition which does not impair the safety, regularity or efficiency of air navigation.

Note 1 — Preventive maintenance is programmed maintenance work done in order to prevent a failure or degradation of facilities.

Note 2 — "Facilities" are intended to include such items as pavements, visual aids, fencing, drainage and electrical systems and buildings.

(b) The design and application of the maintenance programme shall observe Human Factors principles.

Note 1 — Guidance material on Human Factors principles can be found in the ICAO Human Factors Training Manual (Doc 9683) and in the Airport Services Manual (Doc 9127) Part 8.

Note 2. — General principles and procedures on the training of aerodrome personnel, including training programmes and competence checks, are specified in the PANS- Aerodromes NCAA-AC-ARD 036.

12.2.10.2 PAVEMENTS

(a) The surface of all movement areas including pavements (runways, taxiways, aprons) and adjacent areas shall be inspected and their conditions monitored regularly as part of an aerodrome preventive and corrective maintenance programme with the objective of avoiding and eliminating any foreign object debris (FOD) that might cause damage to aircraft or impair the operation of aircraft systems.

Note1 — See 12.2.2.9(c) for inspection of movement areas.

Note 2. — Procedures on carrying out daily inspections of the movement area and control of FOD is given in the PANS-Aerodromes NCAA-AC-ARD 036, *the* Manual of Surface Movement Guidance and Control Systems (SMGCS) *(Doc9476) and the* Advanced Surface Movement Guidance and *Control Systems* (A-SMGCS) Manual *(Doc 9830)*.

Note 3. — Additional guidance on sweeping/cleaning of surfaces is contained in the Airport Services Manual *(Doc 9137), Part 9.*

Note 4. — Guidance on precautions to be taken in regard to the surface of shoulders is given in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD037) Section 10, and the Aerodrome Design Manual *(Doc 9157), Part 2.*

Note 5. — Where the pavement is used by large aircraft or aircraft with tire pressures in the upper categories referred to in 12.2.2.6(f)(3), particular attention should be given to the integrity of light fittings in the pavement and pavement joints.

(b) The surface of a runway shall be maintained in a condition such as to prevent formation of harmful irregularities.

Note —See Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD037) Section 5.

(c) A paved runway shall be maintained in a condition so as to provide surface friction characteristics at or above the minimum friction level specified by the Authority.

Note. — Advisory Circular "Assessment and Reporting of Runway Surface Conditions using Global Reporting Format (NCAA-AC-ARD032) contains further information on this subject.

(d) Runway surface friction characteristics for maintenance purpose shall be periodically measured with a continuous friction measuring device using self-wetting features and documented. The frequency of these measurements shall be sufficient to determine the trend of surface friction characteristics of the runway.

Note 1— Guidance on evaluating the friction characteristics of a runway is provided in Advisory Circular "Supplementary Guidance Material to Aerodrome Regulation" (NCAA-AC-ARD037), Section 8.

Additional guidance is included in the Advisory Circular –(NCAA-AC-ARD032).

Note 2. — The objective of 12.2.10.2(c) to 12.2.10.2(h) is to ensure that the surface friction characteristics for the entire runway remain at or above a minimum friction level specified in Table 10-1.

(e) When runway surface friction measurements are made for maintenance purposes using a self-wetting continuous friction measuring device, the performance of the device shall meet the standard set or agreed by the Authority.

(f) Personnel measuring runway surface friction required in paragraph 12.2.10.2(e) shall be trained to fulfil their duties.

(g) Corrective maintenance action shall be taken to prevent the runway surface friction characteristics for either the entire runway or a portion thereof from falling below a minimum friction level specified in Table 10-1

Note — A portion of the runway in the order of 100m long may be considered significant for maintenance or reporting action

(h) The runway surface shall be visually assessed, as necessary, under natural or simulated rain conditions for ponding or poor drainage and where required, corrective maintenance action taken.

(i) When a taxiway is used by turbine-engined aeroplanes, the surface of the taxiway shoulders shall be maintained so as to be free of any loose stones or other objects that could be ingested by the aeroplane engines.

Note — Guidance on this subject is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 2.

12.2.10.3 REMOVAL OF CONTAMINANTS

(a) Standing water, mud, dust, sand, oil, rubber deposits and other contaminants shall be removed from the surface of the runway in use as rapidly and completely as possible to minimize accumulation.

Note. — Guidance on removal of contaminants is given in the PANS-Aerodrome NCAA-AC-ARD 036 .

(b) Reserved

(c) Reserved.

(d) Reserved

(e) Reserved

(f) Chemicals which may have harmful effects on aircraft or pavements, or chemicals which may have toxic effects on the aerodrome environment, shall not be used.

12.2.10.4 RUNWAY PAVEMENT OVERLAYS

Note — The following specifications are intended for runway pavement overlay projects when the runway is to be returned temporarily to an operational status before is complete thus normally necessitating a temporary ramp between the new and old runway surfaces. Guidance on overlaying pavements and assessing their operational status is given in the ICAO Aerodrome Design Manual (Doc 9157), Part 3.

(a) The longitudinal slope of the temporary ramp, measured with reference to the existing runway surface or previous overlay course, shall be:

(1) 0.5 to 1.0 per cent for overlays up to and including 5 cm in thickness; and

(2) not more than 0.5 per cent for overlays more than 5 cm in thickness.

(b) Overlaying shall proceed from one end of the runway toward the other end so that based on runway utilization most aircraft operations will experience a down ramp.

(c) The entire width of the runway shall be overlaid during each work session.

(d) Before a runway being overlaid is returned to a temporary operational status, a runway centre line marking conforming to the specifications in 12.2.5.2(c) shall be provided. Additionally, the location of any temporary threshold shall be identified by a 3.6 m wide transverse stripe.

(e) The overlay shall be constructed and maintained above the minimum friction level specified in 12.2.10.2(c).

12.2.10.5 VISUAL AIDS

Note 1— These specifications are intended to define the maintenance performance level objectives. They are not intended to define whether the lighting system is operationally out of service.

Note 2. — The energy savings of light emitting diodes (LEDs) are due in large part to the fact that they do not produce the infra-red heat signature of incandescent lamps. Aerodrome operators who have come to expect the melting of ice and snow *by this heat signature may wish to evaluate whether or not a modified maintenance schedule is required during such conditions, or evaluate the possible operational value of installing LED fixtures with heating elements.*

Note 3. — Enhanced Vision systems (EVS) technology relies on the infra-red heat signature provided by incandescent lighting. Annex 15 protocols provide an appropriate means of notifying aerodrome users of EVS when lighting systems are converted to LED.

(a) A light shall be deemed to be unserviceable when the main beam average intensity is less than 50 per cent of the value specified in the appropriate figure in IS:12.2.5.3. For light units where the designed main beam average intensity is above the value shown in IS:12.2.5.3, the 50 per cent value shall be related to that design value.

(b) A system of preventive maintenance of visual aids shall be employed to ensure lighting and marking system reliability.

Note — Guidance on preventive maintenance of visual aids is given in the ICAO Airport Services Manual (Doc 9137), Part 9.

(c) The system of preventive maintenance employed for a precision approach runway category II or III shall include at least the following checks:

(1) visual inspection and in-field measurement of the intensity, beam spread and orientation of lights included in the approach and runway lighting systems;

(2) control and measurement of the electrical characteristics of each circuitry included in the approach and runway lighting systems; and

(3) control of the correct functioning of light intensity settings used by air traffic control.

(d) In-field measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a precision approach runway category II or III shall be undertaken by measuring all lights, as far as practicable, to ensure conformance with the applicable specification in IS:12.2.5.3.

(e) Measurement of intensity, beam spread and orientation of lights included in approach and runway lighting systems for a precision approach runway category II or III shall be undertaken using a mobile measuring unit of sufficient accuracy to analyze the characteristics of the individual lights.

(f) The frequency of measurement of lights for a precision approach runway category II or III shall be based on traffic density, the local pollution level, the reliability of the installed lighting equipment and the continuous assessment of the results of the in-field measurements but in any event shall not be less than twice a year for in-pavement lights and not less than once a year for other lights.

(g) The system of preventive maintenance employed for a precision approach runway category II or III shall have as its objective that, during any period of category II or III operations, all approach and runway lights are serviceable, and that in any event at least:

(1) 95 per cent of the lights are serviceable in each of the following particular significant elements:

(i) precision approach category II and III lighting system, the inner 450 m;

(ii) runway centre line lights;

(iii) runway threshold lights; and

(iv) runway edge lights;

(2) 90 per cent of the lights are serviceable in the touchdown zone lights;

(3) 85 per cent of the lights are serviceable in the approach lighting system beyond 450 m; and

(4) 75 per cent of the lights are serviceable in the runway end lights.

In order to provide continuity of guidance, the allowable percentage of unserviceable lights shall not be permitted in such a way as to alter the basic pattern of the lighting system. Additionally, an unserviceable light shall not be permitted adjacent to another unserviceable light, except in a barrette or a crossbar where two adjacent unserviceable lights may be permitted.

Note — With respect to barrettes, crossbars and runway edge lights, lights are considered to be adjacent if located consecutively and:

— *Laterally: in the same barrette or crossbar; or*

— *Longitudinally: in the same row of edge lights or barrettes.*

(h) The system of preventive maintenance employed for a stop bar provided at a runway- holding position used in conjunction with a runway intended for operations in runway visual range conditions less than a value of 350 m shall have the following objectives:

(1) no more than two lights will remain unserviceable; and

(2) two adjacent lights will not remain unserviceable unless the light spacing is significantly less than that specified.

(i) The system of preventive maintenance employed for a taxiway intended for use in runway visual range conditions less than a value of 350 m shall have

as its objective that no two adjacent taxiway centre line lights be unserviceable.

(j) The system of preventive maintenance employed for a precision approach runway category I shall have as its objective that, during any period of

category I operations, all approach and runway lights are serviceable, and that in any event at least 85 per cent of the lights are serviceable in each of the following:

(1) precision approach category I lighting system;

(2) runway threshold lights;

(3) runway edge lights; and

(4) runway end lights.

In order to provide continuity of guidance an unserviceable light shall not be permitted adjacent to another unserviceable light unless the light spacing is significantly less than that specified.

Note — In barrettes and crossbars, guidance is not lost by having two adjacent unserviceable lights.

(k) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions less than a value of 550 m shall have as its objective that, during any period of operations, all runway lights are serviceable and that in any event:

(1) at least 95 per cent of the lights are serviceable in the runway centre line lights (where provided) and in the runway edge lights; and

(2) at least 75 per cent of the lights are serviceable in the runway end lights.

In order to provide continuity of guidance, an unserviceable light shall not be permitted adjacent to another unserviceable light.

(l) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions of a value of 550 m or greater shall have as its objective that, during any period of operations, all runway lights are serviceable and that, in any event, at least 85 per cent of the lights are serviceable in the runway edge lights and runway end lights. In order to provide continuity of guidance, an unserviceable light shall not be permitted adjacent to another unserviceable light.

(m) During low visibility procedures the aerodrome operator shall restrict construction or maintenance activities in the proximity of aerodrome electrical systems.

SUBPART 3

AERODROME WORK SAFETY, ACCIDENT/ INCIDENT REPORTING AND INVESTIGATION PROCEDURES, CRITICAL DATA RELATED TO SAFETY OCCURRENCES & AERODROME SAFETY COORDINATION

12.3 AERODROME WORK SAFETY, ACCIDENT/ INCIDENT REPORTING AND INVESTIGATION PROCEDURES, CRITICAL DATA RELATED TO SAFETY OCCURRENCES & AERODROME SAFETY COORDINATION

12.3.2. AERODROME WORK SAFETY

12.3.2.1 INTRODUCTION

(a) An aerodrome operator shall plan and implement works to be carried out at an aerodrome so as not to create any hazard to aircraft operations or confusion to pilots. The Aerodrome Manual submitted by an aerodrome operator shall include details of the procedures for planning and safe carrying out of such work activities at the aerodrome.

(b) An aerodrome operator shall, in his Aerodrome Manual, address how aerodrome works are to be carried out so that:

(1) where the works are of a nature that they will disrupt operations, these works shall be carried out with proper planning in advance; and

(2) where the works are of a minor/maintenance nature, these works may be carried out as time-limited works where normal aircraft operations are not disrupted and the movement area can be restored to normal safety requirements and any obstacle created by those works removed in not more than 10 minutes. Depending on the nature and extent of each activity, time-limited works may include minor maintenance of markings and lights, grass mowing, sweeping of aircraft pavements, surveys and inspections, etc.

(c) At a controlled aerodrome, the air traffic control unit may, at the request of the aerodrome operator, vary the time limits in 12.3.1.1(b)(2) above for restoring normal safety requirements or resuming aerodrome works. A variation under this paragraph is subject to such conditions as the air traffic control unit may impose.

12.3.2.2 AERODROME WORK PLANS

(a) Unless an aerodrome is closed during works in progress, or the work is of an emergency nature, an aerodrome operator shall not carry out aerodrome works, other than time-limited works, without proper planning in advance.

(b) A plan shall be established, setting out the arrangements for carrying out those aerodrome works in coordination with all other operational, maintenance and development activities at the aerodrome.

(c) When preparing a work plan, an aerodrome operator shall consult:

(1) commercial air transport operators using the aerodrome;

(2) the aerodrome's air traffic control unit; and

(3) if the work plan may affect its operations, the Rescue and Fire Fighting Service unit at the aerodrome so that the scope and impact of work is understood by related aerodrome users and service providers and to ensure the safety of aircraft operations at the aerodrome.

(d) The aerodrome operator shall ensure that clear and ample prior notification is provided to the Aeronautical Information Services, the aerodrome air traffic control unit, aircraft operators and other users or service providers of the aerodrome. Such notification shall include timely and accurate promulgation of AIP Supplements or NOTAMs, with clear details of the extent and period of works.

(e) An aerodrome operator shall submit, and thereafter provide an explanation of his work plan, and any alterations or updates thereof, to the Authority before commencing the aerodrome works. The aerodrome operator can only be allowed to commence the aerodrome works if the work plan is acceptable to the Authority.

(f) Aerodrome works, for which a work plan is required, shall be carried out in accordance with the arrangements set out in the work plan and any subsequent alterations or updates.

(g) The work plan shall address details of any special requirement or restrictions arising during or on completion of the works.

(h) The work plan shall outline details, if any, of special arrangements to be made during works if emergencies or adverse weather conditions occur.

(i) A work plan may not be required if the aerodrome operator closes the aerodrome to aircraft operations while aerodrome works are being carried out. The Authority, commercial air transport operators and all organisations and persons likely to be affected by the closure shall be given reasonable notice of intention to close the aerodrome.

(j) An aerodrome operator shall not close the aerodrome to aircraft operations due to aerodrome works unless an AIP Supplement or a NOTAM giving notice of the closure has been issued not less than 12 days before the closure takes place.

(k) A work plan is not required for emergency aerodrome works carried out to repair damage to part of the manoeuvring area, or to remove an obstacle, or if the works do not require any restrictions to aircraft operations. Where practicable, a NOTAM giving the nature and time and date of the commencement of the urgent repair works should be issued, as early as possible, before the commencement of the works.

12.3.2.3 MANAGEMENT AND CONTROL OF AERODROME WORKS

(a) An aerodrome operator shall ensure that aerodrome works are carried out in accordance with the requirements of this Manual.

(b) An aerodrome operator shall appoint a person responsible for the safe and proper execution of each item of aerodrome works. This person shall be required to:

(1) ensure the safety of aircraft operations is not affected by the aerodrome work plan;

(2) ensure that, where applicable, the aerodrome works are notified by the issue of an AIP Supplement or a NOTAM and that the text of each AIP Supplement or NOTAM pertaining to such notification conveys the information on operational restrictions accurately and clearly to aerodrome users and service providers;

(3) supply the air traffic control unit with whatever information necessary to ensure the safety of aircraft operations;

(4) discuss with the work organisations involved, on a regular basis, any matters necessary to ensure the safety of aircraft operations;

(5) ensure that vehicles, plant and equipment carrying out aerodrome works are properly marked and lit or are properly supervised;

(6) ensure that all requirements under the work plan pertaining to vehicles, plant and equipment and materials are compiled with;

(7) ensure that access routes to work areas are in accordance with that designated in the work plan and are clearly identified and that access is restricted to these routes;

(8) ensure that excavation is carried out in accordance with the work plan and relevant requirements, and in particular, that sufficient precautions are taken so as to avoid damage or loss of calibration to any underground power or control cable, utilities or other services

associated with a precision approach and landing system, any navigational aid or facility or equipment essential for the safety of aerodrome operations;

(9) report immediately to the aerodrome air traffic control unit and the aerodrome operator any incident, or damage to facilities, likely to affect air traffic control services or the safety of aircraft;

(10) provide adequate supervisory duty at the work areas while major works are in progress and the aerodrome is open to aircraft operations;

(11) ensure that the aerodrome air traffic control unit is kept informed of the radio call signs of vehicles used by the work organizations that are operating in the aircraft movement areas;

(12) remove vehicles, plant and personnel from the movement area immediately, where necessary, to ensure the safety of aircraft operations;

(13) ensure that the movement area is safe for normal aircraft operations following the removal of vehicles, plant and equipment and personnel from the work areas;

(14) in the case of time-limited works, ensure that the work areas are restored to normal safety requirements not less than 5 minutes before the time scheduled for opening the work areas to aircraft operations; and

(15) ensure that floodlighting or any other lighting required for carrying out aerodrome works is shielded so as not to present a hazard to aircraft operations.

(c) The person responsible for the aerodrome works shall be satisfied that the work plan is adequately prepared and that sufficient safety measures are put in place on the work site at all times during the execution of the aerodrome works when the aerodrome is open to aircraft operations.

(d) An aerodrome operator shall take all reasonable measures to ensure that aerodrome works are well-organised and that all work personnel carries out aerodrome works in a manner that will ensure the safety of aircraft operations.

(e) Persons, vehicles, plant and equipment required for carrying out aerodrome works must not be permitted to enter the movement area or remain on it except for the purpose of carrying out those works.

(f) Procedures for entering the work areas shall be addressed in the work plan.

12.3.2.4 MARKERS, MARKINGS AND LIGHTS

(a) Aerodrome markers, markings, signs and lights required for, or affected by, aerodrome works shall be adjusted or installed in accordance with the appropriate aerodrome requirements.

(b) Parts of the movement area that are unserviceable as a result of the aerodrome works being carried out shall be marked and lit in accordance with the appropriate aerodrome requirements.

(c) All obstacles created as a result of aerodrome works being carried out shall be marked and lit in accordance with the appropriate aerodrome requirements.

(d) Vehicles and plant used in carrying out aerodrome works shall be marked and lit, where necessary, in accordance with the appropriate aerodrome requirements.

12.3.2.5 COMMUNICATION EQUIPMENT

(a) At a controlled aerodrome, a vehicle used by work parties carrying out aerodrome works on the movement area shall be equipped with a radio for two-way communications with the aerodrome air control tower unit.

(b) For the purpose of communication with the air traffic control unit, each vehicle used for carrying out aerodrome works on the movement area should be given a call-sign.

(c) Any vehicle or plant that is not:

(1) marked or lit in accordance with 12.3.1.4 above; or

(2) if applicable, equipped with a two-way radio; may only be used in carrying out aerodrome works if it is:

(i) used under the direct supervision of another vehicle that is equipped with a two-way radio set and which is responsible for escorting the vehicle or plant without radio when carrying out aerodrome works; or

(ii) used only within the limits of appropriately marked and lit work areas.

(d) The drivers of vehicles equipped with a radio for two-way communications with the aerodrome air traffic control unit shall be properly trained and be responsible for checking that their radio sets are switched on and serviceable at all times when working on the movement area.

12.3.2.6 WORKS NEAR AIRCRAFT MOVEMENT AREAS

(a) The aerodrome operator shall refer to 12.2.6 and 12.2.7 of these Regulations and ICAO Airport Services Manual (Doc 9137) Part 6 – Control of Obstacles to determine the extent of work allowed near aircraft movement areas.

(b) Works on or near aircraft movement areas or runway strips shall be carried out as quickly as practicable to minimise any potential risks arising out of changes associated with the works in progress.

(c) Where works are to be undertaken in the vicinity of navigational or landing aids located within the runway strips, considerations shall be taken to ensure that neither the works nor vehicles or plant associated with the works may affect the performance of the aids.

12.3.2.7 COMPLETION

(a) On the completion of aerodrome works and restoration of normal safety requirements to the movement area, the aerodrome operator shall cancel any AIP Supplement or NOTAM issued to advise of those works.

(b) An aerodrome operator shall be required to inspect his aerodrome, as circumstances require, to ensure aviation safety during and immediately after any period of construction or repair of an aerodrome facility or equipment that is critical to the safety of aircraft operations, and at any other time when there are conditions at the aerodrome that could affect aviation safety.

12.3.2.8 CONTENT OF WORK SAFETY PLAN

(a) A work safety plan shall contain at least the following information:

(1) Description of the construction project:

(2) Provide a full description of the planned construction project.

(3) Stages/phases of the construction & schedules:

(4) List the different stages of the construction activities with anticipated start and finish dates.

(5) Types & frequency of air traffic:

(6) List the types of aircraft and number of daily movements anticipated during the construction period.

(7) Disruptions to air traffic:

(8) What will be the impact on and disruptions to the air traffic as listed above.

(9) Position and height of equipment (Relative to Runways & Taxiways):

(10) Provide the location and maximum working height of the construction equipment or vehicles and where that equipment will be working in relationship to the taxiway or runway edges/ends. This information is required to assess the impact on Obstacle Limitation Surfaces.

(11) Work adjacent to Runway/Taxiway:

(12) Temporary hazards on runway strips. Which zone will you be working in, which restriction and operational conditions will apply to your project?

(13) Markings, barriers and lighting provided:

(14) Describe all markings, barriers and lighting to be used to indicate unserviceable areas of the aerodrome.

(15) Displaced and/or Relocated Thresholds:

(16) If the project will require a displaced or relocated threshold, provide an explanation as to why this is required, what percentage slope the calculations are based on, how will the new threshold be marked and lighted, what buffer is being provided for jet or prop blast consideration?

(17) Declared distance during all phases:

(18) Based on the above calculation what will be the revised declared distances?

(19) Access control, vehicle operations and Escorts:

(20) How will vehicles and equipment access the construction site, will Aerodrome vehicle Operator Permit be issued, are radio licenses required, will vehicles be escorted, whom will be providing the escorts?

(21) Communications Plan (Prior to Construction & During Construction):

(22) Every construction project requires a Communication Plan. The Plan will cover communication with the aerodrome clients/users, ATS and NDCA during all phases of the project; #1: Planning Phase, #2: Pre-construction Phase #3: Construction Phase.
Aerodrom Ops ↔ ATS; ATS ↔Construction Site;
Aerodrome Ops ↔ Construction Site;
Aerodrome Ops ↔ Users (Stakeholders);
Aerodrome Ops ↔ NDCA.

(23) NOTAMs as per the NOTAM procedure manual:

Provide a draft of all anticipated NOTAMS. NOTAMs revising declared distances must be pre-approved by NCAA.

(24) Drawing or Blueprints:
Provide any drawings required to support your Plan of Construction Operation. It is the aerodrome operator's responsibility to ensure the drawings and final product meet Aerodrome Certification requirements.

12.3.3. (RESERVED)

12.3.4. AERODROME ACCIDENT/INCIDENT REPORTING AND INVESTIGATION PROCEDURES

12.3.4.1 AERODROME OCCURRENCE REPORTING

(a) This Section prescribes the requirements for reporting the occurrence or detection of defects, failures or malfunctions at an aerodrome, its components or equipment, which could jeopardise the safe operation of the aerodrome or cause it to become a danger to persons or property. The objectives of the Aerodrome Occurrence Report are as follows:

(1) To ensure that knowledge of these occurrences is disseminated so that other persons and organizations may learn from them.

(2) To enable an assessment to be made by those concerned (whether internal or external to the aerodrome operator) of the safety implications of each occurrence, both in itself and in relation to previous similar occurrences, so that they may take or initiate any necessary action.

12.3.4.2 REPORTABLE OCCURRENCES AND REPORTING PROCEDURES

(a) An aerodrome operator shall immediately notify the Authority by the fastest means possible, of any accident, serious incident, fatal or serious injury or any other occurrence listed in paragraph (b) of this subsection occurring at aerodrome -In accordance with aerodrome operator's standard operating procedures and provide a detailed occurence report within 72 hours of the occurence .

(b) The Aerodrome Operator shall report any of the following occurrences:

(1) A near collision requiring an avoidance manoeuvre to avoid a collision or an unsafe situation or where an avoidance action would have been appropriate.

(2) Collision between moving aircraft and any other aircraft, vehicle or other ground object

(3) Wing-tip collision between aircrafts

(4) A controlled flight into terrain only marginally avoided

(5) An aborted take-off on a closed or engaged runway.

(6) A take-off from a closed or engaged runway with marginal separation from an obstacle.

(7) A landing or attempted landing on a closed or engaged runway

(8) A take-off or landing incident such as undershooting, overrunning or running off the side of runways, or movement of persons or vehicles in the movement area without authorization from ATC.

(9) A major failure of any navigation aid when a runway is in use.

(10) Apron jet or prop blast incidents that could have resulted in significant damage or serious injury.

(11) Collision between vehicles or vehicle and ground servicing equipment (GSE)

(12) FOD and wildlife on the runway that strikes an aircraft

(13) wildlife / Bird strike of an aircraft or abnormal bird concentrations

(14) Failure or significant malfunction of Aerodrome lighting system during approach or take off

(15) Failure of facility or procedure used in airside operations

(16) Incorrect transmission, receipt or interception of radio telephone messages (ground to air or ground to ground)

(17) Presence of any wild animal in the operational areas and likely to affect safe operations.

(18) Breaches of airside driving rules resulting in hazard to aircraft

(19) Any incident that has jeopardized safety of passengers/public and was avoided being an accident only by exceptional handling or good fortune

(20) Any incident that causes trauma to passenger/ visitors or third party

(21) Any incident of fire which either necessitates use of fire extinguishers or causes failure of any equipment or facility or disturbs smooth flow of air traffic or passengers or visitors.

(c) The owner or operator of an aerodrome in Nigeria shall also notify the Nigeria Safety Investigation Bureau responsible for Accident Investigation where the accident or serious incident occurs on, or adjacent to his aerodrome. In addition, the owner or operators shall also be notified in the case of an accident in Nigeria.

(d) Information to be provided in the reporting and notification of an accident or serious incident with the exception of those listed in 12.3.4 of this regulation shall at least include, as far as possible, the following:

(1) the date and local time of occurrence;

(2) the exact location of the occurrence with reference to some easily defined geographical point ;

(3) detailed particulars of the parties involved, including the owner, operator, manufacturer, nationality, registration marks, serial numbers, assigned identities of aircraft and equipment;

(4) a detailed description of the sequence of events leading up to the incident;

(5) the physical characteristics, environment or circumstances of the area in which the incident occurred and an indication of the access difficulties or special requirements to reach the site;

(6) the identification of the person sending the notice and where the

incident occurred, the means by which the investigator-in-charge may be contacted;

(7) in the case of an aircraft accident, the number of crew members, passengers or other persons respectively killed or seriously injured as a result of the accident; and

(8) a description of the follow-up action being taken after the incident has occurred.

12.3.4.3 AERODROME OCCURRENCE RECORDS

(a) An aerodrome operator shall establish and maintain Aerodrome Occurrence Reports for any accident, serious incident, serious injury or any occurrence or event that has a bearing on the safety of aerodrome operations.

(b) Aerodrome Occurrence Reports should be used by an aerodrome operator to monitor and improve the level of operational safety, including reviews of safety requirements.

(c) The Authority may require the aerodrome operator to produce and provide information contained in the Aerodrome Occurrence Report relating to any safety occurrence or event.

12.3.4.4 AERODROME ACCIDENT/INCIDENT INVESTIGATIONS

(a) In the event of an accident or serious incident, an aerodrome operator shall carry out its own investigations.

(b) The investigations carried out by the aerodrome operator shall be in addition to that carried out by the Nigeria Safety Investigation Bureau responsible for accident investigation.

(c) The investigator, or team of investigators, shall be technically competent and shall either possess or have access to the background information, so that the facts and events are interpreted accurately. The investigations shall be a search to understand how the mishap happened, why it occurred, including organisational contributing factors, and to recommend action to prevent a recurrence, and shall not be intended to apportion blame.

(d) The lesson learnt derived from an aerodrome incident/accident investigation shall be disseminated to staff to provide feedback for safety improvement.

(e) The Authority shall require the aerodrome operator to produce and provide information contained in the aerodrome accident/incident investigation report relating to any such event.

(f) An aerodrome operator shall inspect his aerodrome, as circumstances require, to ensure safety as soon as practicable after any aircraft accident or incident.

12.3.5. CRITICAL DATA RELATED TO SAFETY OCCURRENCES REPORTED AT THE AERODROMES FOR THE MONITORING OF SAFETY

12.3.5.1 INTRODUCTION

When safety occurrences of the following types are reported, the following critical data shall be collected and provided to the Authority. This may require a collaborative effort from the aerodrome operator, ANSP or other involved parties commensurate with the severity of the potential risk attached to each occurrence. In addition to the separate data to be collected for each of the safety occurrences listed from 12.3.4.2 to 12.3.4.10, the following information in paragraph (a) – (c) shall also be obtained:

(a) detailed particulars of the parties involved, including the owner, operator, manufacturer, nationality, registration marks, serial numbers, assigned identities of aircraft and equipment;

(b) a detailed description of the sequence of events leading up to the incident;

(c) in the case of an aircraft accident, the number of crew members, passengers or other persons respectively killed or seriously injured as a result of the accident; and

(d) a description of the follow-up action being taken after the incident has occurred.

12.3.5.2 RUNWAY EXCURSION

(a) type of event (lateral veer-off, overrun);

(b) landing/take-off;

(c) type of approach if it is a landing event (local time or UTC);

(d) date and time (local time or UTC);

(e) aeroplane type;

(f) runway:

(1) dimensions (width/length);

(2) slopes;

(3) displaced threshold (yes/no, and if so, distance between the runway threshold and the runway edge);

(4) runway end safety area (RESA) (yes/no, and if so, orientation, dimensions and structure);

(5) contaminated runway (yes/no, and if so, contaminant type (slush, snow, ice, water, other (to be specified), contaminant depth);

(g) wind (direction and speed);

(h) visibility;

(i) details of the exit:

(1) exit speed or estimation;

(2) aeroplane angle with the runway edge;

(3) distance between the touchdown and the exit;

(4) description of the trajectory of the aeroplane once on the runway strip and/or RESA;

(j) details of the location of the aeroplane once stopped.

Note 1. — For overruns, information to be reported includes longitudinal position in relation to the threshold Location and/or end of runway surface and lateral position in relation to runway lateral edge or runway centre line.

12.3.5.3 UNDERSHOOT (LAND SHORT OF RUNWAY)

(a) type of event (land short, undershoot);

(b) type of approach;

(c) ground-based vertical guidance available and operational (instrument landing system (ILS), precision approach path indicator (PAPI), abbre6ated precision approach path indicator (APAPI));

(d) date and time (local time or UTC);

(e) wind speed (including gusts), description (calm/variable) and direction;

(f) visibility;

(g) aeroplane type;

(h) runway:

(1) dimensions (width/length);

(2) slopes;

(3) displaced threshold (yes/no, and if so, distance between the runway threshold and the runway edge);

(4) RESA (yes/no, and if so, magnetic orientation of runway (QFU), dimensions and structure);

(5) contaminated runway (yes/no, and if so, contaminant type (slush, snow, ice, water, other (to be specified), contaminant depth);

(i) details of the undershoot (aeroplane speed at touchdown, distance between the touchdown and the runway edge, causes of the event):

(1) description of the trajectory of the aeroplane after touchdown.

12.3.5.4 RUNWAY INCURSION

(a) entities involved (aeroplane/vehicle; aeroplane/aeroplane; aeroplane/person);

(b) date and time (local time or UTC);

(c) aeroplane type, landing/take-off, type of approach;

(d) vehicle type, location;

(e) runway:

(1) dimensions (width/length);
(2) slopes/line of sight;
(3) displaced threshold (yes/no, and if so, distance between the runway threshold and the runway edge);
(4) rapid exits;
(5) wind;
(6) visibility;

(f) details of the incursion:

(1) description of the trajectories and speeds of both vehicles/aeroplanes;
(2) estimated distances (horizontal and vertical) between the entities involved;
(3) contaminated operational surfaces in the incursion area (yes/no, and if so, contaminant type (water, other (to be specified), contaminant depth).

Note 1.— Guidance on prevention of runway incursions, including severity classification, is available in Doc 9870 — Manual on the Prevention of Runway Incursions).

12.3.5.5 LANDING OR TAKE-OFF ON A TAXIWAY

(a) landing/take-off;
(b) type of approach when relevant;

(c) date and time (local time or UTC);

(d) wind;

(e) visibility;

(f) aeroplane type;

(g) taxiway:

  (1) dimensions (width/length);

  (2) slopes;

(h) details of the event:

  (1) possible contributing factors (e.g. inadequate lighting, procedure not applied, works, inadequate or misleading marking).

12.3.5.6 FOD RELATED EVENTS

(a) type of event;

(b) location (runway, orientation, or taxiway, stand), location of FOD, including where possible lateral and longitudinal positions;

(c) date and time (local time or UTC);

(d) FOD description:

  (1) name (if possible);

  (2) shape and dimensions;

  (3) material;

  (4) colour;

  (5) origin (if known: lighting, infrastructure, works, animals, aeroplane, environment (wind, etc.)).

12.3.5.7 OTHER EXCURSIONS (i.e. FROM THE TAXIWAY OR APRON)

(a) type of event;

(b) location;

(c) date and time (local time or UTC)

(d) aeroplane type;

(e) taxiway:

(1) dimensions (width/length);

(2) slopes;

(3) if in a curved section: fillets (yes/no, and characteristics);

(4) contaminated taxiway (yes/no, and if so, contaminant type (slush, snow, ice, water, other (to be specified) and contaminant depth);

(f) wind (direction and speed);

(g) details of the exit (exit speed or estimation, aeroplane angle with the taxiway edge, in a straight or a curved section, causes of the event);

(h) details of the location of the aeroplane once stopped.

12.3.5.8 OTHER INCURSIONS (i.e. ON TAXIWAY OR APRON)

Same data as in **12.3.4.3**

12.3.5.9 BIRDS/WILDLIFE STRIKE-RELATED EVENTS

To be conducted in accordance with ICAO bird strike information system (IBIS) data (ingestion, collision). If there has been no collision, and the animal was avoided, it is important to know the location of the animal at the time the avoided collision occurred.

12.3.5.10 GROUND COLLISIONS

(a) type of event (ground collision);

(b) location:

(1) apron;

(2) manoeuvring area;

(3) runway, taxiway;

(4) contaminant (if relevant: type and depth);

(5) wind (if relevant);

(c) date and time (local time or UTC);

(d) phase of flight (e.g. taxi out, departure roll, engine start/pushback);

(e) aeroplane(s) involved;

(1) type of aeroplane
(2) and trajectory;

(f) vehicle(s) involved;
(1) type of vehicle
(2) and trajectory;

(g) material damages (to both aeroplane(s) and/or vehicle(s))/human damages and location of the damages;

(h) phase of operation, if ground handling is involved;

(i) description of the collision:

(1) estimated speed of both vehicle(s) and/or aeroplane(s);
(2) description of the trajectories of the aeroplane(s) and/or the vehicle(s).

Note 1.— Ground collisions involving aeroplanes can be incidents, serious incidents or accidents. If classified as an incident, they are normally investigated as part of the aerodrome's SMS. If classified as a serious incident or accident, the aerodrome operator should involve the Nigerian Safety Investigation Bureau and appropriate coordination is therefore required.

Note 2.— Ground collisions not involving aeroplanes can be an incident and investigated as part of the aerodrome's SMS.

SUBPART 4

AERODROME DEVELOPMENT AND SAFEGUARDING

12.4 AERODROME DEVELOPMENT AND SAFEGUARDING

12.4.1. CONSTRUCTION, ALTERATION, ACTIVATION AND DEACTIVATION OF AERODROMES

Note : For the purpose of this part : an aerodrome includes but is not limited to the following: airport, airstrip, heliport, manned balloon launching facility, or other aircraft landing or take-off area.

12.4.1.1 APPLICABILITY

(a) This subsection prescribes rules for persons proposing to construct, alter, activate, or deactivate a civil aerodrome or the civil portion of a joint -use military aerodrome or to alter the status or use of such an aerodrome.

(b) This subsection does not apply to projects involving intermittent use of a site that is not an established aerodrome, which is used or intended to be used for less than one year/one month (3 months) and at which flight operations will be conducted only under VFR. For the purposes of this subpart, intermittent use of a site means

(1) The site is used or is intended to be used for no more than 1 day in any 7 consecutive day period; and

(2) No more than 5 aircraft operations will (may) be conducted in any one day at that site.

12.4.1.2 PROJECT REQUIRING NOTICE

(a) A person who intends to do any of the following shall seek approval from the Authority in the manner prescribed in 12.4.1.3:

(1) Construct or otherwise establish a new aerodrome or activate an aerodrome.

(2) Construct, re-align, alter, or activate any runway or other aircraft landing or take-off area of an aerodrome.

(3) Deactivate, discontinue using, or abandon an aerodrome; or deactivate, discontinue using, or abandon any landing or take-off area of an aerodrome. c.

(4) Construct, realign, alter, activate, deactivate, abandon, or discontinue using a taxiway associated with a landing or take-off area on a public-use aerodrome.

(5) Aerodrome airside expansion or upgrade including passenger/cargo building, Airfield lighting, fire station, control tower, hangar construction, modification or upgrade.

(6) Change the status of an aerodrome from public use to another status and vice versa.

(7) Change any traffic pattern or traffic pattern altitude or direction.

(8) Change status from IFR to VFR or VFR to IFR.

(9) Decommission an established instrument approach procedure;
(10) Any other project as will be determined by the Authority.

(b) Request for approval will enable the Authority to identify:

(1) Whether the use of the airspace associated with the proposal will be a hazard to other established airspace users;

(2) Any safety related considerations pertaining to persons and property on ground.

12.4.1.3 FORM OF APPLICATION

(a) Applications shall be submitted in a form and manner prescribed by the Authority and shall be submitted at least—

(1) In the cases prescribed in paragraphs 12.4.1.2 (a)(1) to (5), 180 working days in advance of the day that work is to begin; or

(2) In the cases prescribed in paragraphs 12.4.1.2 (a)(6) to (10), (90)

working days in advance of the planned implementation date for modification.

(b) Notwithstanding paragraph 12.4.1.3(a)(1) -

(1) In an emergency involving essential public service, public health, or public safety or when the delay arising from the prescribed notice requirement would result in an unreasonable hardship, an applicant may provide the notice may be sent by telephone, telefax, or other expeditious means, with the appropriate form submitted to the Director General within 5 days thereafter

(2) Notice concerning the deactivation, discontinued use, or abandonment of an aerodrome, an aerodrome landing or take-off area, or associated taxiway shall be submitted by letter.

(c) In completing the form, applicants shall pay particular attention to the following:

(1) Describe the proposed landing area by geodetic coordinates (WGS 84) as well as length and width;

(2) List visual flight rule (VFR) airports within 20 nautical miles;

(3) For heliports, list all VFR airports and heliports within 3 nautical miles and all IFR airports within 10 nautical miles:

(4) List all obstructions within 3 nautical miles of a VFR airport or a seaplane base, within 5 nautical miles of an IFR airport; or within 5,000 feet (1500m) of a heliport;

(5) List schools, churches and residential communities within a 2 nautical mile radius for airports and within one nautical mile for heliports;

(6) List all waste disposal sites within a 5 nautical mile radius of the proposed landing area.

(d) In addition to standard form required to be completed, submittals affecting a heliport must include the following:

(1) City Map identifying the exact location of the heliport in red.

(2) Heliport layout plan, drawn to scale showing key dimensions such as

FATO, TLOF, safety area, approach/departure paths, property boundaries, close in obstructions, etc. or in the case of a hospital heliport, a hospital layout plan, depicting the landing pad in relation to buildings and other obstacles/structures in the vicinity of the landing area. Description of the size of the landing pad and the height of each structure and their distance from the landing pad.

(3) A heliport airspace drawing as described for airport submittals.

12.4.1.4 ASSESSMENT OF AERODROME PROPOSALS

(a) In addition to the application submitted in 12.4.1.3 the aerodrome operator shall include an assessment report of the aerodrome proposal.

(b) An Application required in subsection 12.4.1.3 serves as the basis for evaluating the effects of the proposed action on the safe and efficient use of airspace by aircraft and the safety of persons and property on the ground. In particular, the assessment shall include but are not limited to:

(1) The effects the proposed action would have on existing or proposed traffic patterns of neighboring airports or heliports,

(2) The effect the proposed action would have on the existing airspace structure and projected programs of the Authority.

(3) The effect the proposed action would have on the safety of persons and property on the ground within affected area.

(4) The effects that existing or proposed man-made objects (on file with the Authority) and natural objects within the affected area would have on the proposed action.

(5) The adjustment of other aviation requirements that may be needed to accommodate the proposal, and

(6) Possible revisions of the proposal that may be necessary to eliminate a hazardous or inefficient use of airspace.

(c) The Aeronautical Studies assessment and determination are focused solely on matters that affect the safety and efficiency of airspace use and the safety and security of persons and property on the ground. Authority will not include matters relating to environmental impact issues, the effect on lifestyle or property values, or the effect on other services in the area such as roads.

12.4.1.5 CONSULTATION WITH INTERESTED PERSONS

(a) As part of the evaluation of the aeronautical study assessment report, the Authority will consult with such persons, representative groups, and organisations as the Authority considers appropriate.

(b) This consultation is accomplished by notifying Government Authorities, aerodrome operators in the area, aircraft operators and pilots, air traffic service providers, and the general public of the proposal and offering a period of time within which submissions and comments can be made on the proposal.

12.4.1.6 DETERMINATIONS OF AERODROME PROPOSALS

(a) On completion of the evaluation of assessment, the Authority will issue to the applicant, appropriate local authorities, and other interested persons an aerodrome determination. The determination will be one of the following:

(1) No objection. A no objection determination will be made when the Authority is satisfied that the proposed action will not adversely affect the safe and efficient use of the airspace by aircraft nor the safety of persons or property on the ground nor adversely affect aviation security:

(2) Conditional. A conditional determination will be made when the Authority identifies objectionable aspects of a proposed project or action and specify the conditions which must be met and sustained to preclude an objectionable determination.

(3) Declined. A declined determination will be made when the Authority identifies objectionable aspects of a proposed project or action. The Authority may provide reasons for issuing such a determination.

Note: Determinations communicated either the Authority's approval of the site or denial. A determination does not communicate approval to start construction.

(b) Any determination made by the Authority, indicating that the proposed construction or alteration will adversely affect the safe and efficient use of the airspace by aircraft or the safety of persons or property on the ground will cause the aerodrome determination to be objectionable.

(c) A determination does not relieve the Applicant of responsibility for compliance with any other local laws or State legislation.

(d) Any determination made under this Part of the Regulations does not indicate that the proposed development is environmentally acceptable in accordance with applicable environmental laws.

Note: An environmental finding is a prerequisite to any major airport development project under national environmental laws. Applicants for aerodrome projects are advised to notify the appropriate state environmental authority separately for prior written approval before undertaking proposed aerodrome development.

(e) Any determination made under this subpart of the Regulations does not constitute a determination that the Aerodrome Proponent has the resources, competence and capability to sustainably operate and maintain the aerodrome.

Note: A determination of the aerodrome proponent's capability to sustainable operate and maintain the proposed aerodrome is a prerequisite to any new aerodrome development project under subsection 12.4.1.2 Applicants for aerodrome projects are advised to notify the Authority separately for prior written approval before undertaking proposed aerodrome development.

(f) Any determination made under this subpart of the Regulation does not constitute a waiver of security clearance from the federal government of Nigeria.

Note: A security clearance is a prerequisite to any new project

(g) Any determination made under this subpart of the Regulations does not constitute any approval by the Town Planning Authority for an airport to be sited on the designated land.

Note: An approval of the site by the town planning authority of the proposed site is a prerequisite to any new aerodrome development project. Applicants for aerodrome projects are advised to notify the town planning authority separately for prior written approval before undertaking proposed aerodrome development.

(h) Except for a declined determination, each determination will contain a determination- void date to facilitate efficient planning of the use of the navigable airspace.

Note: the determination void date is the date beyond which the approval to commence the aerodrome project becomes invalid.

(i) All work or action including those for which approval notice from other relevant authorities mentioned in subsection 12.4.1.6 is required, by this subpart shall be completed by the determination void date. Unless otherwise extended, revised, or terminated, a determination by the Authority becomes invalid on the day specified as the determination void date. Any interested person may, at least 15 days prior to the determination void date, petition the Authority to:

(1) Revise the determination based on new facts that change the basis on which it was made; or

(2) Extend the determination void date if there are valid reasons for not completing the action by the void date. Determinations will be furnished to the applicant, aviation officials, and, when appropriate other interested persons.

12.4.1.7 APPROVALS FROM OTHER RELEVANT STATE AUTHORITIES

(a) Once a determination of approval has been issued by the Authority on a proposed site, the applicant shall process, obtain and submit to the Authority:

(1) Approval from the appropriate Town Planning Authority indicating that the proposed site has been designated for the construction of an aerodrome.

(2) Environmental Impact Assessment approval letter or written evidence indicating that an environmental impact assessment of the proposed site acceptable to the federal ministry of Environment has been

conducted by the Aerodrome Proponent. The approval letter or written evidence shall be submitted with an endorsed copy of the Environmental Impact Assessment Report.

(3) Security Clearance by the federal government of Nigeria indicating that appropriate background security checks on all parties to the aerodrome development proposal have been satisfactorily completed.

(4) Approvals listed in subsections 12.4.1.7 shall be submitted to the Authority in a form and manner prescribed by the Authority.

12.4.1.8 AERODROME OPERATIONS AND MAINTENANCE SUSTAINABILITY PLAN

(a) For international aerodromes intended for scheduled commercial operations, in addition to the approvals in subsection 12.4.1.7, the applicant shall show evidence of ability to operate and maintain an aerodrome in an economically and financially viable and sustainable manner. In this respect, the aerodrome proponent shall furnish the following:

(1) Funding and Financial projections including maintenance for five years;

(2) Projected Income and Expenditure Statement;

(3) Projected Balance Sheet;

(4) Projected Cash Flow Analysis;

(5) Rates and Charges System – including details of how charges and fees are computed;

(6) Details of Insurance Policy;

(7) Projected passenger and cargo traffic and aircraft movement;

(8) Projected personnel requirement.

(b) The Authority will evaluate the plan and issue a determination of acceptance or refusal.

12.4.1.9 AERODROME OPERATIONS DESIGN AND CONSTRUCTION

(a) Once a determination of no objection approval has been issued by the Authority on a proposed site, the applicant shall submit detailed construction drawings in the form of Airport Layout Plans (ALP) or Airport Master Plans (AMP) as may be required by the Authority for acceptance.

(b) The design of an aerodrome shall provide aerodrome facilities that are suitable for the aircraft intended to operate at the aerodrome.

(c) Aerodrome designs shall be based on the critical aircraft characteristics for which the facility is to be provided.

(d) Architectural and infrastructure-related requirements for the optimum implementation of international civil aviation security measures shall be integrated into the design and construction of new facilities and alterations to existing facilities at an aerodrome.

(e) The design of aerodromes shall take into account land-use and environmental control measures and shall satisfy the requirements of other regulatory agencies.

(f) Human factors shall be considered in all aspect of the aerodrome design.

(g) Specifications for the design of aerodromes and heliports are contained in the Part 12 Vol. I subpart 2 and Part 12 Vol. II subpart 2 respectively.

(h) An applicant shall not commence construction or alteration without approval from the Authority.

(i) During construction, the Authority may request for material and construction data from the applicant. Information on cored samples and laboratory analysis of material properties should be certified by laboratories of competent institutions and other institutions acceptable to the Authority.

(j) Aerodrome Operators shall maintain an up-to-date Airport Master Plan that ensures the safety, utility and efficiency of the airport.

(k) Depending on the type and size of the airport, ALP's shall be updated at least every 10 years. If an ALP is less than 10 years old and there are significant changes in proposed airport expansion not shown on the current ALP, the preparation of a new ALP shall be required.

(l) A new AMP update shall be required where;

(1) an AMP is more than 10 years old and the aerodrome is proposing a project not shown on the ALP or

(2) the current ALP does not meet the existing standards.

12.4.1.10 SUBMISSION OF AIRPORT LAYOUT PLANS

Note : An Airport Layout Plan (ALP) is a planning document for aerodromes. It is designed to show existing conditions, near-term and long-term aerodrome development.

(a) An applicant shall not commence construction or alteration without acceptance of the Airport Layout Plan by the Authority.

(b) The acceptance of the Authority must be obtained before the ALP revision, or modification takes effect;

(c) The aerodrome operator shall not make or allow any alteration in the aerodrome or any of its facilities if the alteration does not comply with the plan the Authority approves, and the Authority is of the opinion that the alteration may affect adversely the safety, utility, or efficiency of the aerodrome.

(d) The ALP must be completed to the requirements of this Part. The Authority will review the ALP. If the submittal is incomplete or determined to be not acceptable, it will be returned without comment by the Authority for completion and re-submittal.

(e) The aerodrome operator shall submit a minimum of two signed copies of the ALP to the authority. ALP's shall be signed by the aerodrome operator's consultant or representative that prepared the plans and the aerodrome operator.

(f) ALP's shall be submitted on (36" by 48") sized plan sheets. An electronic copy of the signed ALP shall also be submitted. The electronic copy shall be a computer aided design (CAD) file with all applicable reference files needed to reproduce the hard copy sheets as submitted. If an ALP is being updated that has been previously hand scribed, the aerodrome shall update the ALP into a CAD-based drawing.

(g) A complete copy of the Aerodrome Layout Plan Package submitted to the Authority shall include a narrative report.

12.4.1.11 EVALUATION OF AIRPORT LAYOUT PLANS BY THE AUTHORITY

(a) The ALP proposal shall be evaluated with the objective of:

(1) ensuring a safe and efficient use of the airspace by aircraft;

(2) determining the impact on instrument procedures and ensuring safe navigation of aircraft under instrument flight rules;

(3) ensuring that the obstacle limitation surfaces and PANS-OPS surfaces are not infringed;

(4) conducting electromagnetic studies to evaluate the effect of existing and/or proposed objects will have upon air navigation and communication facilities;

(5) Reviewing and evaluating line-of-sight studies on existing and/or proposed objects to determine impact on control tower visibility.

(6) Highlighting frequency management problems;

(7) Reviewing and evaluating the adequacy of terminal facilities taken into account capacity-demand needs for efficient flow of passenger, baggage and aircraft traffic.

(8) Ensuring that architectural and infrastructure-related requirements for the optimum implementation of international civil aviation security measures are integrated into the design for new facilities and alterations to existing facilities at an aerodrome.

(b) The document will be sent to the coordinating Directorate who will circulate to the appropriate departments for review to ensure compliance with Aviation Security Regulations and the National Aviation Security Programme requirements.

(c) The consultation on security implications of the proposed aerodrome construction or alteration shall be accomplished by written submission of the construction or alteration project to the Security and Facilitation Department for a formal evaluation. The Security and Facilitation Department may, if the situation warrants, extend the consultation to the aerodrome security and facilitation committee and any other State security body for additional submissions and comments.

12.4.1.12 GENERAL REQUIREMENT FOR AIRPORT LAYOUT PLANS

(a) ALP's shall conform to the requirements of subpart 2 for all aerodromes.

(b) Every sheet shall show the following:

(1) Applicable scale;

(2) Name, Signature and revision blocks completed with signature and date of latest revision;

(3) Existing and ultimate aerodrome development elements;

(4) Map legend depicting existing and ultimate elements with different symbology (Note: Not required on title sheet);

(5) North Arrow.

(c) If the ultimate development is to occur in stages, the ALP must show all phases/stages of construction of the ultimate development in all applicable drawings.

(d) All coordinates shall be in WGS-84 datum and elevations shall be in mean sea level. (see subsection 12.2.1.3)

12.4.1.13 AIRPORT LAYOUT PLANS DRAWING SET

(a) The following sheets are required for all ALP submittals:

(1) Title Sheet

(2) Aerodrome Layout Drawing

(3) Aerodrome Airspace Drawing (obstacles charts)

(4) Inner Portion of the Approach Surface Drawing

(5) Terminal and/or Building Area Drawing

(6) Land Use Drawing

(7) Zoning Map, if applicable

(8) Aerodrome Property Map

(b) Submittals in respect of modification, realignment or alteration work, specified subsection 12.4.1.2 must include all components of the drawing sets given in subsection 12.4.1.13 which will be affected by the realignment, alteration or modification

Narrative Report

Note: The narrative report provides useful information in an understandable format to the aerodrome. It also defines the rationale behind proposed aerodrome improvements facilitating final approval by the Authority.

(a) A narrative report shall accompany the ALP and all ALP revisions. The items included in a narrative report are not limited to, but shall include the following:

(1) Basic aeronautical forecasts;

(2) Justification for proposed aerodrome development projects;

(3) Assessment justifying compliance with obstacle limitation surfaces and PANS-OPS surfaces in line with the requirements of subpart 2;

(4) Structural design details/criteria for runway, taxiway, apron and access roads;

(5) Geometrical design details/criteria for runway, taxiway, apron and other elements of the movement area such as safety areas and strips;

(6) Design details for sizing of terminal building facilities for efficient processing of passenger and baggage;

(7) Development summary for stages of construction for:

0 to 5 years
6 to 10 years
11 to 20 years

(8) Shadow study for towered aerodrome, depicting shadows obscure no portion of the movement area.

Title Sheet

Note: The title sheet provides a quick overview of the aerodrome's location, navigation aids, aircraft reference code, ALP sheet index, and signatures.

(a) Items that shall be shown on a title sheet include the following:

(1) State outline depicting state boundaries. The State that the aerodrome is located in shall be shaded;

(2) Vicinity map – showing immediate area around the aerodrome;

(3) Location map – showing general area of the location of the aerodrome;

(4) Index to sheets;

(5) Wind rose – all weather and Instrument Flight Rules (IFR) weather wind rose;

(6) Wind coverage data table;

(7) Aerodrome data table;

Aerodrome Layout Drawings

Note: The Aerodrome Layout drawing is a detailed, scaled representation of existing and ultimate aerodrome facilities. It provides pertinent dimensions and clearance information pursuant to applicable requirements.

(a) The Aerodrome Layout drawing sheet shall be scaled to show the entire aerodrome facilities.

Aerodrome Airspace Drawings (obstacles charts)

Note: The drawing is intended to show the relationship between the imaginary surfaces and the topographical features. Emphasis is on defining significant objects and elevations that are critical to aerodrome operations.

(a) The aerodrome airspace drawing sheet(s) shall include all applicable obstacle limitation surfaces in Subpart 2. The surfaces shown should be for the ultimate runway lengths.

(b) All obstructions, natural and constructed, within any imaginary surface must be shown in a schedule of obstructions. The schedule should show a reference number for all obstructions shown on the plan and profile drawings.

Inner Portion of the Approach Surface Drawing

Note: The drawing is an easily-readable, scaled detail of the approach surfaces.

(a) A separate sheet shall be provided for the inner portion of the approach surface drawing for each end of each runway. It shall be drawn at a scale to show the approach surface from the ground to at least a height 30 metres above the elevation of the end of the runway. There shall be a plan and profile drawing on each sheet. The approach surface drawing sheets may show other zones as long as they are distinctly labeled and do not impede the clarity of the drawing.

(b) A separate schedule of obstructions shall be included on each sheet for each surface. The schedule of obstructions shall give coordinates for each obstruction and the height above mean seal level. Obstructions shall also be depicted on both the plan and profile drawings.

Terminal/Building Area Drawing

Note: The purpose of this sheet is to depict all buildings and their related infrastructure at aerodromes for reviewing safety and security.

(a) The building area drawing shall show all buildings, existing and planned, aprons with tie down locations depicted, parking areas, fueling facilities, and the building restriction line with elevations/heights. A table shall also be included listing each building's coordinates, function, and elevation. For aerodromes with commercial service, terminal area drawings as well as general aviation (GA) areas shall be shown.

Land Use Drawing

Note: This sheet provides details for current and future uses of property within, and surrounding the aerodrome boundaries. It also serves as a planning tool for communities to ensure that growth in the area around the aerodrome will be compatible in use and not impede future aeronautical expansion.

(a) The land use map shall show existing, as well as recommended land uses for all properties within the ultimate aerodrome boundary.

Local Authority Zoning Map

Note: The zoning map will only be required if the local zoning authority (the appropriate responsible for zoning) has not produced a zoning ordinance map covering lands around the airport based on an applicable zoning ordinance. The purpose of the zoning map is to replicate the information on the zoning ordinance map. It may be utilized by the aerodrome operator as well as the local zoning authority (the appropriate responsible for zoning), for use in exhibits for zoning ordinances, planning, and issuing permits for development around existing and proposed aerodrome designs.

(a) The zoning map shall be constructed at a scale that allows for the depiction of the aerodrome airside (existing and ultimate). The map shall show all the existing property zoning in the area (agricultural, residential, commercial, etc.), as well as all appurtenant topographical data, including waterways, man-made structures, and significant contours.

(b) If available it is recommended that an aerial photo be used as a background for this mapping.

Aerodrome Property Map

Note: This sheet serves an inventory of existing and future land/property rights owned by the aerodrome.

(a) The aerodrome property map shall show all parcels within the aerodrome property as well as any future parcels to be purchased. Parcels shall be clearly defined with parcel numbers and parcel flagging. Existing and ultimate property lines shall be clearly defined. A property table shall be included which indicates parcel owners, size and date of purchase.

12.4.1.14 APPROVAL

Note 1: Conditional approval is given for ALPs where the aerodrome operator has not submitted an environmental impact assessment approval letter, security clearance, town planning approval and Aerodrome Operations and Maintenance Sustainability Plan acceptable to the Authority. Unconditional approval is given only when the other approvals have been received.

(a) The ALP drawing will be stamped and signed indicating conditional or unconditional approval.

Note 2: At least two sets of the ALP need original signatures: one for the Authority and one for the aerodrome operator.

(b) The Authority will approve the Aerodrome Layout Plan after all identified non-compliances are corrected.

12.4.1.15 NOTICE OF COMPLETION

(a) Within 15 days of completion of any aerodrome project covered by this part, the applicant shall notify the Authority by submission of the approved form.

(b) Upon submission of the approved form the applicant shall not conduct and or authorize any flight operations at the aerodrome until inspections are conducted and a final approval is granted by the Authority.

(c) The applicant shall not operate the aerodrome or navigational facility until the Authority has duly given approval.

12.4.2. OTHER CONSTRUCTION, ALTERATION AND ACTIVITIES THAT MAY AFFECT AERODROMES

Note : Applications received under this subpart provide a basis for: Evaluating the effect of the construction or alteration on operational procedures and proposed operational procedure; Determining the possible hazardous effect of the proposed construction or alteration on air navigation; Determining the requirements for marking and lighting of constructions or alterations, in accordance with Part 12 Subpart 2; Determining other appropriate measures to be applied for continued safety of air navigation; and Charting and other notification to airmen (NOTAM) of the construction or alteration.

12.4.2.1 REQUIREMENTS FOR CONSTRUCTION OR ALTERATIONS

(a) A person who proposes the construction or alteration of a structure, shall apply to the Authority in the form and manner prescribed in subsection 12.4.2.7 if:

(1) Any construction or alteration shall result in an overall height of the structure above ground level as follows:

(i) more than 1.5 meters at its site and within 15km radius of an existing or proposed aerodrome; or

(ii) 1.5 meters or more at its site beyond 15km radius of an existing or proposed aerodrome.

Note: 1nm=6076ft, or 1853m

(2) Any construction or alteration of greater height than any obstacle limitation surfaces prescribed in Subpart 2

(3) Any highway, railroad, or other traverse way for mobile objects, of a height which, if adjusted upward by 5 meters for any highway where over crossings are designed for a minimum of 5 meters vertical distance, 4 meters for any other public roadway, 3 meters or the height of the highest mobile object that would normally traverse the road, whichever is greater, for a private road, 7 meters for a railroad and for any other traverse way not previously mentioned, an amount equal to the height of the highest mobile object that would normally traverse it, would exceed a standard of paragraph 12.4.2.1 (a) (1) & (2)

(4) The object, construction or alteration would be in an instrument approach area.

(5) The object would be on designated low-level flying routes or close to major highways

(6) The object is located within an IFR en-route obstacle clearance area, including evaluated routes on en- route and area charts but excluding charted routes as published in the AIP instrument flight guide, and would necessitate an increase in an existing or planned minimum obstacle clearance altitude; or

(7) The object exceeds the general tree height in the area by 18 m and is located in an area of low level aerial activity or other low flying activity, or in a low flying zone or low-level route.

(8) Any object, construction or alteration would be on any of the following airports;

(i) an airport that is available for public use.

(ii) an airport under construction, which is the subject of an application or proposal on file with the Authority at the time of application.

(9) A person who proposes construction or alteration that is the subject of an application under paragraph 12.4.2.1(a), and is advised by the

Authority that a supplemental notice is required, shall submit that notice on a prescribed form, to be received by the Authority at least 30 working days before the start of the construction or alteration.

(10) A person who undertakes construction or alteration that is the subject of an Application under paragraph 12.4.2.1(a) shall, within five (5) days after that construction or alteration reaches its greatest height submit a supplemental notice to the Authority, or upon request of the Authority that the submission of the form is required.

(11) Any person who fails to notify the Authority of the proposed construction or alteration commits an offence and shall be liable to sanctions as specified in schedule of sanctions in Part 1.

(12) The filing of an Application with the Authority does not relieve the Applicant from compliance with laws, ordinances or regulations of any other governmental entity.

12.4.2.2 NOTICE OF USE OF A STRUCTURE DISCHARGING EFFLUX, A LIGHT OR A LASER

(a) A person proposing to use a structure which may discharge efflux shall apply for approval from the Authority in accordance with subsection 12.4.2.6 if:

(1) the structure may discharge efflux at a velocity in excess of 4.3m per second through an obstacle limitation surface of an aerodrome; or

(2) the structure may discharge efflux at a velocity in excess of 4.3 m per second higher than 60 m above ground level.

(b) A person proposing to operate a light or laser within 18500 meters of an aerodrome reference point and below 3000 meters Above Ground Level (AGL) shall apply for approval from the Authority in accordance with subsection 12.4.2.6 if:

(1) its glare may affect a pilot's vision or the light or laser is liable to endanger aircraft; or

(2) the laser would produce exposures in navigable airspace exceeding the maximum permissible exposure defined for that Laser in the manufacturer's manual; or

(3) it is likely to endanger aircraft by being mistaken for—

(i) a light or part of a system of lights established or approved for display at or near an aerodrome; or

(ii) a light marking a hazard in navigable airspace.

(c) The use of lasers is an obstruction to air navigation if their use will produce exposures in navigable airspace exceeding the maximum permissible exposure defined for that zone in subpart 2.

12.4.2.3 NOTICE OF USE OF WEAPON

(a) The approval of the Authority shall be required in accordance with subsection 12.4.2.6 where a person proposes to use a weapon that fires or launches a projectile that has a trajectory higher than:

(1) 45 m if within 10000m from the aerodrome reference point; or

(2) 120m if more than 15000m from the aerodrome reference point.

(b) Any appropriate authority proposing to allow the use of weapons that will fire or launch a projectile that will have a trajectory higher than 45 m within 15000m from aerodrome reference point shall notify the Authority of the proposal.

(c) The use of weapons is an obstruction to air navigation if an analysis discloses that their use will constitute a hazard in navigable airspace.

12.4.2.4 NOTICE OF USE OF PYROTECHNICS

(a) The approval of the Authority will be required in accordance with subsection 12.4.2.6 where a person proposes to stage pyrotechnics display that will involve the firing or launching of a projectile that will have a trajectory higher than:

(1) 45 m if within 10000m from the aerodrome reference point; or

(2) 120m if more than 15000m from the aerodrome reference point.

(b) Pyrotechnics displays that will involve the firing or launching of a projectile that will have a trajectory higher than 60 m are prohibited within 15000m from an aerodrome reference point.

(c) The use of pyrotechnics is an obstruction to air navigation if an analysis discloses that their use will constitute a hazard in navigable airspace.

12.4.2.5 NOTICE OF ACQUISITION OF AERODROME SERVICE EQUIPMENT

(a) In accordance with subsection 12.4.2.6 where a person proposes to procure or acquire any one of the following aerodrome service equipment the advice of the Authority may be sought:

(1) Rescue and Fire Fighting Vehicle;

(2) Friction Measuring Equipment

(3) Disabled Aircraft Removal Equipment

(4) Airfield Lighting Control Equipment

(5) Photometric Equipment

(6) Bird/Wildlife dispersal equipment like Radar Dispersal, Pyrotechnic e.t.c

(7) Any other equipment to be utilized in the provision of emergency services or other safety enhancing and risk mitigation activities as may be determined by the Authority.

12.4.2.6 FORM AND TIME OF NOTICE AND NOTICE REQUIREMENTS

(a) Each person required to notify the Authority under subsection 12.4.2.1 shall complete the appropriate application form and submit it to the Authority at least 90 working days prior to the proposed date of commencement of construction, alteration, use or procurement. However, a notice relating to proposed construction or alteration that is subject to the licensing requirements of the Nigeria Communication Commission (NCC) may be sent to the Authority at the same time the application for construction is filed with the NCC. The notice may be filed with the Authority prior to filing with the NCC

(b) In the case of an emergency involving essential public services, public health, or public safety that requires immediate construction or alteration of a structure, or use of structure, lights, lasers, weapons, or pyrotechnics or acquisition of an equipment the prescribed notice requirement does not apply and the notice may be sent by telephone, telefax, or other expeditious means, with the appropriate form submitted to the Authority within 5 days thereafter.

(c) Notwithstanding the provisions of 12.4.2.6(b) above, where the construction or alteration involves a mast, tower or some other structure as may be specified by the Authority, prior approval shall be obtained from the Authority before the construction or alteration commences.

(d) A person proposing to use lights, lasers, weapons, or pyrotechnics under subsections 12.4.2.2, 12.4.2.3 and 12.4.2.4 shall complete the appropriate form and submit it to the Authority at least 14 working days prior to the proposed commencement of its use.

(e) A person who is required to notify the Authority by paragraph 12.4.2.6(a) or 12.4.2.6(b), or both, shall send a notice of progress of construction or alteration, on the form prescribed for this purpose to the Authority.

(f) A person proposing to procure an aerodrome service equipment under subsections 12.4.2.5, shall notify by letter to the Authority at least 60 working days prior to the proposed commencement of the acquisition.

12.4.2.7 ADDITIONAL NOTICE REQUIREMENTS

(a) An Applicant or person who is required to give notice under subsections 12.4.2.2, 12.4.2.3, 12.4.2.4 and 12.4.2.5 shall, if and when required by the Authority, notify the Authority in writing of the actual commencement date of the construction, alteration, use or acquisition as applicable.

(b) A person who is required to give notice under subsection 12.4.2.1 shall notify the Authority, that the construction or alteration has reached the approved height within 5 days of it doing so.

(c) The notice required by paragraph 12.4.2.7(b), when the structure reaches its greatest height, shall include a registered surveyor's determination of structure height and position and proof of compliance with marking and lighting requirements as determined by the Authority.

(d) A person who abandons a construction or alteration project that is the subject of an application under this subpart shall notify the Authority in writing within 30 days after the project is abandoned.

(e) A person who dismantles, removes or allows the destruction of a structure that is the subject of an application or approval under this Part shall immediately notify the Authority in writing after the construction or alteration is removed, dismantled or destroyed.

12.4.2.8 ADDITIONAL NOTICE REQUIREMENTS – AERODROME SERVICE EQUIPMENT

(a) In submitting the notice of acquisition of major Aerodrome Services Equipment under subsection 12.4.2.5, the letter must be accompanied with the following:

(1) Equipment Acquisition plan: The plan shall detail:

(i) The specification of the equipment to be procured, its operating and performance characteristics

(ii) A list of the types of similar equipment, if any, currently in use at the aerodrome, and the names of the manufacturers, make, model, age and condition of the equipment, whether serviceable or unserviceable

(iii) Arrangements with the manufacturers in respect of training to be provided to operating and maintenance personnel,

(iv) The names, number and job description of operating and maintenance personnel to be trained

(v) Arrangements with the manufacturers in respect of repairs in the event of premature unserviceability of the equipment or premature failure of any component parts.

Note: Failure of any component part of the equipment in the first year of its acquisition will be deemed a premature failure.

(vi) Minimum number and type of initial spares to accompany the equipment during procurement

(2) A person who is required to notify the Authority by subsection 12.4.2.5, shall send to the Authority the signed procurement agreement with the manufacturers covering the terms in respect of the items listed under 12.4.2.8(a)(1)(i) - (vi).

12.4.2.9 ACKNOWLEDGEMENT AND DETERMINATION

(a) The Authority will acknowledge in writing the receipt of each application or notice submitted under subsections 12.4.2.2, 12.4.2.3, 12.4.2.4 and 12.4.2.5.

(b) If the construction or alteration proposed in an application or notice is one for which lighting or marking is prescribed, the acknowledgment will contain a statement to that effect and information on how the structure should be marked and lighted in accordance with the criteria established in the Subpart 2

(c) Subject to a determination made under subsection 12.4.2.11, the Authority will issue a determination in writing which states that an evaluation of the proposed construction or alteration has resulted in a determination that the construction or alteration:

(1) Would not exceed any specification of section 12.4.2, and would not be a hazard to air navigation; or

(2) Would exceed a specification of section 12.4.2, but would not be a hazard to air navigation; or

(3) Would exceed a specification of section 12.4.2, and would be a hazard to air navigation; or

(4) Would exceed a specification of section 12.4.2 and requires further aeronautical study, subject to payment of a prescribed aeronautical study fee to determine whether it would be a hazard to air navigation;

(d) An Applicant may request, within 30 days of receiving a determination under paragraph 12.4.2.9(c)(4) above, that further study be conducted subject to the payment of the prescribed fee. Pending completion of any further study, it is presumed the construction or alteration would be a hazard to air navigation.

12.4.2.10 AERONAUTICAL STUDY OF ON THE EFFECT OF PROPOSED CONSTRUCTION ON NAVIGABLE AIRSPACE

(a) The Authority will conduct an aeronautical study to determine the impact of the following on aeronautical operations, procedures, and the safety of flight:

(1) a proposed structure;

(2) an existing structure that has not yet been evaluated by the Authority; or

(3) an alteration of an existing structure.

(b) The Aeronautical studies will evaluate:

(1) The impact on present and future arrival, departure, and en route procedures for aircraft operating under visual flight rules and any possible changes in those operations and procedures that would eliminate or alleviate the conflicting demands;

(2) The impact on present and future arrival, departure, and en route procedures for aircraft operating under instrument flight rules and any possible changes in those operations and procedures that would eliminate or alleviate the conflicting demands;

(3) The impact on existing and planned public use aerodromes;

(4) Airport traffic capacity of existing public use aerodrome and public use aerodrome development plans received before the issuance of the final determination;

(5) Minimum obstacle clearance altitudes, minimum instrument flight rules altitudes, approved or planned instrument approach procedures, and departure procedures;

(6) The potential effect on operations of ATC radar, direction finders, ATC tower line-of- sight visibility, and physical or electromagnetic effects on air navigation, communication facilities, and other surveillance systems;

(7) The aeronautical effects resulting from the cumulative impact of a proposed construction or alteration of a structure when combined with the effects of other existing or proposed structures and any possible changes in the proposal that would eliminate or alleviate the conflicting demands.

(8) Such other factors as will be determined by the Authority

(c) An aeronautical study will be conducted by the Authority:

(1) Upon the request of an Applicant seeking approval for any construction or alteration for which an Application is submitted under section 12.4.2 of this part, unless that construction or alteration would be located within an antenna farm area established in accordance with subsection 12.4.2.17; or

(2) Whenever the Authority determines it appropriate.

(d) The Authority may terminate the study if an Applicant withdraws its application for the proposed construction or alteration or revises it to such an extent that it is no longer considered as an obstruction, or if no further aeronautical study is necessary.

(e) The Authority will evaluate the proposal under subsection 12.4.2.5 to acquire aerodrome service equipment and identify whether or not :

(1) The equipment is of the specifications acceptable to the Authority

(2) The equipment can optimally and sustainably support safe operation at the airport, or

(3) The equipment will satisfactorily control and mitigate risk associated with aerodrome and aircraft operations

12.4.2.11 DETERMINATION UNDER THIS SUBPART

(a) The Authority will prepare a report of the aeronautical study including the determinations made.

(b) The determinations made by the Authority will be based on the findings and will identify the following:

(1) The effects on VFR/IFR aeronautical departure/arrival operations, air traffic procedures, minimum flight altitudes, and existing, planned, or airport proposals of which the Authority has received actual notice prior to issuance of a final determination.

(2) The extent of the physical and/or electromagnetic effect on the operation of existing or proposed air navigation facilities, communication aids, or surveillance systems.

(c) The Authority may make any of the possible determinations based on the outcome of the evaluation:

(1) A No Objection or a Determination of No Hazard to Air Navigation will be issued when the aeronautical study concludes that the proposed construction or alteration will not exceed an obstruction standard and would not have a substantial aeronautical impact to air navigation

(2) A No Objection or a Determination of No Hazard to Air Navigation will be issued when the aeronautical study concludes that the proposed construction or alteration will exceed an obstruction standard but would not have a substantial aeronautical impact to air navigation

(3) A Determination of No Hazard to Air Navigation subject to certain stated conditions that may include:

(i) Conditional provisions of a Determination.

(ii) Limitations necessary to minimize potential problems, such as the use of temporary construction equipment.

(iii) Supplemental notice requirements, when required.

(iv) Marking, markers and lighting recommendations, as appropriate.

(4) A determination of Hazard to air navigation will be issued when the aeronautical study concludes that the proposed construction or alteration will exceed an obstruction standard and would have a substantial aeronautical impact.

(5) The Authority will only issue an Aviation Height Clearance to Applicants when a determination of “No Hazard to Air Navigation” has been made.

(6) A determination issued under this subpart will be final unless a petition for a review is received by the Authority within 30 days of issuance. The

determination will not become final till a final decision is taken on the petition.

(7) Unless a determination void date is specified or otherwise extended, revised, or terminated, each Aviation Height Clearance Certificate issued under this subpart expires 12 months after its effective date, regardless of whether the proposed construction or alteration has been commenced, or on the date the proposed construction or alteration is abandoned, whichever is earlier.

(8) A determination that has become final regarding the use of balloons, lights, lasers, weapons, or pyrotechnics, expires upon completion of use as indicated on the notice or application form or the day after the date of use granted by the Authority, whichever is earlier.

(9) In the case of the proposal for the acquisition of an Aerodrome Service Equipment, the Authority will issue a non-objectionable determination when the evaluation concludes that the equipment is of acceptable specification and performance characteristics and will satisfactorily provide the aerodrome service for which it is intended.

12.4.2.12 PETITIONS, EXTENSIONS, TERMINATIONS, REVISIONS AND CORRECTIONS

(a) A Petition for the review of a determination shall be submitted within 30 days of the issuance of the determination to the Authority by:

(1) The applicant for approval for any proposed construction or alteration

(2) any person who stated a substantial aeronautical objection to it in an aeronautical study, or

(3) any person who has a substantial aeronautical objection to it but was not given an opportunity to state it.

(b) The petition must contain a full statement of the aeronautical basis upon which it is made.

(c) The Authority will examine each petition and decide whether a review is required. Any review will be based on written materials, including a report of the previous aeronautical study, briefs, and related submissions by any interested party, and other relevant facts, with the Authority affirming, revising, or reversing the determination.

(d) In any case including a case of a determination of no hazard, where the proposed construction or alteration has not been commenced during the applicable period by actual structural work, such as the laying of a foundation, but not including excavation, any interested person may, at least 15 days before the date the final determination expires, petition the Authority to: Revise the determination based on new facts that change the basis on which it was made; or Extend its effective period.

(e) In any case including a final determination made under this subpart or section 12.4.1 and which relates to a proposed construction or alteration that may not be commenced unless an appropriate authority issues an appropriate construction permit, the effective period of each final determination includes:

(f) The time required to apply to such appropriate authority for a construction permit, but not more than 180 days after the effective date of the determination; and

(g) The time necessary for such appropriate authority to process the application except in a case where the authority determines a shorter effective period is required by the circumstances.

(h) If such appropriate authority issues a construction permit, the final determination is effective until the date prescribed for completion of the construction. If such appropriate authority refuses to issue a construction permit, the final determination expires on the date of the refusal.

12.4.2.13 ANNUAL INFORMATION REPORT

(a) Owners of any new or existing telecommunication mast shall submit annually on or before January 31 of each year, to the Authority, a Telecommunication Facility Annual Information Report. The TFAIR shall include the mast owner's name(s), address(es), phone number(s), contact person(s).

(b) The mast owner shall supply the mast height, address, site geographic co-ordinate, and AHC status. The mast owner shall certify that the mast is still being used. This information shall be submitted on a signed form, designated for such use, and shall become evidence of compliance.

12.4.2.14 RENEWAL OF AVIATION HEIGHT CLEARANCE CERTIFICATE

(a) The AHC shall remain in force for a period of One (1) year when it shall be due for renewal unless suspended or cancelled by the Authority. Application for AHC renewal shall be made at least 30days to the expiry date.

12.4.2.15 COMPLIANCE

(a) A person required by 12.4.2.2, 12.4.2.3, 12.4.2.4, or 12.4.2.5 to apply or provide notice to the Authority shall comply with any requirement, condition, or limitation imposed in the issuance of a determination.

(b) The following shall constitute grounds for revocation of Aviation Height Clearance issued under 12.4.2.11 :

(1) The owner of telecommunication mast site, service provider and/or mast owner fails to comply with the requirements of the Permit;

(2) The Permit Holder has failed to comply with the conditions of approval imposed;

(3) The facility has not been properly maintained;

(4) And any other grounds as may be determined by the Authority to be in the public interest.

(c) Any antenna or mast that is not operated for a continuous period of twelve (12) months shall be considered abandoned. In such circumstances, the following shall apply:

(1) The owner of such site, antenna or mast and the property owner upon which the site is located shall remove said antenna and/or mast within thirty (30) days of receipt of notice from the Authority of such abandonment. If satisfactory removal does not occur within the specified thirty (30) days, the Authority may order removal at cost.

(2) The Holder of an AHC for a telecommunications mast shall notify the Authority within 30 days of cessation of use of the mast.

12.4.2.16 MAINTENANCE

(a) The surface of a structure for which an AHC has been issued shall be repainted when the colour changes noticeably or its effectiveness is reduced by scaling, oxidation, chipping, or layers of contamination. Markers shall be replaced when faded or otherwise deteriorated and obstruction warning lights shall be closely monitored by visual or automatic means to ensure that burnt lights are replaced without delay.

12.4.2.17 ESTABLISHMENT OF ANTENNA FARM AREA

Note: It is the policy of the Authority to encourage the use of antenna farms and the single structure-multiple antenna concept for radio and television masts whenever possible. In considering proposals for establishing antenna farm areas, the Authority will consider as far as possible the revision of aeronautical procedures and operations to accommodate antenna structures that will fulfil broadcasting requirements.

(a) Antenna farm areas in which antenna structures may be grouped to localize their effect on the use of navigable airspace may be established.

NIGERIA CIVIL AVIATION REGULATIONS

PART 12 VOLUME I — IMPLEMENTING STANDARDS

APRIL 2023

IMPLEMENTING STANDARDS (IS)

IS: 12.1.3.2– PARTICULARS TO BE INCLUDED IN AN AERODROME MANUAL

(a) GENERAL

General information, including the following:

(1) Purpose and scope of the Aerodrome Manual;

(2) The legal requirement for an Aerodrome Certificate and an Aerodrome Manual as prescribed in the national regulations

(3) conditions for use of the aerodrome – a statement to indicate that the aerodrome shall at all times when it is available for the take-off and landing of aircraft, be so available to all persons on equal terms and conditions;

(4) The available aeronautical information services and procedures for timely and accurate effecting promulgation of AIP Amendment, AIP Supplement or NOTAM

(5) The system for recording aircraft movements;

(6) Obligations of the aerodrome operator; and

(7) Coordination policy or letters of agreement between ATS and Aerodrome operator on areas of coordination such as Aerodrome Emergency planning, Aerodrome condition reporting, Aerodrome vehicle Operations etc.

(8) A list of all deviations from the regulatory provisions and operating restrictions authorized by the Authority together with their validity and references to the related documents

(9) A description of the intended operations, including:

(i) the critical aeroplanes the aerodrome is intended to serve;

(ii) the category of runway(s) provided (non-instrument, instrument including non-precision and precision);

(iii) the different runways and their associated levels of service;

(iv) the nature of aviation activities (commercial, passenger, air transport, cargo, aerial work, general aviation);

(v) the type of traffic permitted to use the aerodrome (international/national, IFR/VFR, scheduled/nonscheduled); and

(vi) the minimum RVR that aerodrome operations can be permitted;

(b) PARTICULARS OF THE AERODROME SITE

General information, including the following:

(1) A plan of the aerodrome showing the main aerodrome facilities for the operation of the aerodrome including, particularly, the location of each wind direction indicator;

(2) A plan of the aerodrome showing the aerodrome boundaries;

(3) A plan showing the distance of the aerodrome from the city or other populous area, and the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome; and

(4) Particulars of the title of the aerodrome site. If the boundaries of the aerodrome are not defined in the title documents particulars of the title to, or interest in, the property on which the aerodrome is located and a plan showing the boundaries and position of the aerodrome.

(5) Procedures for ensuring that the plans are up-to-date and accurate

(c) PARTICULARS OF THE AERODROME REQUIRED TO BE REPORTED TO THE AERONAUTICAL INFORMATION SERVICE (AIS)

(1) General Information

(i) The name of the aerodrome;

(ii) The location of the aerodrome;

(iii) The geographical coordinates of the aerodrome reference point determine in terms of the World Geodetic System – 1984 (WGS-84) reference datum;

(iv) The aerodrome elevation and geoid undulation;

(v) The elevation of each threshold and geoid undulation, the elevation of the runway end and any significant high and low points along the runway, and the highest elevation of the touchdown zone of a precision approach runway;

(vi) The aerodrome reference temperature;

(vii) Details of the aerodrome beacon; and

(viii) The name of the aerodrome operator and the address and telephone number at which the aerodrome operator may be contacted at all times.

(2) Aerodrome Dimensions And Related Information

General information, including the following:

(i) Runway – true bearing, designation number, length, width, displaced threshold location, slope, surface type, type of runway and, for a precision approach runway, the existence of an obstacle free zone;

(ii) Length, width and surface type of strip, runway end safety areas stop- ways;

(iii) Length, width and surface type of taxiways;

(iv) Apron surface type and aircraft stands;

(v) Clearway length and ground profile;

(vi) visual aids for approach procedures, *viz*, approach lighting type and visual approach slope indicator system (PAPI/APAPI and T-VASIS/AT- VASIS); marking and lighting of runways, taxiways, and aprons; other visual guidance and control aids on taxiways (including runway holding positions, intermediate holding positions and stop bars) and aprons, location and type of visual docking guidance system; availability of standby power for lighting.

(vii) The location and radio frequency of VOR aerodrome checkpoints;

(viii) The location and designation of standard taxi routes;

(ix) The geographical coordinates of each threshold;

(x) The geographical coordinates of appropriate taxiway centre line points;

(xi) The geographical coordinates of each aircraft stand;

(xii) The geographical coordinates and the top elevation of significant obstacles in the approach and take-off areas, in the circling area and in the vicinity of the aerodrome. (This information may best be shown in the form of charts such as those required for the preparation of aeronautical information publications, as specified in Annexes 4 and 15 to the Convention);

(xiii) Pavement surface type and bearing strength using the Aircraft Classification Number – Pavement Classification Number (ACN-PCN) method;

(xiv) One or more pre-flight altimeter check locations established on and apron and their elevation;

(xv) Declared distances: take-off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), landing distance available (LDA);

(xvi) Disabled aircraft removal plan: the telephone/telex/facsimile numbers and email address of the aerodrome coordinator for the removal of a disabled aircraft on or adjacent to the movement area, information on the capability to remove a disabled aircraft, expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove; and

(xvii) Rescue and fire-fighting: the level of protection provided, expressed in terms of the category of the rescue and fire-fighting services, which should be in accordance with the longest aeroplane normally using the aerodrome and the type and amounts of extinguishing agents normally available at the aerodrome.

Note – The accuracy of the information in Part 3 is critical to aircraft safety. Information requiring engineering survey and assessment should be gathered or verified by qualified technical persons.

(d) PARTICULARS OF THE AERODROME OPERATING PROCEDURES AND SAFETY MEASURES

(1) Aerodrome Reporting

Particulars of the procedures for reporting any changes to the aerodrome information set out in the AIP and procedures for requesting the issue of NOTAMS, including the following:

(i) Arrangement for reporting any changes to the Authority and recording the reporting of changes during and outside the normal hours of aerodrome operations;

(ii) The names and roles of persons responsible for notifying the changes, and their telephone numbers during and outside the normal hours of aerodrome operations; and

(iii) The address and telephone numbers, as provided by the Authority, of the place where changes are to be reported to the Authority.

(2) Access To The Aerodrome Movement Area

Particulars of the procedures that have been developed and are to be followed in coordination with the agency responsible for preventing unlawful interferences in

Civil aviation at the aerodrome and for preventing unauthorised entry of persons, vehicles, equipment, animals or other things into the movement area, including the following:

(i) The role of the aerodrome operator, the aircraft operator, aerodrome fixed base operators, the aerodrome security entity, the Authority and other government departments, as applicable; and

(ii) The names and roles of the personnel responsible for controlling access to the aerodrome, and the telephone numbers for contacting them during and after working hours.

(3) Aerodrome Emergency Plan

Particulars of the aerodrome emergency plan, including the following:

(i) Pans for dealing with emergencies occurring at the aerodrome or in its vicinity, including the malfunction of aircraft in flight; structural fires; sabotage, including bomb threats (aircraft or structure); unlawful seizure of aircraft; and incidents on the airport covering "during the emergency" and "after the emergency" considerations;

(ii) Details of test for aerodrome facilities and equipment to be used in emergencies, including the frequency of those tests;

(iii) Details of exercises to test emergency plans, including the frequency of those exercises;

(iv) Details regarding the observance of human factor principles in developing the plan;

(v) Where the aerodrome is close to water, swampy areas or difficult terrain, availability and coordination with specialist rescue services;

(vi) Details regarding the establishment and manning of Emergency Operations Centre, Command Post and for communication between them;

(vii) a list of organizations, agencies and persons of authority, both on- and off airport, for site roles; their telephone and facsimile numbers, e-mail and SITA addresses and the radio frequencies of their offices; description of roles and responsibilities for each type of emergency;

(viii) The establishment of an aerodrome emergency committee to organize training and other preparations for dealing with emergencies; and

(ix) Procedure for the appointment of an on-scene commander for the overall emergency operation;

(x) Reporting mechanism in the event of an emergency;

(xi) Arrangement for personnel training and preparation for dealing with emergencies.

(4) Rescue And Fire-Fighting

Particulars of the facilities, equipment, personnel and procedures for meeting the rescue and fire-fighting requirements:

(i) Policy statement on the RFF categories to be provided.

(ii) Where the senior aerodrome fire officer or designated fire watch officers have specific safety accountabilities, these should be included in the relevant Section of the aerodrome manual.

(iii) Policy and procedures indicating how depletion of the RFF service is to be managed. This should include the extent to which operations are to be restricted, how pilots are to be notified and the maximum duration of any depletion.

(iv) At aerodromes where a higher category of RFF is available by prior arrangement, the aerodrome manual should clearly state the actions necessary to upgrade the facility. Where necessary, this should include actions to be taken by other departments.

(v) The aerodrome operator's objectives for each RFF category provided should be defined, including a brief description of:

(A) amounts of extinguishing agents provided;

(B) discharge rates;

(C) number of foam-producing appliances;

(D) manning levels;

(E) levels of supervision;

(F) number of each type of rescue equipment and their location;

(G) number of sets of protective clothing and allotment method;

(H) number and types of breathing apparatus;

(vi) Procedures for:

(A) monitoring the aeroplane movement areas for the purpose of alerting RFF personnel;

(B) indicating how the adequacy of the response time capability of the RFF services throughout their functions and locations is monitored and maintained; and details regarding communication and alerting facilities to support the achie6ng of response time.

(C) indicating how RFF personnel engaged in extraneous duties are managed to ensure that response capability is not affected.

(vii) Where the aerodrome provides specialist equipment such as rescue craft, emergency tenders, hose layers, and appliances with aerial capability, details should be included in the aerodrome manual. Procedures to be followed if these facilities are temporarily unavailable should also be included.

(viii) Where the aerodrome is reliant upon other organizations to provide equipment which is essential for ensuring the safe operation of the aerodrome (perhaps water rescue), policies or letters of agreement should be included in the aerodrome manual. Where necessary, contingency plans in the event of non-availability should be described.

(ix) A statement describing the process by which aerodrome operators ensure the initial and continued competence of their RFF personnel, including the following:

(A) realistic fuel fire training;

(B) breathing apparatus training in heat and smoke;

(C) first aid;

(D) low visibility procedures (LVP);

(E) any legal requirements;

(F) health and safety policy with regard to training of personnel in the use of respiratory protection equipment and personal protection equipment.

(x) Procedures indicating how accidents in the immediate vicinity of the aerodrome are to be accessed. Where difficult environs exist, the aerodrome manual should indicate how these are to be accessed.

(xi) Where local authorities or the aerodrome operator expects the RFF facility to respond to domestic fires or special services, procedures for managing their impact upon normal aeroplane RFF responses should be included.

(xii) Where the aerodrome operator expects the RFF facility to respond to aeroplane accidents landside, the policy should be clearly described, including procedures to manage the effects on continued aeroplane operations.

(xiii) The availability of additional water supplies should be described.

(xiv) Aerodrome operator's arrangements for ensuring the adequacy of responses in abnormal conditions, i.e. LVP.

(5) Inspection Of The Aerodrome Movement Area By The Aerodrome Operator

Particulars of the procedures for the inspection of the aerodrome movement area including the following:

(i) The names and roles of persons responsible for carrying out inspections and their telephone number during and after working hours

(ii) Routine aerodrome inspections, including lighting inspections, and reporting, including the nature and frequency of these inspections.

(iii) Inspecting the apron, runways and taxiways following a report of debris on the movement area, an abandoned take-off due to engine, tire or wheel failure, or any incident likely to result in debris being left in a hazardous position.

(iv) Sweeping of runways, taxiways and aprons.

(v) Measurement and promulgation of water, slush and other contaminants including depths on runways and taxiways.

(vi) Assessment and promulgation of runway surface conditions:

(A) details of inspection intervals and times;

(B) completion and effective use of an inspection checklist;

(C) arrangements and methods for carrying out inspections on FOD, lighting, pavement surface, grassing;

(D) arrangements for reporting the results of inspections and for follow-up action;

(E) arrangements and means of communication with air traffic control during an inspection;

(F) arrangements for keeping an inspection logbook and the location of the logbook.

(vii) Procedures to report the presence of water on runway; and

(viii) Procedures to report slippery runway condition.

(6) Visual Aids And Aerodrome Electrical Systems

Particulars of the procedures for the inspection and maintenance of visual aids and electrical including the following:

(i) The names and roles of the persons responsible for the inspection and maintenance of the electrical system, airfield lighting, markings and airfield signs, and the telephone numbers for contacting those persons during and after working hours.

(ii) A full description of all visual aids available on each approach, runway, taxiway and apron, including signs, markings and lighting including visual docking guidance system.

(iii) Description of electrical system and power supply.

(iv) Marking, signage, lighting and SMGCS plan.

(v) Procedures for operational use and brilliancy settings of the lighting system.

(vi) Standby and emergency power arrangements, including operating procedures both in LVP and during main power failure situations.

(vii) If applicable, the particulars of any other method of dealing with partial or total system failure and of monitoring lighting systems reliability;

(viii) Procedures for routine inspection and photometric testing of approach lights, runway lights, VASIS and PAPI

(ix) The location of and responsibility for obstacle lighting on and off the aerodrome

(x) Procedures for recording inspection and maintenance of visual aids and actions to be taken in the event of failures.

(xi) Procedure to monitor or control non-aeronautical ground lights which could present a hazard to aircraft safety

(xii) The control of work, including trenching and agricultural activity, which may affect the safety of the aeroplane.

(xiii) Procedure to prevent aircraft from entering permanently closed runways and taxiways and to mark permanent and temporary movement area closures

(xiv) Arrangements for carrying out routine maintenance and emergency mtce, including description of inspection schedule, types of inspection and definition of maintenance performance level objectives for visual aids as part of preventive maintenance programme

(xv) Process to show that the Surface Movement guidance and Control System is appropriate to the traffic density and visibility conditions at the aerodromes

(7) Maintenance Of Movement Area

Particulars of the facilities and procedures for the maintenance of the movement area including:

(i) Names and telephone numbers and roles of persons for maintenance of movement area, pavement and drainage

(ii) arrangement for maintaining the paved areas, including FOD management for movement areas, rubber removal programme and friction assessment and oil and grease contaminant removal programme for aprons

(iii) Arrangements for maintaining the unpaved runways and taxiways;

(iv) Arrangements for maintaining the runway and taxiway strips; and

(v) Arrangements for the maintenance of aerodrome drainage.

(vi) arrangements for maintaining the visual aids, including the measurement of intensity, beam spread and orientation of lights;

(vii) Arrangements for maintaining the obstacle lighting;

(viii) Arrangements for reporting and action taken in the event of failure or unsafe occurrence.

(8) Aerodrome Work Safety

Particulars of the procedures for planning and carrying out construction and maintenance work safely (including work that may have to be carried out at short notice) on or in the vicinity of the movement area which may extend above an obstacle limitation surface, including the following:

(i) Arrangements for communicating with the aerodrome air traffic control unit and other related parties during the progress of such work;

(ii) Procedure for closing and reopening work areas

(iii) Work notification and work permit process

(iv) The names, telephone numbers and roles of the persons and organizations responsible for planning and carrying out the work, and arrangements for contacting those persons and organizations at all times;

(v) The names and telephone numbers, during and after working hours, of the aerodrome fixed-based operators, ground handling agents and aircraft operators who are to be notified of the work.

(vi) A distribution list for work plans, if required.

(vii) Procedure to return a runway to operational status after pavement overlay.

(9) Apron Management

Particulars of the apron management procedures, including the following:

(i) Arrangements between air traffic control and the apron management units, including procedures for transfer of control for arriving and departing aircraft;

(ii) Arrangements for allocating aircraft parking positions, including arrangement for ensuring stand and equipment availability prior to aircraft arrival;

(iii) Arrangements for initiating engine start and ensuring clearance of aircraft push-back; and

(iv) Marshalling service.

(10) Apron Safety Management

Procedures to ensure apron safety, including:

(i) Means and procedures for jet blasts protection;

(ii) Arrangement for safety precautions during aeroplane refueling operations;

(iii) Apron sweeping and apron cleaning;

(iv) Arrangements for reporting incidents and accidents on an apron;

(v) Arrangements for assessing the safety compliance of all personnel working on the apron.

(vi) Arrangement for the use of advanced visual docking systems, if provided

(11) Airside Vehicle Control

Particulars of the procedure for the control of surface vehicles on or in the vicinity of the movement area, including the following:

(i) Details of the application traffic rules (including speed limits and the means of enforcing the rules); and

(ii) Method and criteria for allowing drivers to operate vehicles on the movement area.

(iii) Arrangements and means of communicating with air traffic control.

(iv) Details of the equipment needed in vehicles that operate on the movement area.

(12) Wildlife Hazard Management

Particulars of the procedures to deal with the danger posed to aircraft operations by the presence of bird or wildlife in the aerodrome flight pattern or movement area, including the following:

(i) Arrangements and method for dispersal of bird and other wildlife.

(ii) Measure to discourage birds and other wildlife.

(iii) Arrangements for assessing wildlife hazards.

(iv) Arrangements for implementing wildlife control programmes.

(v) The names and roles of the persons responsible for dealing with wildlife hazards, and their telephone numbers during and after working hours.

(13) Obstacle Control

Particulars setting out the procedures for:

(i) Monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces;

(ii) Controlling new developments in the vicinity of aerodromes; and

(iii) Notifying the Authority of the nature and location of obstacles and any subsequent addition or removal of obstacles for action as necessary, including amendment of the AIS publications.

(iv) Periodic survey and revision of Type A Chart for obstacle;

(14) Removal Of Disabled Aircraft

Particulars of the procedures for removing a disabled aircraft on or adjacent to the movement area, including the following:

(i) the roles of the aerodrome operator and the holder of the aircraft certificate of registration;

(ii) Arrangements for notifying the holder of the certificate of registration;

(iii) Arrangements for liaising with the aerodrome air traffic services; and arrangements for obtaining equipment and personnel to remove the disabled aircraft.

(15) Handling Of Hazardous Materials

Particulars of the procedures for the safe handling and storage of hazardous material on the aerodrome, including the following:

(i) Arrangements for special areas on the aerodrome to be set up for the storage of inflammable liquids (including aviation fuels) and any other hazardous materials; and

(ii) The method to be followed for the delivery, storage, dispensing and handling of hazardous materials.

Note – Hazardous materials include inflammable liquids and solid, corros4e liquids, compressed gases and magnetized or radioactive materials. Arrangements for dealing with the accidental spillage of hazardous materials should be included in the aerodrome emergency plan.

(16) Low-Visibility Operations

Particulars of procedures to be introduced for low-visibility operations, including

(i) Obtaining and disseminating meteorological information, including runway visual range and surface visibility

(ii) Protection of runways during LVP if such operations are permitted.

(iii) The arrangement and rules before, during and after low visibility operations, including applicable rules for vehicles and personnel operating in the movement area and aerodrome works.

(17) Protection Of Sites For Radar And Navigational Aids

Particulars of the procedures for the protection of sites for radar and radio navigational aids located on the aerodrome to ensure that their performance will not be degraded, including the following:

(i) Arrangements for the control of activities in the vicinity of radar and NAVAIDs installations;

(ii) Arrangements for ground maintenance in the vicinity of these installations; and

(iii) Arrangements for the supply and installation of signs warning hazardous microwave radiation.

Note 1 – In writing the procedures for each category, clear and precise information should be included on:

- when, or in what circumstances, an operating procedure is to be activated
- how an operating procedure is to be activated;
- actions to be taken;
- the persons who are to carry out the actions; and
- the equipment necessary for carrying out the actions, and access to such equipment.

Note 2 – If any of the procedures specified above are not relevant or applicable, the reason should be given.

(18) Hazardous Meteorological Conditions

Particulars of the procedures describing the actions that have to be taken and defining the responsibilities and criteria for suspension of operations on the runway for hazardous situations that may occur at the aerodrome such as thunderstorms, strong surface wind and gust sandstorm)

(e) DETAILS OF THE AERODROME ADMINISTRATION AND SAFETY MANAGEMENT SYSTEM

(1) Aerodrome Administration

Particulars of the aerodrome administration, including the following:

(i) An aerodrome organizational chart showing the names and positions of key personnel, including their responsibilities;
(ii) The name, position and telephone number of the person who has overall responsibility for aerodrome safety;
(iii) Aerodrome committees; and
(iv) Particulars of staff training and competency, including the specifications of staff qualifications and experience, training and programme for upgrading of skills provided to staff on safety-related duties, and where necessary, the certification system for testing their competency.

(2) Safety Management System (SMS)

Particulars of the safety management system established for ensuring compliance with all safety requirements and achie6ng continuous improvement in safety performance, the essential features being:

(i) The safety policy, in so far as applicable, on the safety management process and its relation to the operational and maintenance process;

(ii) The structure or organization of the SMS, including staffing and the assignment of individual and group responsibilities for safety issues;

(iii) SMS strategy and planning, such as setting safety performance target, allocating priorities for implementing safety initiatives and providing a framework for controlling the risks to as low a level as is practicable keeping always in view the requirements of the Standards and Recommended Practices in Volume I of Annex 14 to the Convention on International Civil Aviation, and the National Regulations, Rules or Orders.

(iv) SMS implementation, including facilities, methods and procedures for the effective communication of safety messages and the enforcement of safety requirements;

(v) A system for the implementation of, and action on, critical safety areas which require a higher level of safety management integrity (safety measures programmes;

(vi) Measures for safety promotion and accident prevention and a system for risk control involving analysis and handling of accidents, incidents, complaints, defects, faults, discrepancies and failures, and continuing safety monitoring; including the procedures for evaluating the impact of proposed change in physical characteristics, facilities and equipment on the safety of existing operations

(vii) The internal safety audit and review system detailing the systems and programmes for quality control of safety;

(viii) The system for documenting all safety-related aerodrome facilities as well as aerodrome operational and maintenance records, including information on the design and construction of aircraft pavements and aerodrome lighting. The system should enable easy retrieval of record including charts,

(ix) The incorporation and enforcement of safety-related clauses in the contracts for construction work at the aerodrome.

(f) LETTER OF AGREEMENT BETWEEN THE APPLICANT AND DESIGNATED SERVICE PROVIDERS

To ensure safety of aeroplane operations at the aerodrome and in the associated airspace, the applicant will be required to coordinate with designated service providers and arrange for the provision of aeronautical information, air traffic control and aviation security service.

The applicant is therefore required to enter into a technical agreement with the entities or agencies responsible for providing air traffic control, aeronautical information and aviation security services as may be applicable at the aerodrome

In this connection, the applicant should submit to Authority:

(1) A copy of the Letter of Agreement signed between the applicant and the prospective aviation security service provider at the aerodrome (this shall not apply to State owned aerodromes), and a copy of the approved airport security programme detailing the arrangement in place at the airport to ensure optimum implementation of aviation security measures.

(2) A copy of the letter of approval or authorization or reports of assessment conducted on prospective air traffic, aeronautical information, and communication, navigation and surveillance service provider(s), issued by the Authority following its assessment of the facilities, equipment, procedures personnel structure and organization of the service provider, and attesting to the availability of satisfactory level of ATS, AIS and CNS facilities and services at the aerodromes.

(3) A copy of Letter of Agreement signed between the applicant and prospective air traffic service provider at the aerodrome setting out the technical terms under which the services are to be provided (Shall not apply to State owned aerodromes).

(4) A copy of Letter of Agreement signed between the applicant and prospective communication, navigation and surveillance service provider at the aerodrome setting out the technical terms under which the services are to be provided. (Shall not apply to State owned aerodromes).

(5) A copy of the Letter of Agreement signed between the applicant and the prospective aeronautical information service provider at the aerodrome to ensure accurate, up-to-date and timely information of aerodrome related safety condition is provided to aviation service users. (Shall not apply to State owned aerodromes).

IS 12.1.4.9 – RECORDS AND REFERENCE MATERIALS THAT MUST BE KEPT BY THE AERODROME OPERATOR

Item	Safety Records	Retention Period
1	Aircraft Ground Incident Records	Minimum retention periods for these documents and records shall be established by the Aerodrome operator and approved by the Authority
2	Aircraft Pavement Inspection Log and Maintenance Records	
3	Airfield Lighting Inspection Log and Maintenance Records	
4	Aerodrome Engineering Facilities (related to aircraft operations) Maintenance Records.	
5	Apron Control Log	
6	Bird Control Activities Records (Observation and Dispersal)	
7	Safety Audit Records (in conjunction with the implementation of Safety Management System)	
8	Vehicular Accident Records	
9	Airside Inspection Records	
10	NOTAM Origination Records	

LIST OF PUBLICATION

No.	Document
1	ICAO Annex 14, Vol. I
2	ICAO Aerodrome Design Manual (Doc 9157) Part 1 – Runways Part 2 – Taxiways, Aprons and Holding Bays Part 3 – Pavements Part 4 – visuals Aids Part 5 – Electrical Systems Part 6 – Frangibility
3	ICAO Airport Planning Manual (Doc 9184) Part 1 – Master Planning Part 2 – Land Use and Environment Control Part 3 – Guidelines for Consultant/Construction Services

4	ICAO Airport Services Manual (Doc 9137) Part 1 – Rescue and Fire Fighting Part 2 – Pavement Surface Conditions Part 3 – Bird Control and Reduction Part 4 – Fog Dispersal Part 5 – Removal of Disabled Aircraft Part 6 – Control of Obstacles Part 7 – Airport Emergency Planning Part 8 – Airport Operational Services Part 9 – Airport Maintenance Practices
5	ICAO Manual on ICAO Bird Strike Information System (Doc 9332)
6	ICAO Manual of Surface Movement Guidance and Control Systems (Doc 9476)

IS 12.1.4.25 Fuel Farm and Storage Areas

(a) General: **The farm**:

(1) Shall be sited in accordance with paragraphs i – iv below so that damage by aircraft surface vehicles is unlikely:

(i) The determination of present and future storage needs requires close coordination with aerodrome users and fuel system design experts. Economic and functional considerations are: accessibility of roads, railroad sidings, pipelines, or large docks of fuel storage facilities; proximity of the proposed fuel storage facilities to fueling areas; and, ability of the fuel storage site(s) to expand to meet future requirements. Consideration is also required for: the safe separation of the fuel storage site from aeronautical operational areas as well as other aerodrome facilities and adjoining properties; protection of the natural environment; the location of storm and sanitary drainage; and, the accessibility of fore protection equipment and systems.

(ii) **NCAA Safety Consideration.** Fuel storage facilities require a location outside of the runway and taxiway safety areas and the area between runways and their associated building restrictions. Fuel storage facilities must not be located in runway clear zones.

(iii) **USA National Fire Protection Association (NFPA) Location Criteria.** NFPA Standard No. 30 Flammable and Combustible Liquids Code, Section2, contains location and installation criteria for fuel storage tanks with respect to other buildings, property lines and public ways and must be complied with by the Aerodrome operator and fueling agent.

(iv) Requirements for the Determination of building restriction lines and runway clear zones contained in FAA Advisory Circular 150/5300-13/ on aerodrome design is to be utilized.

(2) Shall be fenced and signed to reduce chance of unauthorized entry or tampering.

(3) Shall be posted with flammable and no smoking signs.

(4) Shall be free of materials, equipment, functions and activities, which would be an ignition source.

(b) Fuel Tanks

Shall be equipped with accessible fire extinguishers which meet or exceed NFPA Standard 407 having at least a 20-BC rating.

(c) Piping

Shall be underground or protected from damage by surface vehicles.

(d) Hoses, Nozzles and Overflow Connectors

Shall be controlled by spring-loaded, non-by passable automatic dead man fuel flow cut off feature capable of overriding all other controls and stopping, with one physical movement, all fuel flow.

(e) Electrical Equipment, Switches and Wiring

(i) Shall be reasonably protected from heat, abrasion or other impact which could cause failure of insulation, open spark or other ignition source.

(ii) Shall be of a type or design approved for use according to NFPA standards.

(f) Grounding and Bonding Equipment

Shall be available to provide that piping, filters, tanks and electrical components are electrically bonded together and interconnected to form an adequate electrical ground.

(g) Unloading Docks and Stations

(1) Shall be equipped with accessible fire extinguishers meeting standards of NFPA Standard 407. A minimum of two, each having at least a 20-BC rating.

(2) Shall be equipped with bond and ground wire and appropriate connector clamp for bounding tankers.

(h) Loading Docks and Stations

(1) Shall be equipped with accessible fire extinguishers meeting requirements of NFPA Standard 407. A minimum of two, each having at least a 20-BC rating.

(2) If a top load system, must be equipped with metallic drop tube having anti- splash fuel deflector long enough to reach bottom of deepest fueler tank.

(3) Shall be equipped with a dead-man control.

(4) Shall be equipped with boldly marked emergency fuel shutoff.

(5) Shall be equipped with bonding wire and appropriate connector clamp for bonding fueler vehicles.

Mobile Fuelers, Fueling Pits and Fueling Cabinets

(i) Overall

(1) Shall be marked to prohibit smoking with letters at least three inches high on all sides and inside crew compartment to show danger, flammability, standard hazardous material placard with identification number.

(2) If at fixed location, such as the pit or fueling cabinet, it shall be equipped with:

   (i) at least one boldly marked emergency fuel shutoff clearly visible and accessible from all normal fueling stations; and

(ii) fire extinguishers as required by NFPA Standard 407 accessible during fueling operations.

(3) If a mobile fueler, it shall be equipped with:
(i) a system capable of overriding all other controls and stopping, with one physical movement, all fuel flow; and
(ii) fire extinguishers as prescribed by NFPA Standard 407. At least one for a hydrant vehicle and at least two for a tank vehicle, each having at least a 20-BC rating. For a tank vehicle, each extinguisher will be accessible from a different side.

(4) Shall contain no feature that would allow fuel or concentrated fumes to contact during normal operations, overfilling or other spill exhaust system, hot exhaust gasses or any other ignition source.

(5) If equipped with internal combustion engine, it will be equipped with air filter and spark arrestor and a leak-free exhaust system terminating in a standard baffled original equipment type muffler.

(j) Fuel Tanks
(1) Shall be closed and equipped with gasket dome covers
(i) which contain a three pounds per square inch emergency vapour pressure relief valve and
(ii) which are adequate to prevent fuel spillage during vehicle movement and influx of water anytime.

(2) Shall be equipped with tank bottom outflow cut-off valve that can block fuel flow and spill in event of piping rupture or other valve failure.

(k) Piping

Shall be reasonably protected from impact and stress which could cause rupture or fuel spillage.

(l) Hoses, Nozzles and Connectors

Shall be controlled by a dead-man flow cut-off feature.

(m) Electrical Equipment and Wiring Hoses, Nozzles and Connectors
(1) Shall be reasonably protected from heat, abrasion or other impact which could cause failure of insulation, open spark or other ignition source.

(2) Shall be of a type or design approved for use according to NFPA standards.

(n) Grounding and Bonding

(1) Is required to provide electrical continuity between all metallic or conductive components.

(2) If a mobile fueler, prior to making any fueling connection to the aircraft, the fueling equipment will be bonded to the aircraft by use of a cable, thus providing a conductive path to equalize the potential between the fueling equipment and the aircraft. The bond will be maintained until fueling connections have been removed, thus allowing separated charges that could be generated during the fueling operation to reunite.

(3) If a pit or cabinet, it will be permanently electrically grounded.

(o) Fueling Personnel

(1) **Training for Supervisory Personnel**

(i) **Supervisory personnel:**

(A) All aviation fueling agents, Shall be required to show that at least one supervisor has completed an aviation fuel training course that has been approved by the Authority. Such an individual shall be trained prior to initial performance of duties, or enrolled in an authorised aviation fuel training course that shall be completed within 90 days of initiating duties, and receive recurrent instruction at least every 24 consecutive calendar months.

(B) Shall be able to explain purpose of and safely perform periodic inspections and checks needed to keep equipment operational and functioning safely.

(C) Shall understand and be able to explain what shall be done when a required component of fuel farm, mobile fueler, pit or cabinet is inoperable.

(D) Shall understand the basic fire triangle and be able to identify the more common ignition sources found on aerodromes.

(E) Shall understand and be able to explain what shall be done if fuel leak or spill occurs.

(F) Shall understand and be able to generally explain static- generation/retention misting of fuels and the dangers associated with filtering and pumping fuels to and from storage tanks, mobile fuelers and aircraft.

(G) Shall understand and be able to explain the hazards of atmospheric electrical phenomena, including lightning and static charging of aircraft in flight.

(H) Shall understand and be able to explain main features of proper firefighting technique using, and demonstrating use of, the fire extinguishers normally at fuel farms and on fuelers, pit and cabinets.

(I) Shall understand and be able to explain defueling procedures and precautions.

(J) Shall maintain records of individual training and recurrent training.

(2) **Training for Line Personnel**

(i) **Line personnel:**

(A) For all aviation fueling agents, Shall be required to show that all employees who fuel aircraft, accept fuel shipments or otherwise handle fuel has received at least on-the job training and recurrent instruction every 24 consecutive calendar months in fire safety from the supervisor that has completed an aviation fuel training course that has been approved by the Authority.

(B) Shall be able to understand purpose of and safely perform periodic inspections and checks needed to keep equipment operational and functioning safely.

(C) Shall understand what shall be done when required component of fuel farm, mobile fueler, pit or cabinet is inoperable.

(D) Shall understand the basic fire triangle and be able to identify the more common ignition sources found on aerodromes.

(E) Shall understand what shall be done if fuel leak or spill occurs.

(F) Shall understand static-generation and retention misting of fuels and the dangers associated with filtering and pumping fuels to and from storage tanks, mobile fuelers and aircraft.

(G) Shall understand the hazards of atmospheric electrical phenomena, including lightning and static charging of aircraft in flight

(H) Shall understand the main features of proper fire-fighting technique using, and demonstrating use of, the fire extinguishers normally at fuel farms and on fuelers, pit or cabinets.

(I) Shall understand the dangers of defueling.

(3) **Clothing and Footwear**
Fueling personnel shall be appropriately clothed. Garments will be other than silk,

polyesters, nylon with wool or other static generating fabrics; shoes containing no taps, hobnails or other material which could generate sparks on pavement.

(4) **Other**
Fueling personnel Shall not carry on their persons at any time in, on or within 30.48m of any tank, dock, storage area, fueler or aircraft any igniting device, including safety matches, strike-anywhere matches, cigarette lighter or other items which could become ignition sources if operated, bumped, hit or dropped.

(5) **Supervision**
Fueling personnel Shall be adequately supervised and periodically checked to ensure training and knowledge levels are maintained, all equipment and required components are kept fully operational, required periodic checks and inspections are made when due, required records are kept and that proper quantity and grade, clean, dry, on specification fuel is routinely delivered to the proper aircraft.

(6) **Fuel Farm, Fueler and Pit Operations**

(i) **Fueling Staff:**

(A) Shall ensure that only qualified personnel are allowed to operate fuel farm or equipment or to fuel aircraft.

(B) Shall ensure fueling is performed outside only, never in a building.

(C) Shall ensure fuelers are never parked closer than 3.048m from each other, 15.24m from any building or aircraft not being fueled or defueled and during loading and fueling operations, 30.48m from smokers or other visible sources of ignition.

(D) Shall ensure that before all unloading, loading, fueling and defueling operations are begun, all motors, engines, radios and other electrical and mechanical equipment, except only auxiliary power units not needed for that specific operation, are turned off and kept off.

(E) Shall ensure that before opening any aircraft or fueler tank or commencing fueling operations and at all times during fuel transfer at least a bonding wire is connected between fueler being loaded and the loading dock ground or between the fueler, pit, cabinet and the aircraft being fueled.

(F) Shall before commencing loading of any fueler or fueling any aircraft, ensure that all fuel farm, fueler, pit and cabinet equipment to be used is in good operating condition; that the tank and filter or filter/separator involved have been sumped in the previous 24 hours and that the fuel about to be loaded or pumped into the airplane is free of contaminants and of proper color, smell, feel and type and is clear and bright.

(G) Shall ensure that mobile fueler loading and aircraft fueling is conducted only when the deadman control is operable and used to control fuel flow.

(H) Shall ensure that fuel farm and all equipment are kept neat and free of trash or debris that could cause or contribute to fuel contamination or fire.

(I) Shall ensure that all fire extinguishers area checked for charge and condition at least semi-annually.

(J) Shall ensure that fuel service operations will be suspended when there are lightning discharges in the immediate vicinity of the aerodrome.

(7) **Fueler Records**

(i) **Fueler Staff and Supervisors**

Fueler staff and supervisors must develop and maintain for at least 12 months records adequate to at least show:

(A) Checks and any subsequent corrective action taken made on equipment required.

(B) Training given and qualifications on achievements of all fueling staff on the aerodrome.

(8) **Inspections**

These records shall be made available by the fueling agent for inspection upon request.

(9) **Proof of Training**

Each aerodrome aviation fueling agent shall be required to provide written proof to the aerodrome operator once a year that:

(i) At least one supervisor has completed an aviation fuel training course in fire safety that has been acceptable by the Authority.

(ii) All other employees who fuel aircraft, accept fuel shipments or otherwise handle fuel have received at least on-the-job training in fire safety.

(10) **Inspection Schedule**

Authority's aircraft rescue and firefighting personnel will inspect each aerodrome tenant fueling agent's fuel storage areas, mobile fuelers and fuel cabinets for compliance to the above fire safety fuel requirements. Quarterly safety inspections must be conducted.

(11) **Left Blank Intentionally**

(12) **Corrective Action**

Upon completion of any safety inspection, the inspector and the aerodrome tenant fueling agent supervisor will discuss and sign the safety survey form. The aerodrome tenant fueling agent will be required to take immediate corrective action whenever notified of noncompliance with these requirements. A follow up inspection will be scheduled to confirm compliance. If the corrective action is not accomplished within a reasonable period of time, the fueling agent shall notify the Authority.

IS 12.1.4.27 Quality Control System

Minimum Standards for a Quality Control System

(a) The quality control system shall include: –
- (i) a clear definition of the level of quality the aerodrome operator intends to achieve;
- (ii) a procedure that sets out the level and frequency of the internal reviews;
- (iii) a procedure to record the findings and communicate them to management
- (iv) a list of responsible persons;
- (v) procedures by which other quality indicators such as facility malfunction reports, incidents, occurrences, complaints and defects are brought into the quality control system;
- (vi) procedures for management analysis and overview;
- (vii) procedures for rectifying any deficiencies which may be found; and
- (viii) procedures for documenting the complete review process from the inspection to the satisfactory management review so that this is available to Director General during a safety inspection and audit.

(b) Measures must be taken to ensure that the system is understood, implemented and complied with at all levels.

IS 12.2.1.2 – COLOURS FOR AERONAUTICAL GROUND LIGHTS, MARKINGS, SIGNS AND PANELS

(a) General

Introductory Note. — The following specifications define the chromaticity limits of colours to be used for aeronautical ground lights, markings, signs and panels. The specifications are in accord with the 1983 specifications of the International Commission on Illumination (CIE), except for the colour orange in Figure A1-2.

It is not possible to establish specifications for colours such that there is no possibility of confusion. For reasonably certain recognition, it is important that the eye illumination be well above the threshold of perception, that the colour not be greatly modified by selective atmospheric attenuations and that the observer's colour vision be adequate. There is also a risk of confusion of colour at an extremely high level of eye illumination such as may be obtained from a high-intensity source at very close range. Experience indicates that satisfactory recognition can be achieved if due attention is given to these factors.

*The chromaticities are expressed in terms of the standard observer and coordinate system adopted by the International Commission on Illumination (CIE) at its Eighth Session at Cambridge, England, in 1931.**

The chromaticities for solid state lighting (e.g. LED) are based upon the boundaries given in the standard S 004/E-2001 of the International Commission on Illumination (CIE), except for the blue boundary of white.

(b) Colours for aeronautical ground lights

(1) Chromaticities for lights having filament-type light sources.

(i) The chromaticities of aeronautical ground lights with filament-type light sources shall be within the following boundaries:

CIE Equations (see Figure A1-1a):

(A) Red
Purple boundary $y = 0.980 – x$

Yellow boundary $y = 0.335$, except for visual approach slope indicator systems

Yellow boundary y = 0.320, for visual approach slope indicator systems

Note.— See 12.2.5.3(e)(15) and 12.2.5.3(e)(31).

(B) Yellow
Red boundary y = 0.382

White boundary y = 0.790 – 0.667x

Green boundary y = x – 0.120

(C) Green
Yellow boundary x = 0.360 – 0.080y

White boundary x = 0.650y

Blue boundary y = 0.390 – 0.171x

(D) Blue
Green boundary y = 0.805x + 0.065

White boundary y = 0.400 - x

Purple boundary x = 0.600y + 0.133

(E) White
Yellow boundary x = 0.500

Blue boundary x = 0.285
Green boundary y = 0.440 and y = 0.150 + 0.640x
Purple boundary y = 0.050 + 0.750x and y = 0.382

(F) Variable White
Yellow boundary x = 0.255 + 0.750y and y = 0.790 – 0.667x

Blue boundary x = 0.285
Green boundary y = 0.440 and y = 0.150 + 0.640x
Purple boundary y = 0.050 + 0.750x and y = 0.382

Note. — Guidance on chromaticity changes resulting from the effect of temperature on filtering elements is given in the Aerodrome Design Manual (Doc 9157), Part 4.

(ii) Where dimming is not required, or where observers with defective colour vision must be able to determine the colour of the light, green signals shall be within the following boundaries:

Yellow boundary	y = 0.726 – 0.726x
White boundary	x = 0.650y
Blue boundary	y = 0.390 – 0.171x

Note. — Where the colour signal is to be seen from long range, it has been the practice to use colours within the boundaries of 12.2.2.1(b).

(iii) Where increased certainty of recognition from white is more important than maximum visual range, green signals shall be within the following boundaries:

Yellow boundary	y = 0.726 – 0.726x
White boundary	x = 0.625y – 0.041
Blue boundary	y = 0.390 – 0.171x

(2) Discrimination between lights having filament-type sources

(i) If there is a requirement to discriminate yellow and white from each other, they shall be displayed in close proximity of time or space as, for example, by being flashed successively from the same beacon.

(ii) If there is a requirement to discriminate yellow from green and/or white, as for example on exit taxiway centre line lights, the y coordinates of the yellow light shall not exceed a value of 0.40.

Note. — The limits of white have been based on the assumption that they will be used in situations in which the characteristics (colour temperature) of the light source will be substantially constant.

(iii) The colour variable white is intended to be used only for lights that are to be varied in intensity, e.g. to avoid dazzling. If this colour is to be discriminated from yellow, the lights shall be so designed and operated that:

(A) the x coordinate of the yellow is at least 0.050 greater than the x coordinate of the white; and

(B) the disposition of the lights will be such that the yellow lights are displayed simultaneously and in close proximity to the white lights.

(3) Chromaticities for lights having a solid-state light source.

(i) The Chromaticities of aeronautical ground lights with solid state light sources, e.g., LEDs, shall be within the following boundaries:

CIE Equations (see Figure A1-1b):

(A) Red
Purple boundary $y = 0.980 – x$

Yellow boundary $y = 0.335$, except for visual approach slope indicator systems

Yellow boundary $y = 0.320$, for visual approach slope indicator systems

Note. — See 12.2.5.3(e)(15) and 12.2.5.3(e)(31).

(B) Yellow
Red boundary $y = 0.387$

White boundary $y = 0.980 – x$

Green boundary $y = 0.727x + 0.054$

(C) Green (also refer to 2.3.2 and 2.3.3)
Yellow boundary $x = 0.310$
White boundary $x = 0.625y – 0.041$

Blue boundary $y = 0.400$

(D) Blue
Green boundary $y = 1.141x – 0.037$

White boundary $y = 0.400 – y$

Purple boundary $x = 0.134 + 0.590y$

(E) White
Yellow boundary $x = 0.440$

Blue boundary $x = 0.320$

Green boundary $y = 0.150 + 0.643x$

Purple boundary $y = 0.050 + 0.757x$

(F) Variable white
The boundaries of variable white for solid state light sources are those of (E) White above.

(ii) Where observers with defective colour vision must be able to determine the colour of the light, green signals shall be within the following boundaries:

Yellow boundary $y = 0.726 – 0.726x$

White boundary $x = 0.625y – 0.041$

Blue boundary $y = 0.400$

(iii) In order to avoid a large variation of shades of green, if colours within the boundaries below are selected, colours within the boundaries of 2.3.2 shall not be used.

Yellow boundary $x = 0.310$

White boundary $x = 0.625y – 0.041$

Blue boundary $y = 0.726 – 0.726x$

(4) Colour measurement for filament-type and solid state-type light sources

(i) The colour of aeronautical ground lights shall be verified as being within the boundaries specified in Figure A1-1a or A1-1b, as appropriate, by measurement at five points within the area limited by the innermost isocandela curve (isocandela diagrams in Appendix 2 refer), with operation at rated current or voltage. In the case of elliptical or circular isocandela curves, the colour measurements shall be taken at the centre and at the horizontal and vertical limits. In the case of rectangular isocandela curves, the colour measurements shall be taken at the centre and the limits of the diagonals (corners). In addition, the colour of the light shall be checked at the outermost isocandela curve to ensure that there is no colour shift that might cause signal confusion to the pilot.

Note 1. — For the outermost isocandela curve, a measurement of colour coordinates shall be made and recorded for review and judgement of acceptability by the Authority.

Note 2. — Certain light units may have application so that they may be viewed and used by pilots from directions beyond that of the outermost isocandela curve (e.g., stop bar lights at significantly wide runway- holding positions). In such instances, the Authority shall assess the actual application and if necessary, require a check of colour shift at angular ranges beyond the outermost curve.

(ii) In the case of visual approach slope indicator systems and other light units having a colour transition sector, the colour shall be measured at points in accordance with 12.2.2.4.(a), except that the colour areas shall be treated separately and no point shall be within 0.5 degrees of the transition sector.

(c) Colours for markings, signs and panels

Note 1. — The specifications of surface colours given below apply only to freshly coloured surfaces. Colours used for markings, signs and panels usually change with time and therefore require renewal.

Note 2.— Guidance on surface colours is contained in the CIE document entitled Recommendations for Surface Colours for Visual Signalling — Publication No. 39-2 (TC-106) 1983.

Note 3. — The specifications recommended in 3.4 for transilluminated panels are interim in nature and are based on the CIE specifications for transilluminated signs. It is intended that these specifications will be reviewed and updated as and when CIE develops specifications for transilluminated panels.

(1) The chromaticities and luminance factors of ordinary colours, colours of retroreflective materials and colours of transilluminated (internally illuminated) signs and panels shall be determined under the following standard conditions:

(i) angle of illumination: 45°;

(ii) direction of view: perpendicular to surface; and

(iii) illuminant: CIE standard illuminant D65.

(2) The chromaticity and luminance factors of ordinary colours for markings and externally illuminated signs and panels shall be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure A1-2):

(i)	*Red*	
	Purple boundary	*y = 0.345 – 0.051x*
	White boundary	*y = 0.910 – x*
	Orange boundary	*y = 0.314 + 0.047x*
	Luminance factor	*ß = 0.07 (mnm)*
(ii)	*Orange*	
	Red boundary	*y = 0.285 + 0.100x*
	White boundary	*y = 0.940 – x*
	Yellow boundary	*y = 0.250 + 0.220x*
	Luminance factor	*ß = 0.20 (mnm)*
(iii)	*Yellow*	
	Orange boundary	*y = 0.108 + 0.707x*
	White boundary	*y = 0.910 – x*
	Green boundary	*y = 1.35 x – 0.093*
	Luminance factor	*ß = 0.45 (mnm)*
(iv)	*White*	
	Purple boundary	*y = 0.010 + x*
	Blue boundary	*y = 0.610 – x*
	Green boundary	*y = 0.030 + x*
	Yellow boundary	*y = 0.710 – x*
	Luminance factor	*ß = 0.75 (mnm)*
(v)	*Black*	
	Purple boundary	*y = x – 0.030*
	Blue boundary	*y = 0.570 – x*
	Green boundary	*y = 0.050 + x*
	Yellow boundary	*y = 0.740 – x*
	Luminance factor	*ß = 0.03 (max)*
(vi)	*Yellowish green*	
	Green boundary	*y = 1.317x + 0.4*
	White boundary	*y = 0.910 – x*
	Yellow boundary	*y = 0.867x + 0.4*
(vii)	*Green*	
	Yellow boundary	*x = 0.313*
	White boundary	*y = 0.243 + 0.670x*
	Blue boundary	*y = 0.493 – 0.524x*
	Luminance factor	*β = 0.10 (mnm)*

Note. — The small separation between surface red and surface orange is not sufficient to ensure the distinction of these colours when seen separately.

(3) The chromaticity and luminance factors of colours of retroreflective materials for markings, signs and panels shall be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure A1-3):

(i) *Red*

Purple boundary	*y = 0.345 – 0.051x*
White boundary	*y = 0.910 – x*
Orange boundary	*y = 0.314 + 0.047x*
Luminance factor	*ß = 0.03 (mnm)*

(ii) *Orange*

Red boundary	*y = 0.265 + 0.205x*
White boundary	*y = 0.910 – x*
Yellow boundary	*y = 0.207 + 0.390x*
Luminance factor	*ß = 0.14 (mnm)*

(iii) *Yellow*

Orange boundary	*y = 0.160 + 0.540x*
White boundary	*y = 0.910 – x*
Green boundary	*y = 1.35x – 0.093*
Luminance factor	*ß = 0.16 (mnm)*

(iv) White

Purple boundary	y = x
Blue boundary	y = 0.610 – x
Green boundary	y = 0.040 + x
Yellow boundary	y = 0.710 – x
Luminance factor	ß = 0.27 (mnm)

(v) Blue

Green boundary	y = 0.118 + 0.675x
White boundary	y = 0.370 – x
Purple boundary	y = 1.65x – 0.187
Luminance factor	ß = 0.01 (mnm)

(vi) Green

Yellow boundary	y = 0.711 – 1.22x
White boundary	y = 0.243 + 0.670x
Blue boundary	y = 0.405 – 0.243x
Luminance factor	ß = 0.03 (mnm)

(4) The chromaticity and luminance factors of colours for luminescent or transilluminated (internally illuminated) signs and panels shall be within the following boundaries when determined under standard conditions.

CIE Equations (see Figure A1-4):

(i)	*Red*	
	Purple boundary	*$y = 0.345 - 0.051x$*
	White boundary	*$y = 0.910 - x$*
	Orange boundary	*$y = 0.314 + 0.047x$*
	Luminance factor (day condition)	*ß = 0.07 (mnm)*
	Relative luminance to white (night condition)	*5% (mnm) 20% (max)*
(ii)	*Yellow*	
	Orange boundary	*$y = 0.108 + 0.707x$*
	White boundary	*$y = 0.910 - x$*
	Green boundary	*$y = 1.35x - 0.093$*
	Luminance factor (day condition)	*ß = 0.45 (mnm)*
	Relative luminance to white (night condition)	*30% (mnm) 80% (max)*
(iii)	*White*	
	Purple boundary	*$y = 0.010 + x$*
	Blue boundary	*$y = 0.610 - x$*
	Green boundary	*$y = 0.030 + x$*
	Yellow boundary	*$y = 0.710 - x$*
	Luminance factor (day condition)	*ß = 0.75 (mnm)*
	Relative luminance to white (night condition)	*100%*
(iv)	*Black*	
	Purple boundary	*$y = x - 0.030$*
	Blue boundary	*$y = 0.570 - x$*
	Green boundary	*$y = 0.050 + x$*
	Yellow boundary	*$y = 0.740 - x$*
	Luminance factor (day condition)	*ß = 0.03 (max)*
	Relative luminance to white (night condition)	*0% (mnm) 2% (max)*
(v)	*Green*	
	Yellow boundary	*$x = 0.313$*
	White boundary	*$y = 0.243 + 0.670x$*
	Blue boundary	*$y = 0.493 - 0.524x$*
	Luminance factor	*β = 0.10 minimum (day conditions)*
	Relative luminance: to white (night conditions)	*5% (minimum) 30% (maximum)*

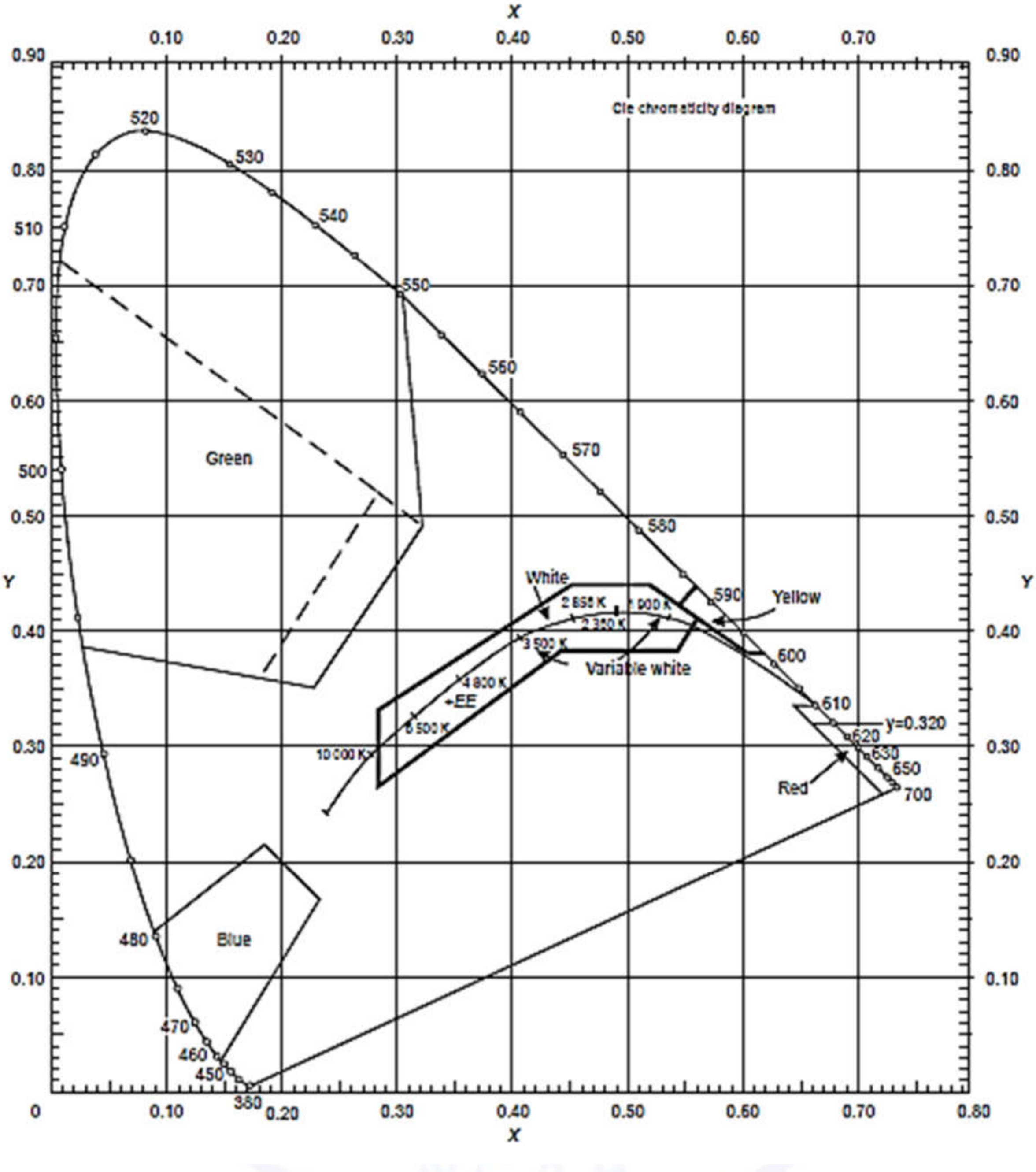


Figure A1-1a. Colours for aeronautical ground lights (filament-type lamps)

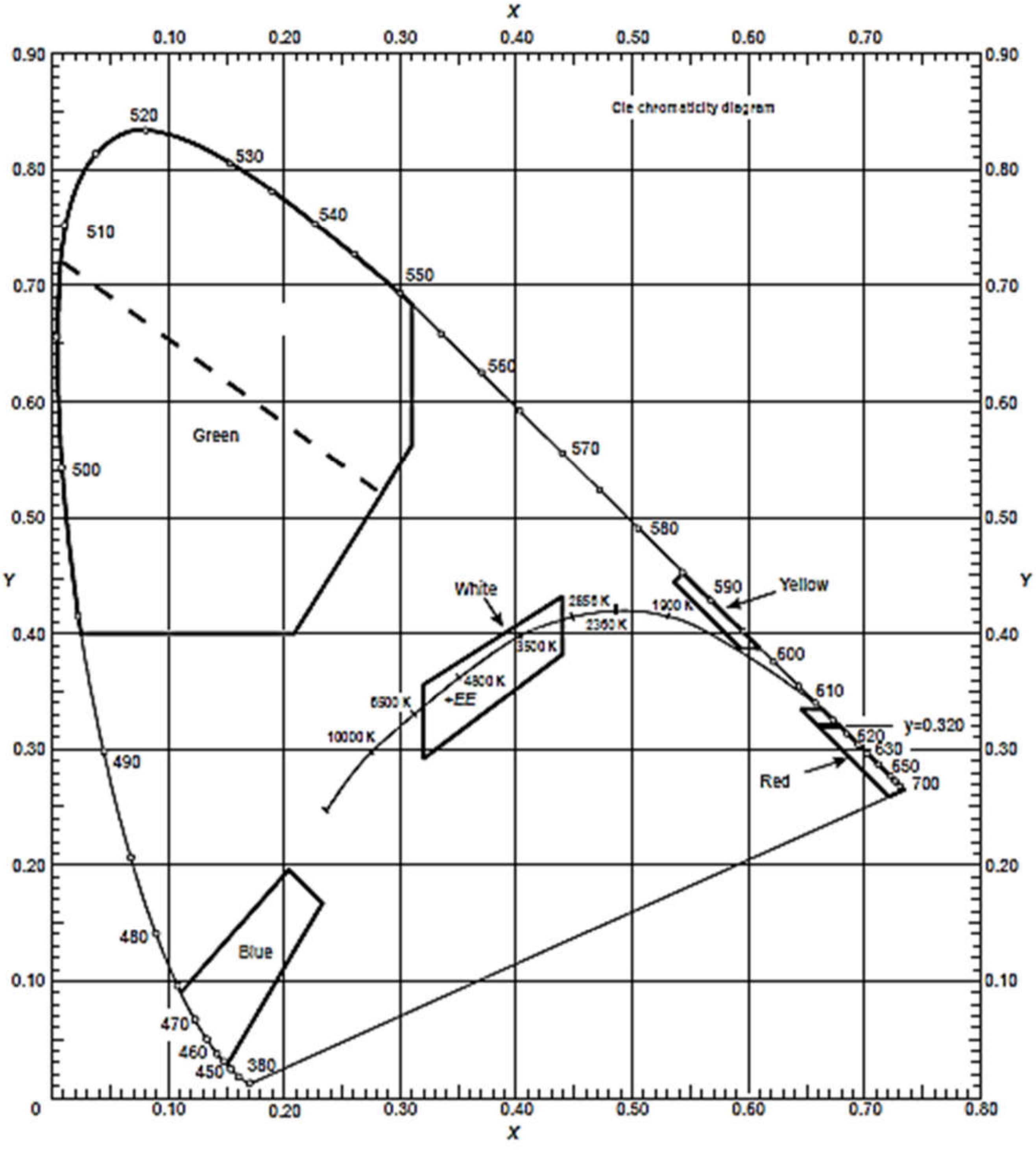


Figure A1-1b. Colours for aeronautical ground lights (solid state lighting)

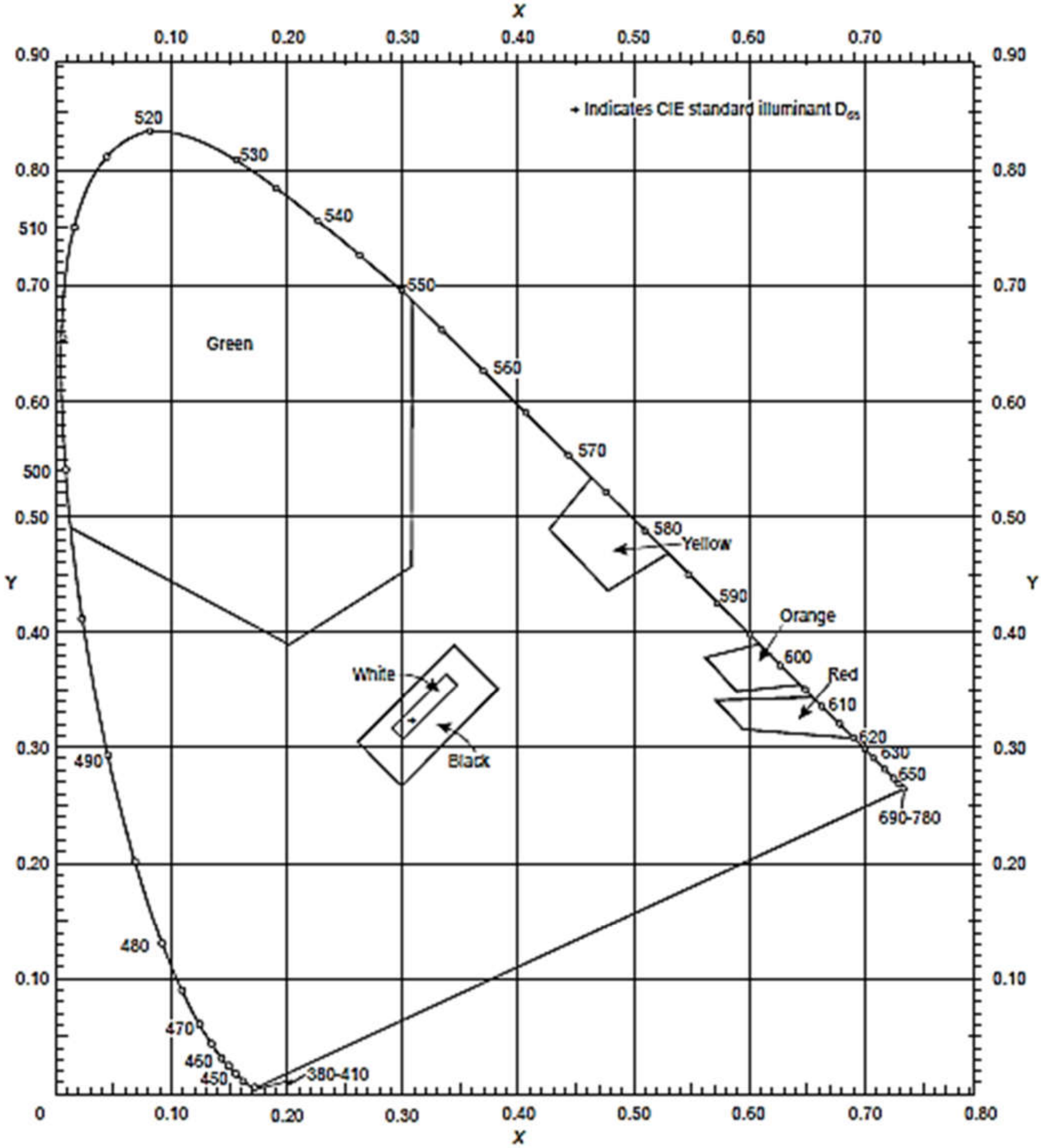


Figure A1-2. Ordinary colours for markings and externally illuminated signs and panels

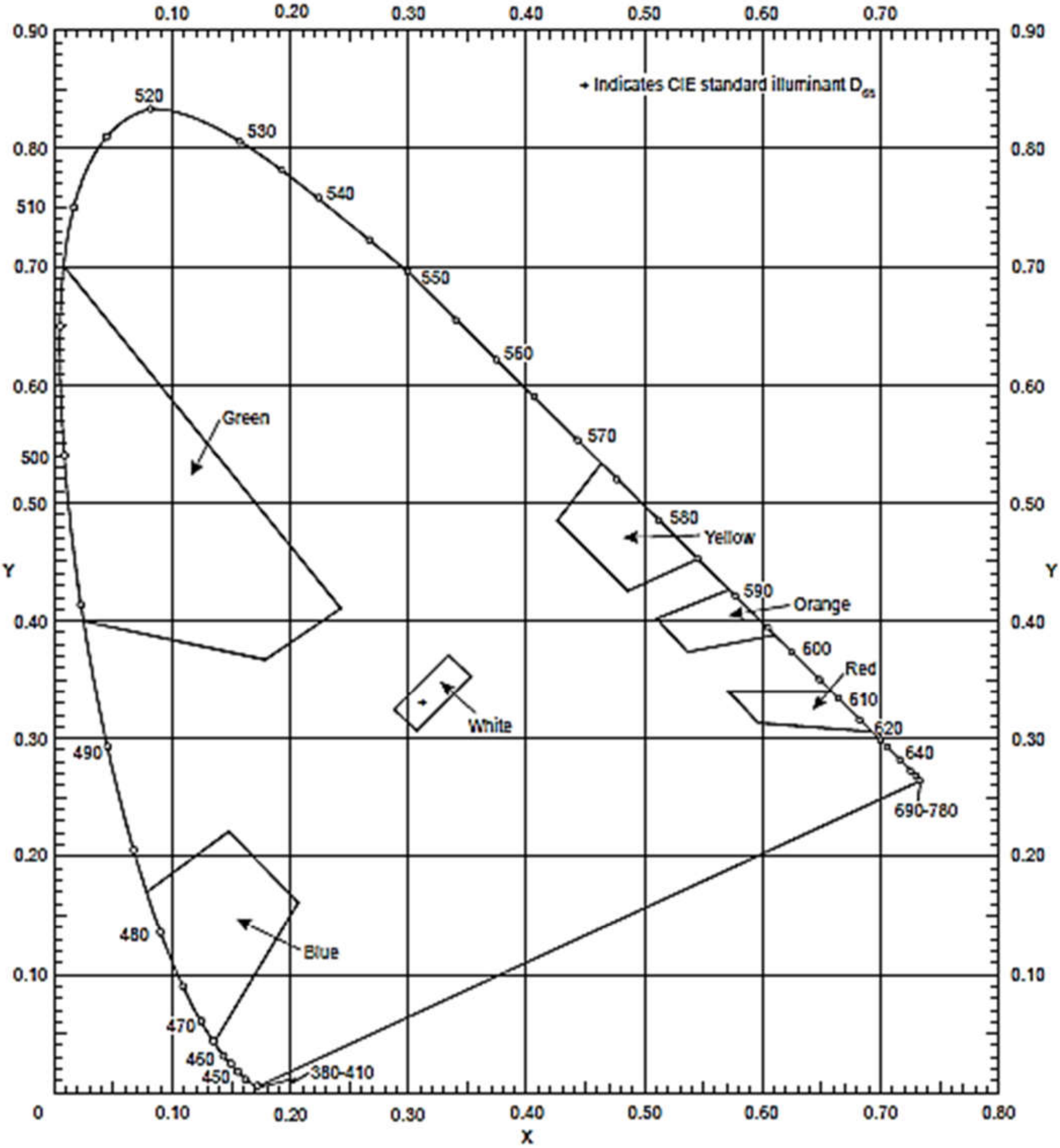


Figure A1-3. Colours of retroreflective materials for markings, signs and panels

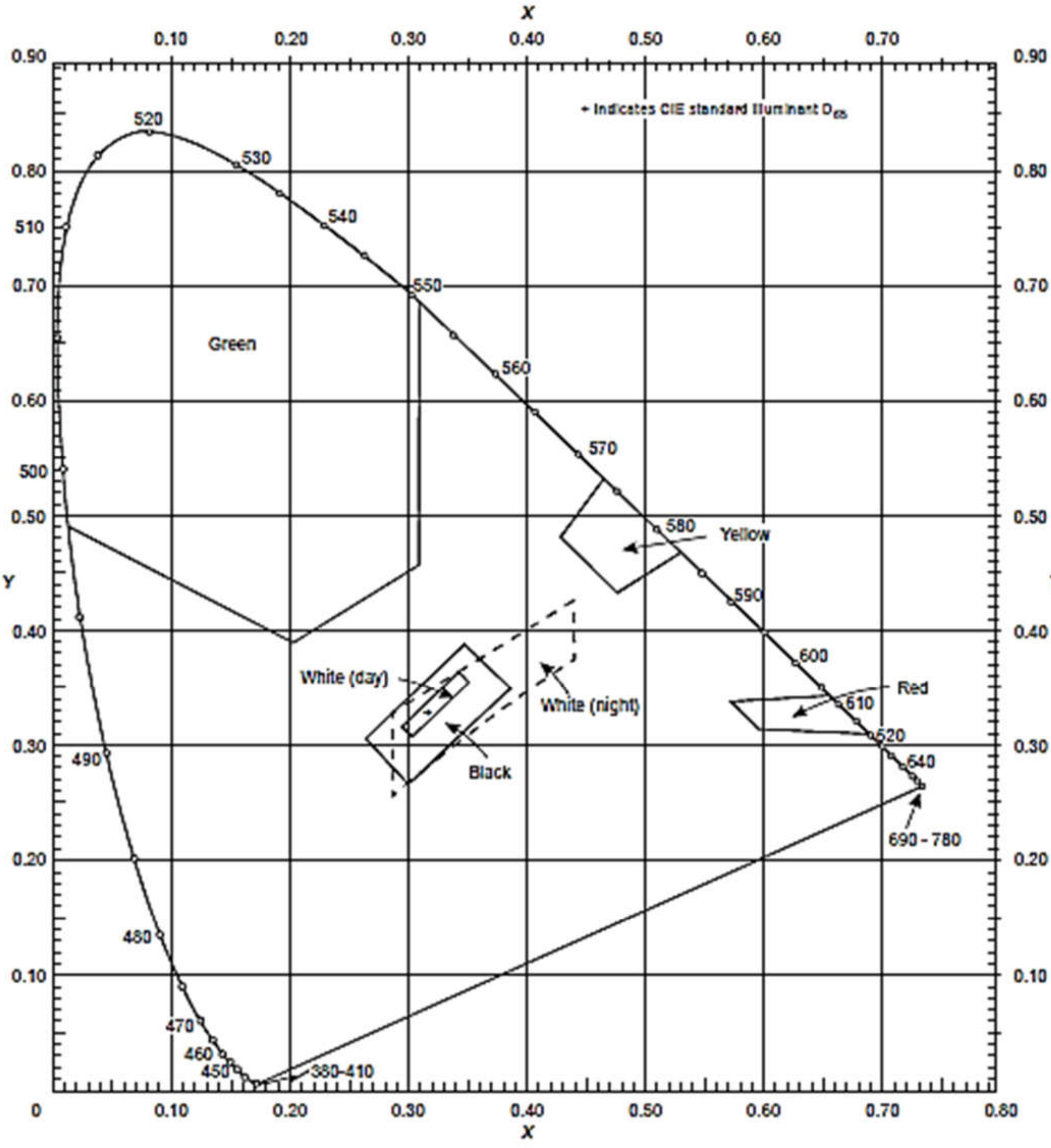
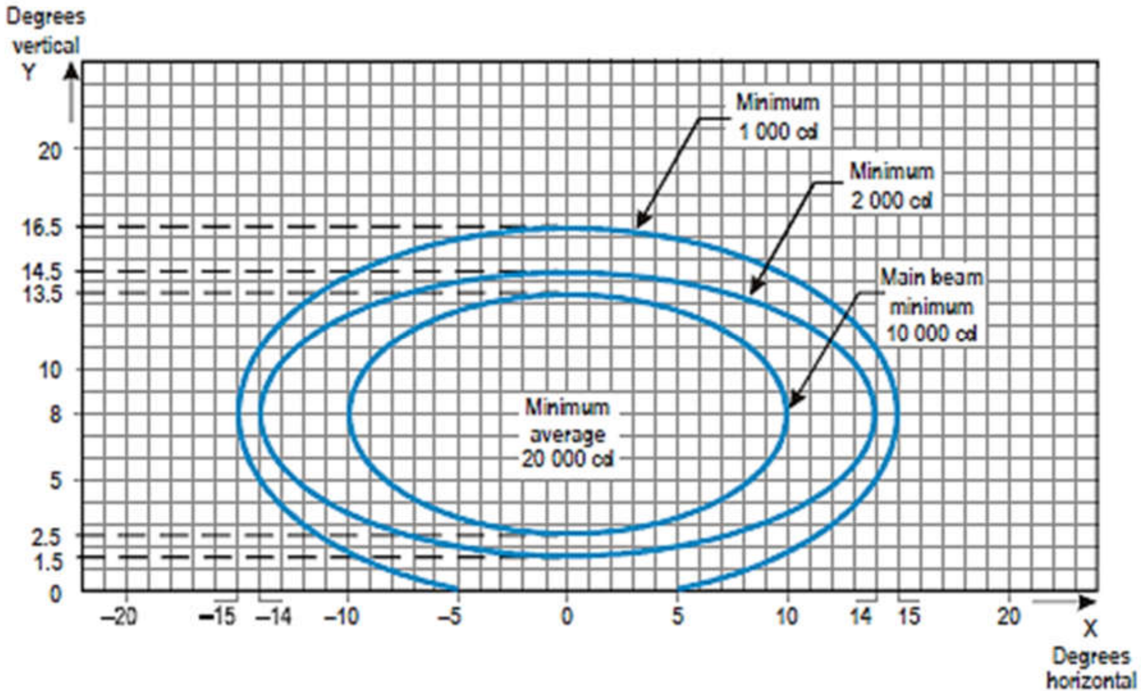


Figure A1-4. Colours of luminescent or transilluminated (internally illuminated) signs and panels

IS 12.2.5.3 – AERONAUTICAL GROUND LIGHT CHARACTERISTICS



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	10	14	15
b	5.5	6.5	8.5

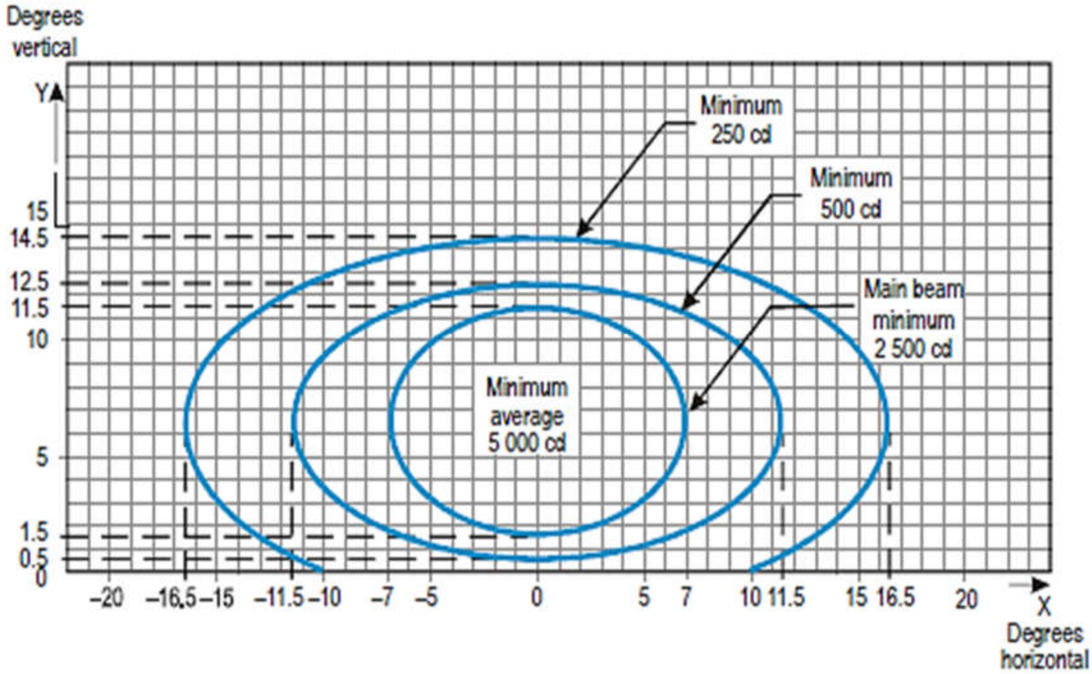
2. Vertical setting angles of the lights shall be such that the following vertical coverage of the main beam will be met:

distance from threshold	vertical main beam coverage
threshold to 315 m	0° — 11°
316 m to 475 m	0.5° — 11.5°
476 m to 640 m	1.5° — 12.5°
641 m and beyond	2.5° — 13.5° (as illustrated above)

3. Lights in crossbars beyond 22.5 m from the centre line shall be toed-in 2 degrees. All other lights shall be aligned parallel to the centre line of the runway.

4. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-1. Isocandela diagram for approach centre line light and crossbars (white light)



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

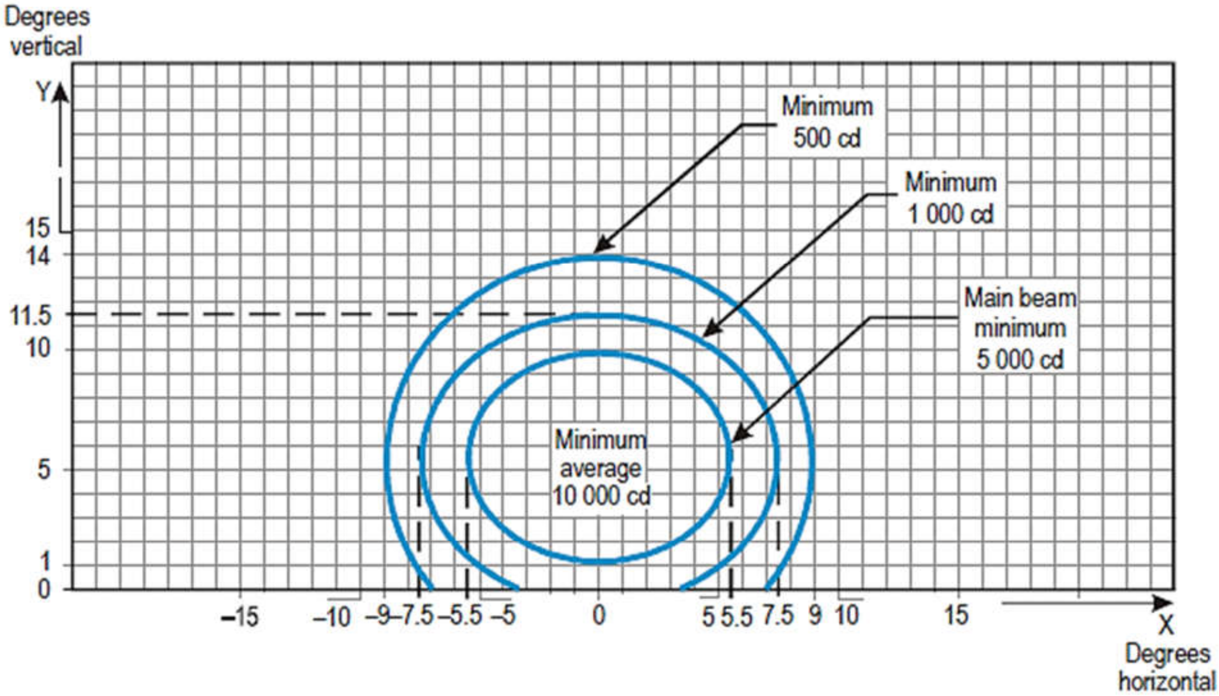
2. Toe-in 2 degrees

3. Vertical setting angles of the lights shall be such that the following vertical coverage of the main beam will be met:

distance from threshold	vertical main beam coverage
threshold to 115 m	0.5° — 10.5°
116 m to 215 m	1° — 11°
216 m and beyond	1.5° — 11.5° (as illustrated above)

4. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-2. Isocandela diagram for approach side row light (red light)



Notes:

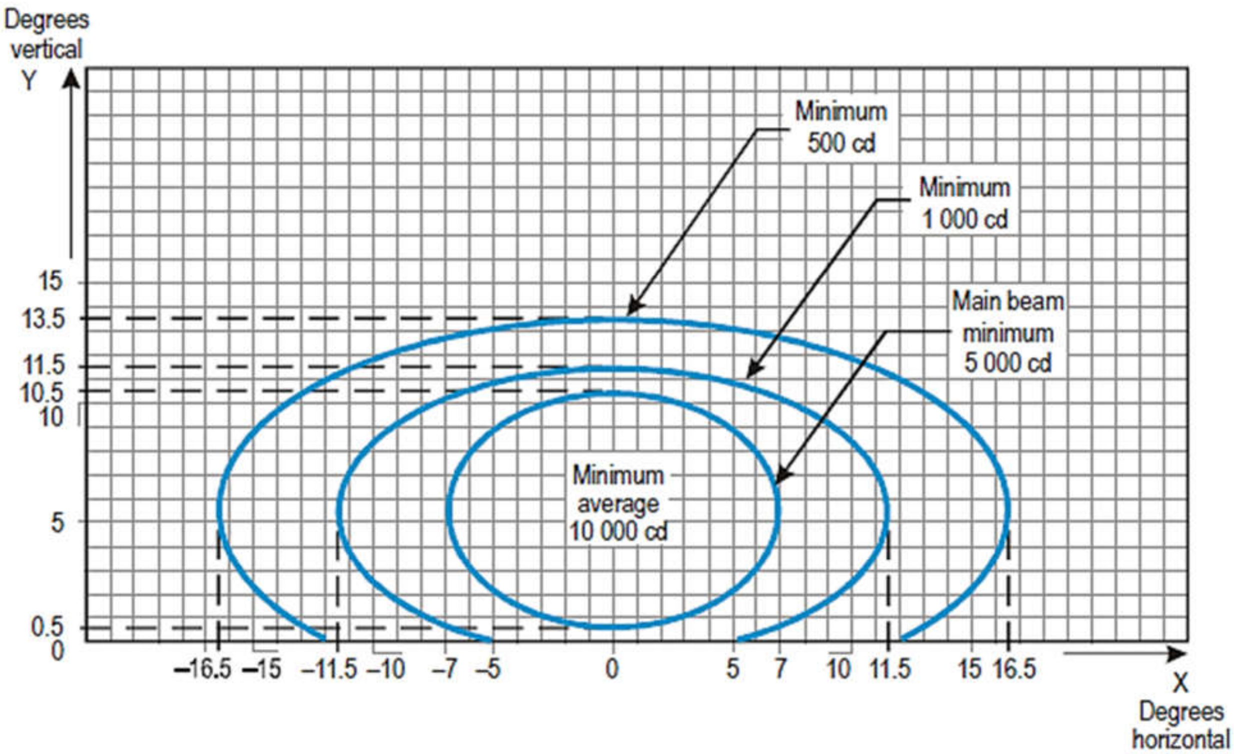
1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	5.5	7.5	9.0
b	4.5	6.0	8.5

2. Toe-in 3.5 degrees

3. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-3. Isocandela diagram for threshold light (green light)



Notes:

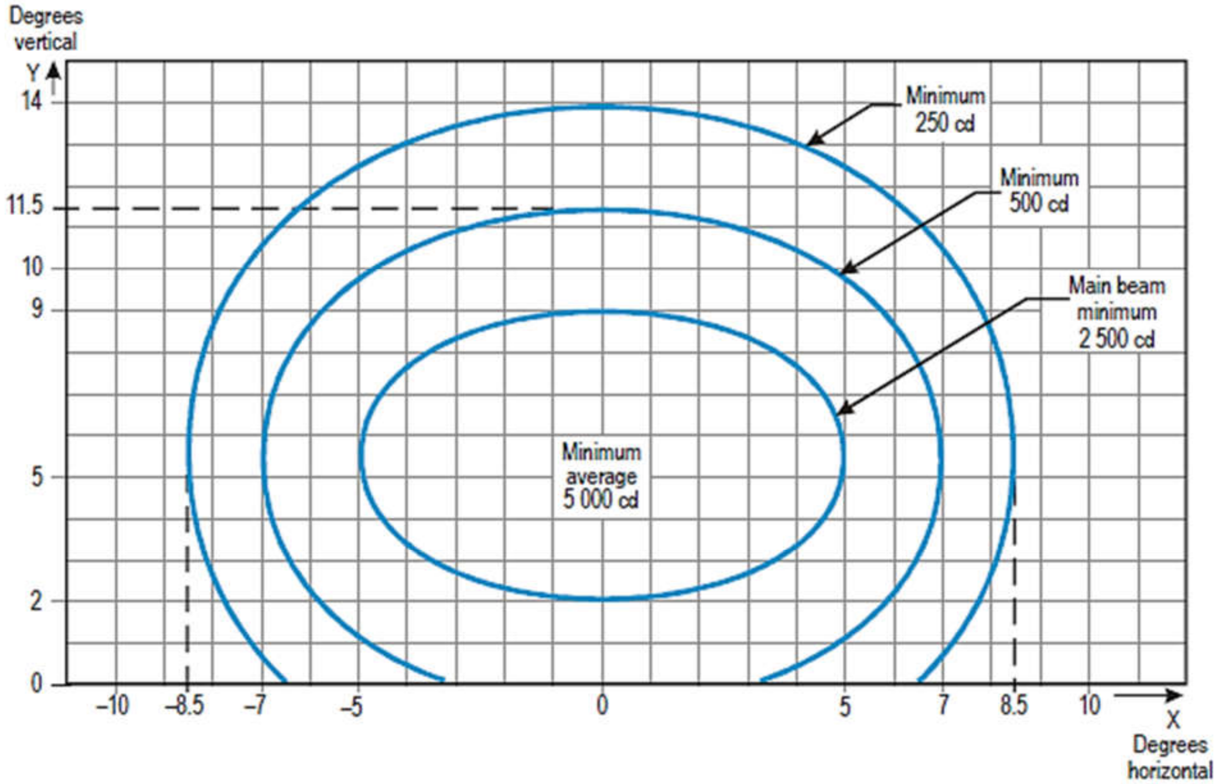
1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	7.0	11.5	16.5
b	5.0	6.0	8.0

2. Toe-in 2 degrees

3. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-4. Isocandela diagram for threshold wing bar light (green light)



Notes:

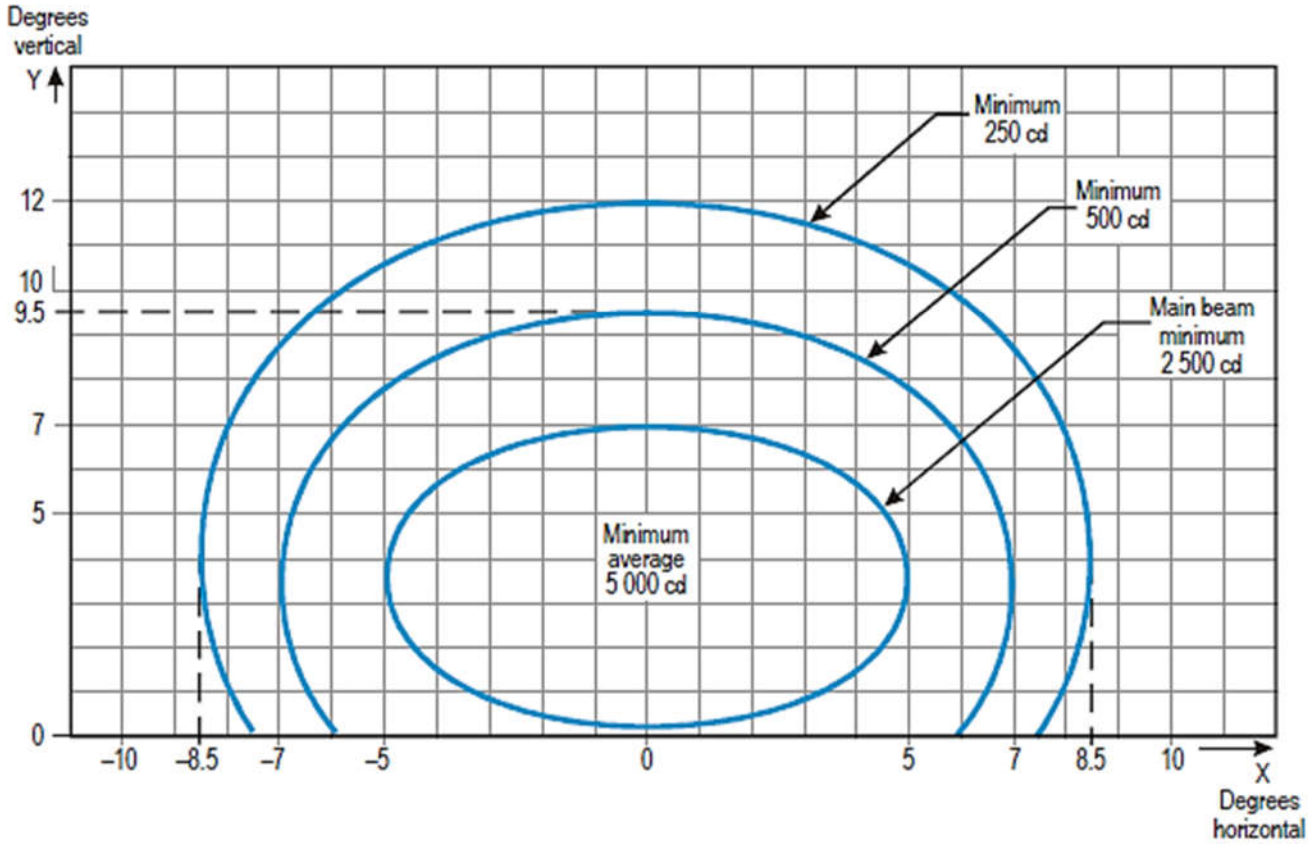
1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	5.0	7.0	8.5
b	3.5	6.0	8.5

2. Toe-in 4 degrees

3. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-5. Isocandela diagram for touchdown zone light (white light)



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

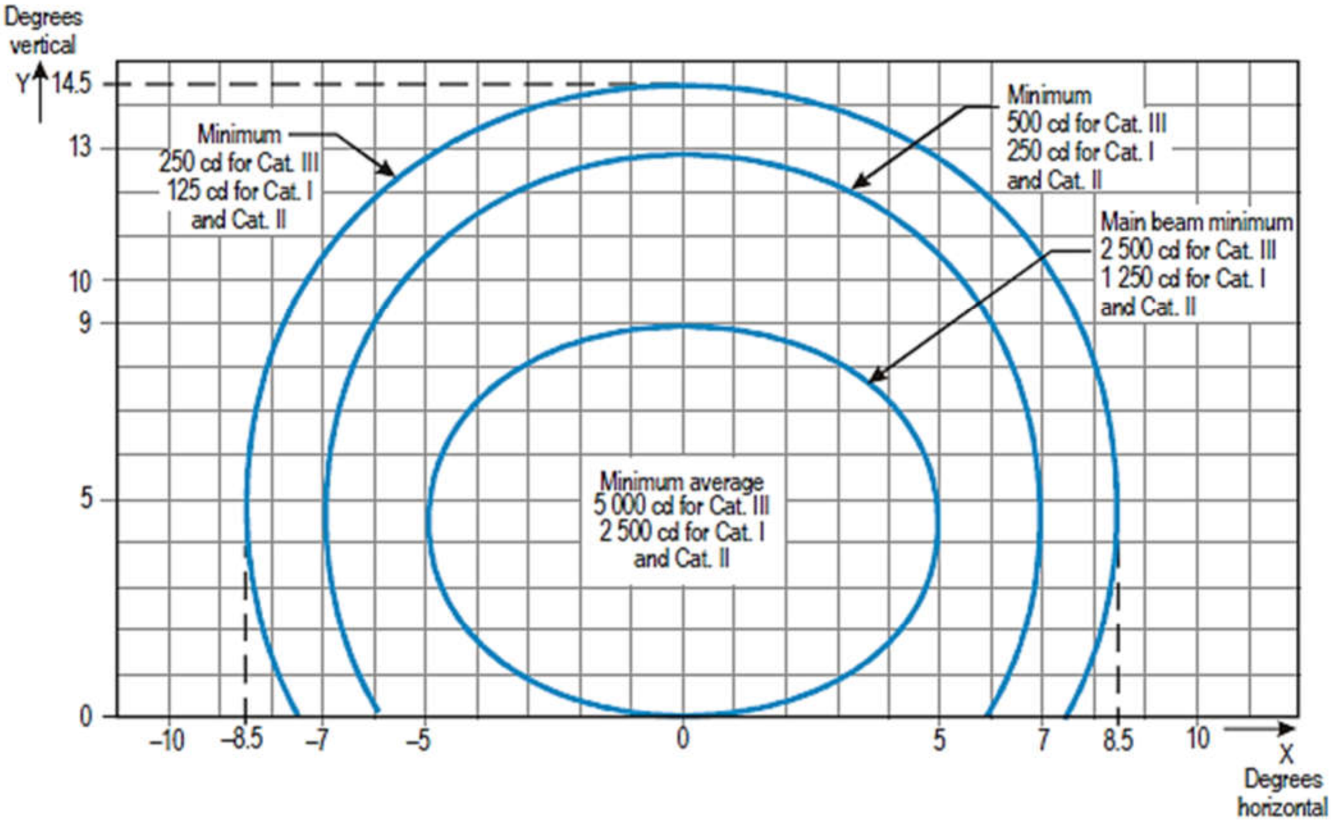
a	5.0	7.0	8.5
b	3.5	6.0	8.5

2. For red light, multiply values by 0.15.

3. For yellow light, multiply values by 0.40.

4. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-6. Isocandela diagram for runway centre line light with 30 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

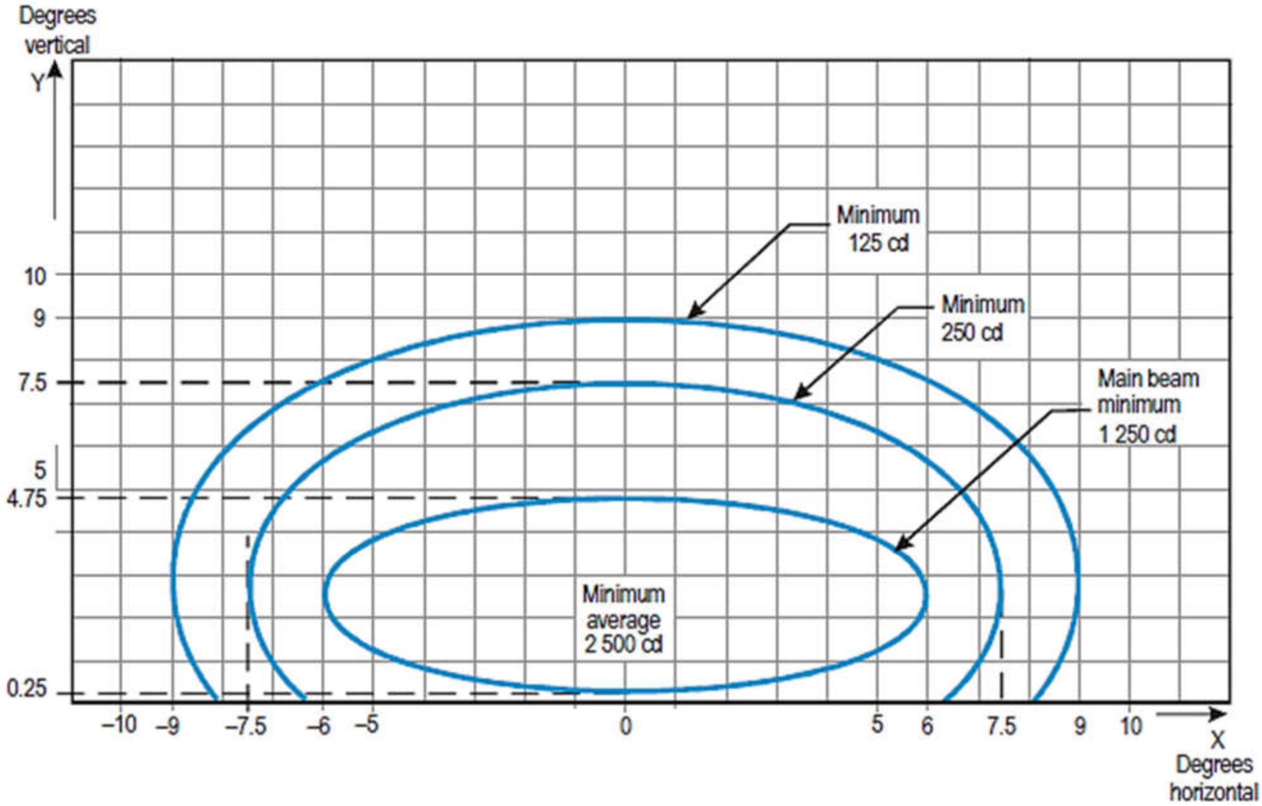
a	5.0	7.0	8.5
b	4.5	8.5	10

2. For red light, multiply values by 0.15.

3. For yellow light, multiply values by 0.40.

4. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-7. Isocandela diagram for runway centre line light with 15 m longitudinal spacing (white light) and rapid exit taxiway indicator light (yellow light)



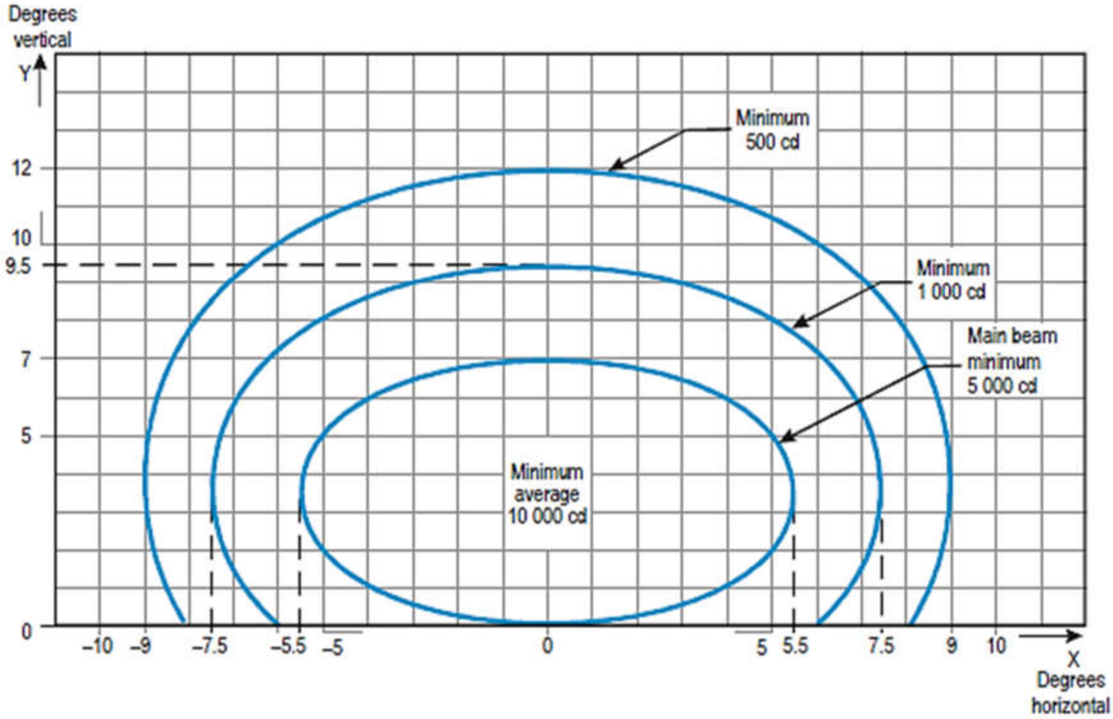
Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	6.0	7.5	9.0
b	2.25	5.0	6.5

2. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-8. Isocandela diagram for runway end light (red light)



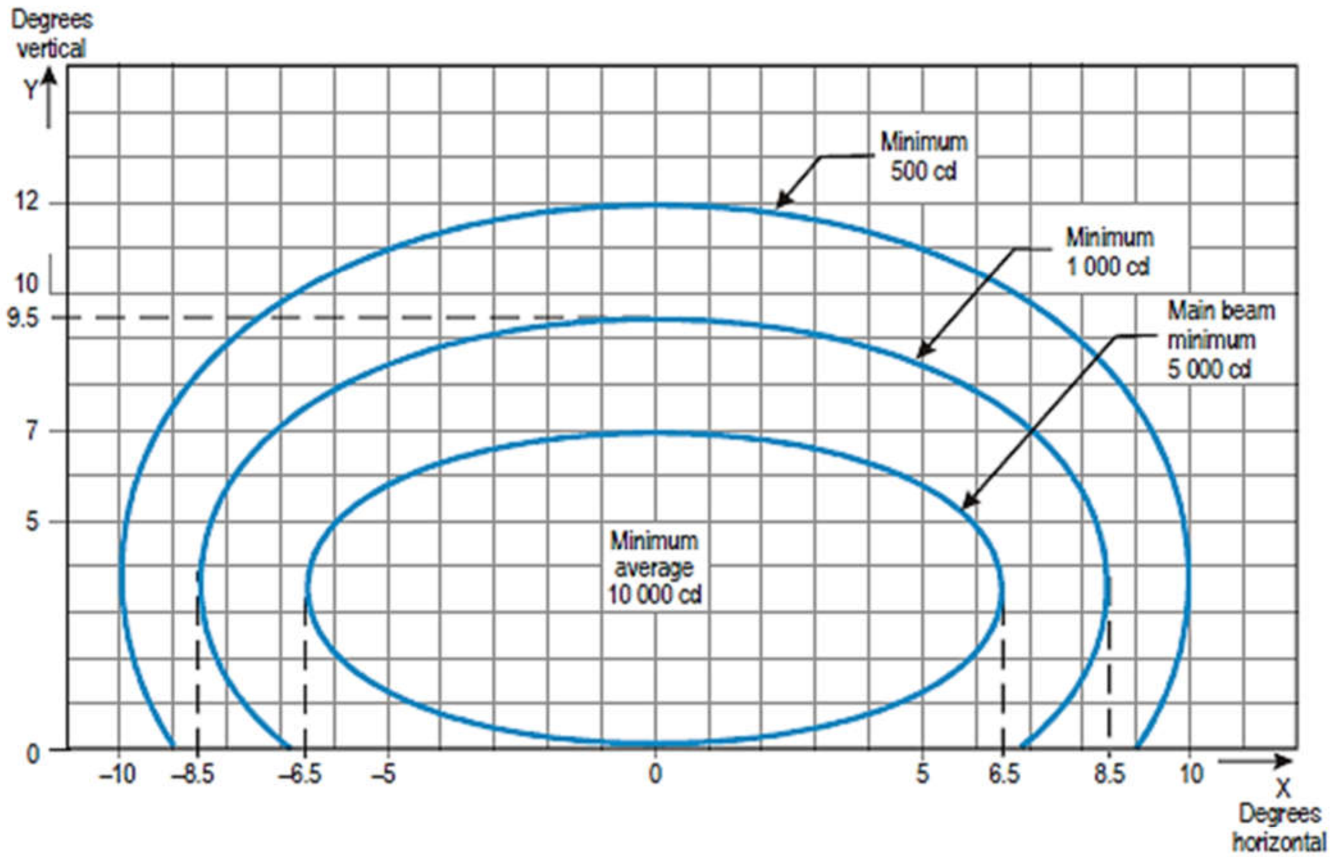
Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	5.5	7.5	9.0
b	3.5	6.0	8.5

2. Toe-in 3.5 degrees
3. For red light, multiply values by 0.15.
4. For yellow light, multiply values by 0.40.
5. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-9. Isocandela diagram for runway edge light where width of runway is 45 m (white light)



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

a	6.5	8.5	10.0
b	3.5	6.0	8.5

2. Toe-in 4.5 degrees
3. For red light, multiply values by 0.15.
4. For yellow light, multiply values by 0.40.
5. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-10. Isocandela diagram for runway edge light where width of runway is 60 m (white light)

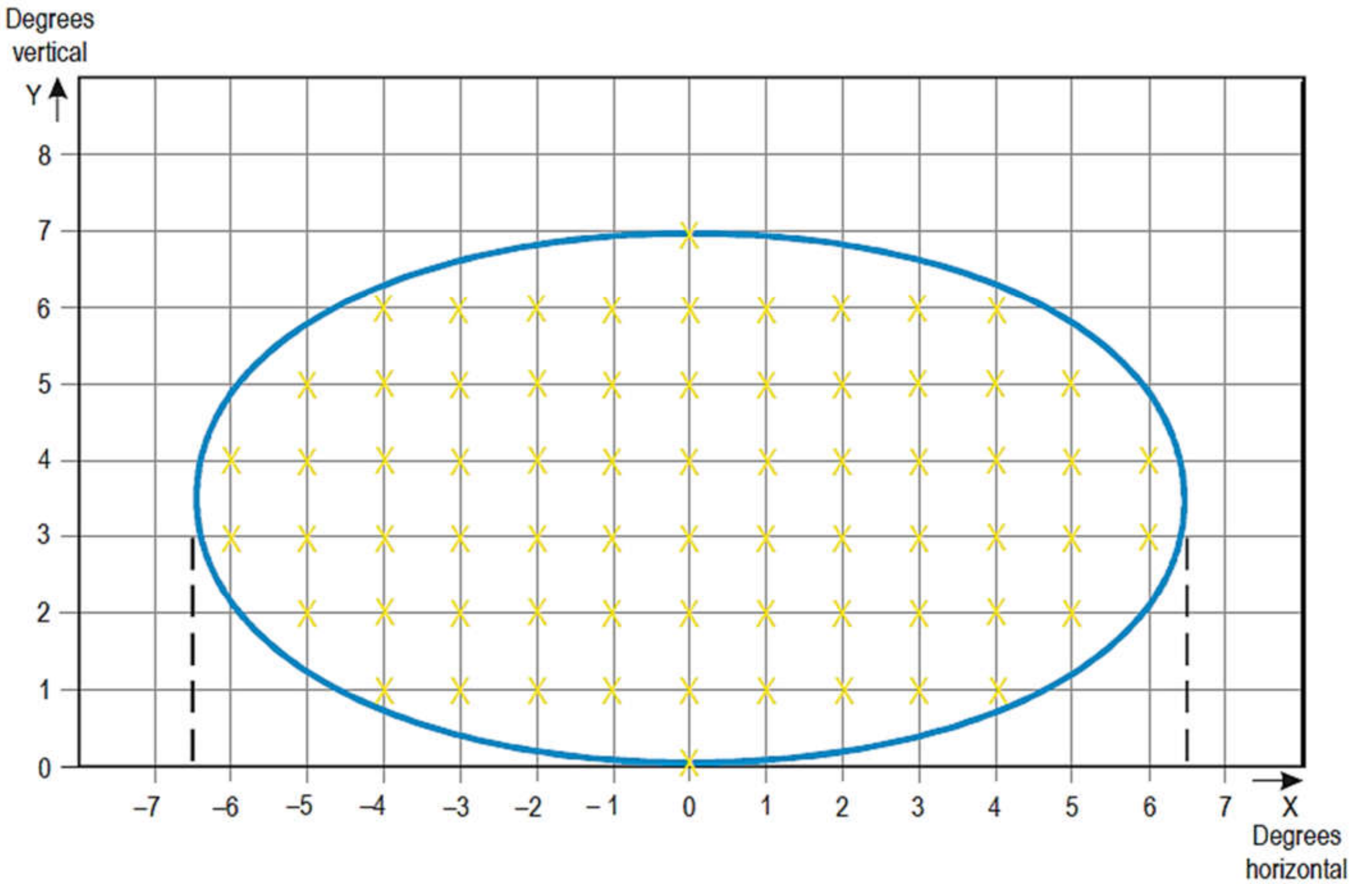


Figure A2-11. Grid points to be used for the calculation of average intensity of approach and runway lights

Collective notes to Figures A2-1 to A2-11 and A2-26

(1) The ellipses in each figure are symmetrical about the common vertical and horizontal axes.

(2) Figures A2-1 to A2-10, as well as Figure A2-26, show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure A2-11 and using the intensity value measures at all grid points located within and on the perimeter of the ellipse representing the main beam. The average value is the arithmetic average of light intensities measured at all considered grid points.

(3) No deviations are acceptable in the main beam pattern when the lighting fixture is properly aimed.

(4) Average intensity ratio. The ratio between the average intensity within the ellipse defining the main beam of a typical new light and the average light intensity of the main beam of a new runway edge light shall be as follows:

Figure A2-1	Approach centre line and crossbars	1.5 to 2.0 (white light)
Figure A2-2	Approach side row	0.5 to 1.0 (red light)
Figure A2-3	Threshold	1.0 to 1.5 (green light)
Figure A2-4	Threshold wing bar	1.0 to 1.5 (green light)
Figure A2-5	Touchdown zone	0.5 to 1.0 (white light)
Figure A2-6	Runway centre line (longitudinal spacing 30 m)	0.5 to 1.0 (white light)
Figure A2-7	Runway centre line (longitudinal spacing 15 m)	0.5 to 1.0 for CAT III (white light) 0.25 to 0.5 for CAT I, II (white light)
Figure A2-8	Runway end	0.25 to 0.5 (red light)
Figure A2-9	Runway edge (45 m runway width)	1.0 (white light)
Figure A2-10	Runway edge (60 m runway width)	1.0 (white light)

(5) The beam coverages in the figures provide the necessary guidance for approaches

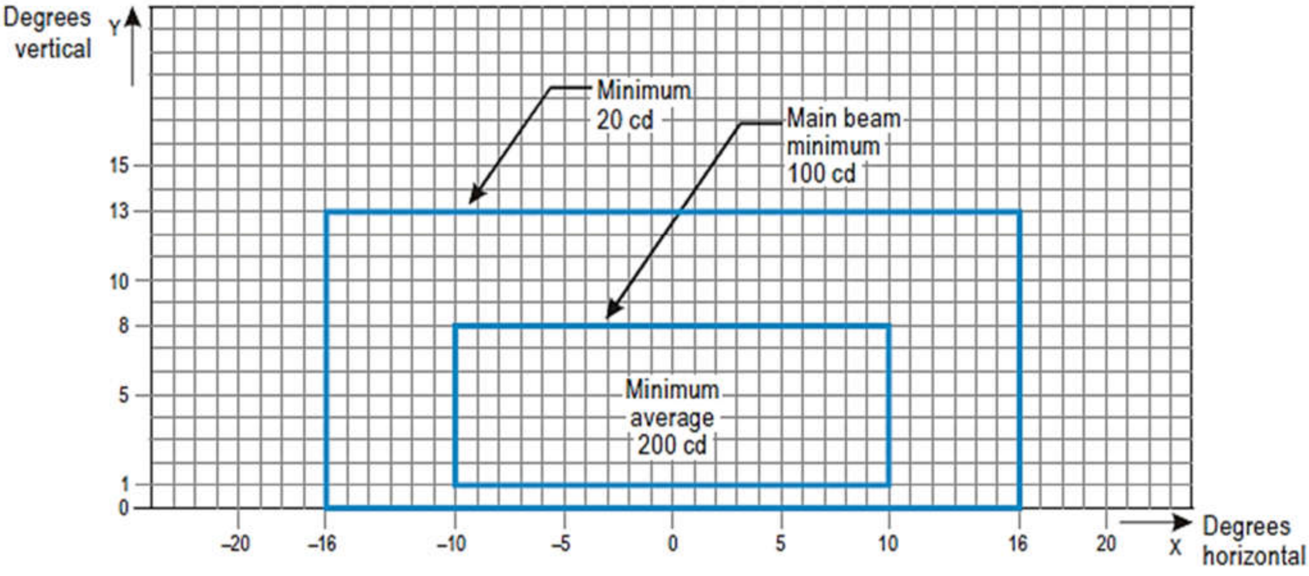
down to an RVR of the order of 150 m and take-offs down to an RVR of the order of 100 m.

(6) Horizontal angles are measured with respect to the vertical plane through the runway centre line. For lights other than centre line lights, the direction towards the runway centre line is considered positive. Vertical angles are measured with respect to the horizontal plane.

(7) Where, for approach centre line lights and crossbars and for approach side row lights, inset lights are used in lieu of elevated lights, e.g. on a runway with a displaced threshold, the intensity requirements can be met by installing two or three fittings (lower intensity) at each position.

(8) The importance of adequate maintenance cannot be overemphasized. The average intensity should never fall to a value less than 50 per cent of the value shown in the figures, and it should be the aim of airport authorities to maintain a level of light output close to the specified minimum average intensity.

(9) The light unit shall be installed so that the main beam is aligned within one-half degree of the specified requirement.



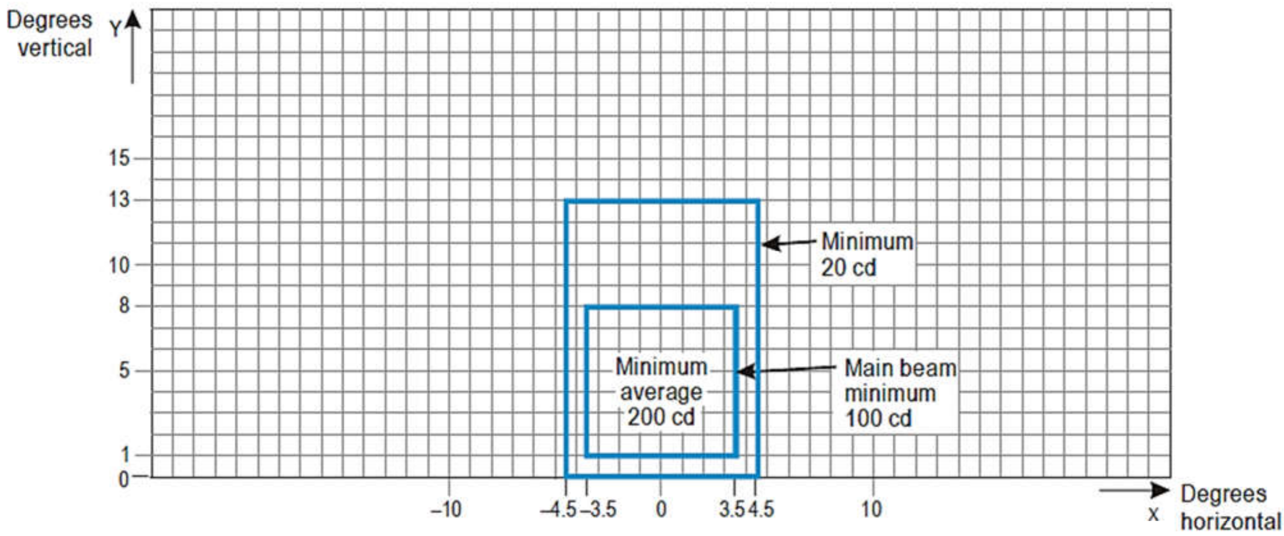
Notes:

1. These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m and are intended for use before and after curves.

2. See collective notes for Figures A2-12 to A2-21.

3. Increased intensities for enhanced rapid exit taxiway centre line lights as recommended in 5.3.16.9 are four times the respective intensities in the figure (i.e. 800 cd for minimum average main beam).

Figure A2-12. Isocandela diagram for taxiway centre line (15 m spacing), RELs, no-entry bar and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m where large offsets can occur and for low-intensity runway guard lights, Configuration B

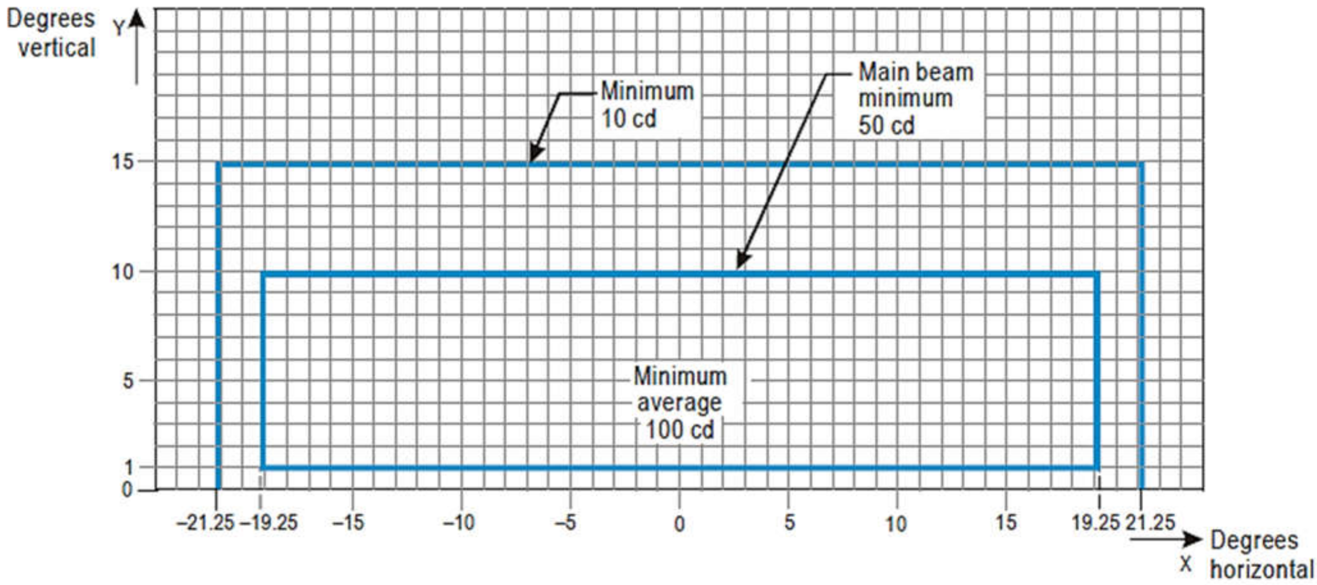


Notes:

1. These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit from the centre line of approximately 3 m.

2. See collective notes for Figures A2-12 to A2-21.

Figure A2-13. Isocandela diagram for taxiway centre line (15 m spacing), no-entry bar and stop bar lights in straight sections intended for use in runway visual range conditions of less than a value of 350 m



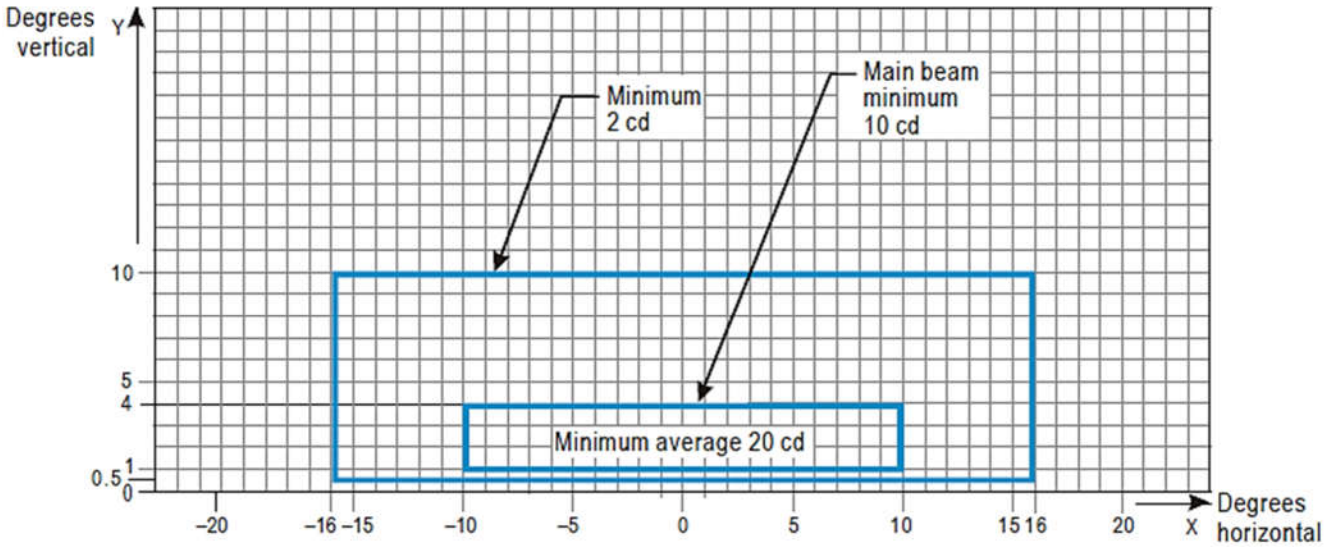
Notes:

1. Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve. This does not apply to runway entrance lights (RELs)

2. Increased intensities for RELs shall be twice the specified intensities, i.e., minimum 20 cd, main beam minimum 100 cd and minimum average 200 cd.

3. See collective notes for Figures A2-12 to A2-21.

Figure A2-14. Isocandela diagram for taxiway centre line (7.5 m spacing), RELs, no-entry bar and stop bar lights in curved sections intended for use in runway visual range conditions of less than a value of 350 m



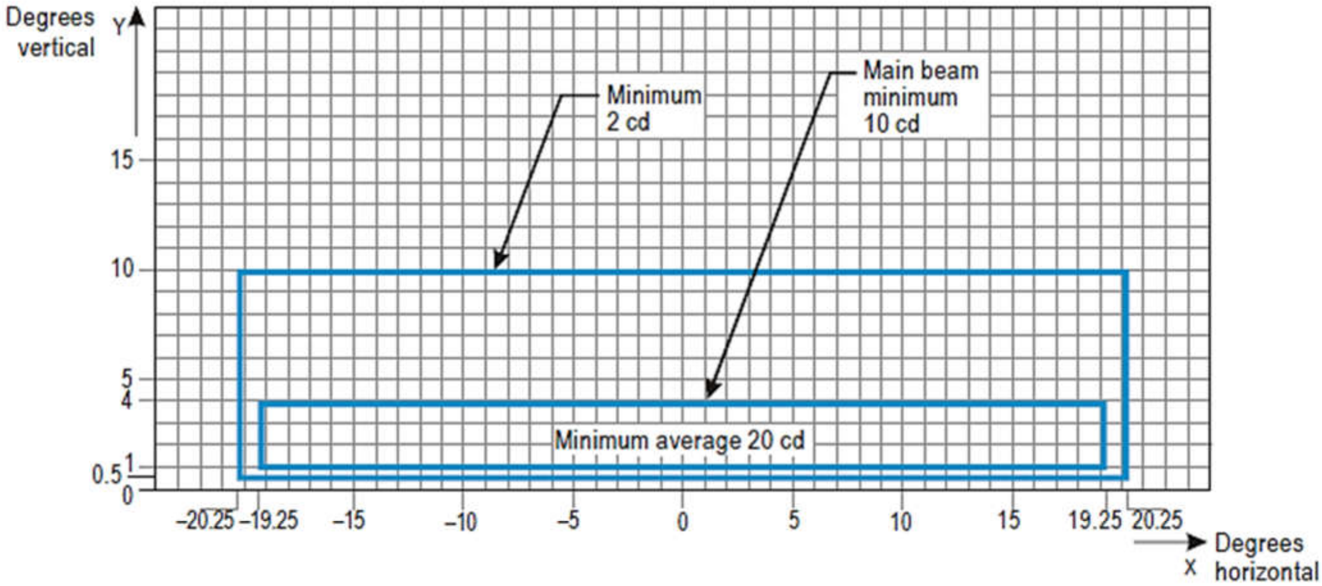
Notes:

1. At locations where high background luminance is usual and where deterioration of light output resulting from dust, snow and local contamination is a significant factor, the cd-values should be multiplied by 2.5.

2. Where omnidirectional lights are used they shall comply with the vertical beam requirements in this figure.

3. See collective notes for Figures A2-12 to A2-21.

Figure A2-15. Isocandela diagram for taxiway centre line (30 m, 60 m spacing), no-entry bar and stop bar lights in straight sections intended for use in runway visual range conditions of 350 m or greater



Notes:

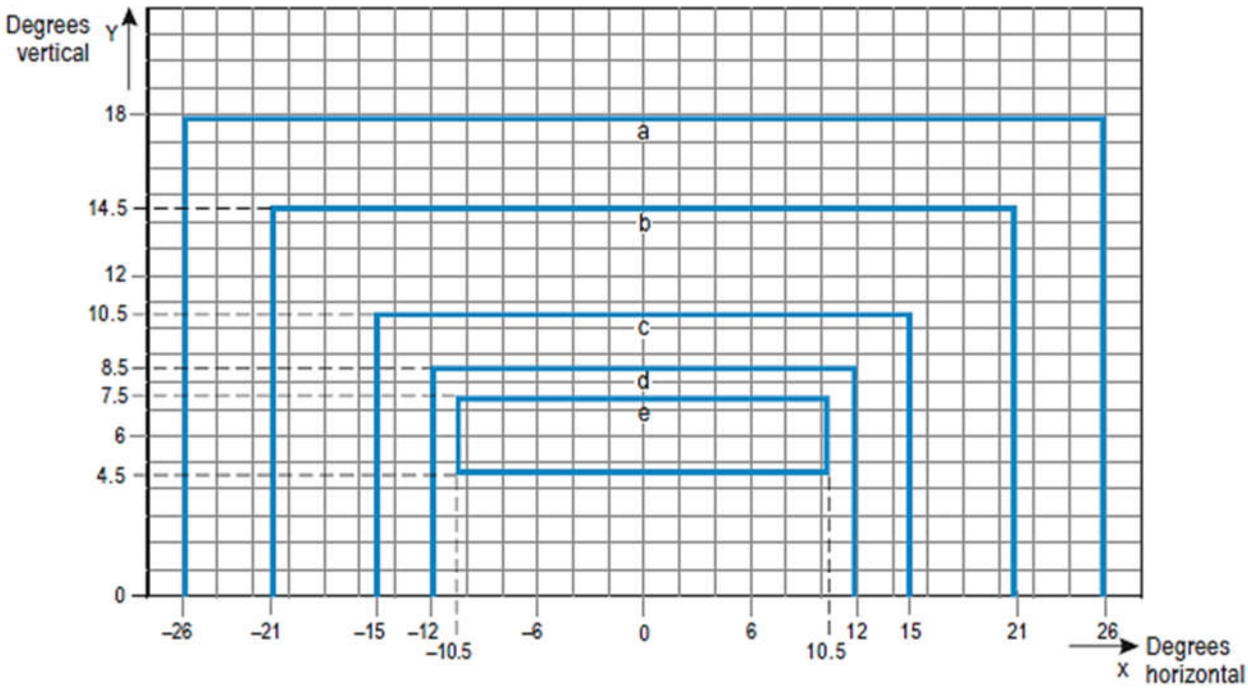
1. Lights on curves to be toed-in 15.75 degrees with respect to the tangent of the curve.

2. At locations where high background luminance is usual and where deterioration of light output resulting from dust, snow and local contamination is a significant factor, the cd-values should be multiplied by 2.5.

3. These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m as could occur at the end of curves.

4. See collective notes for Figures A2-12 to A2-21.

Figure A2-16. Isocandela diagram for taxiway centre line (7.5 m, 15 m, 30 m spacing), no-entry bar and stop bar lights in curved sections intended for use in runway visual range conditions of 350 m or greater



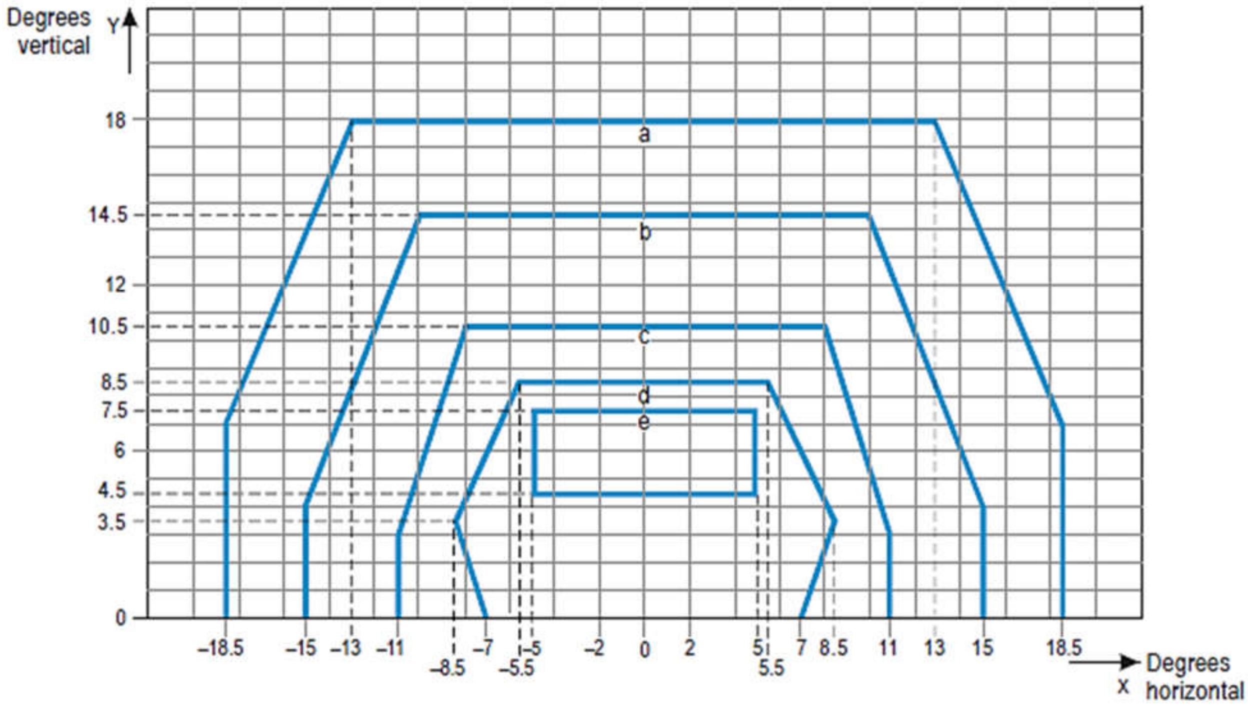
Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1 800

Notes:

1. These beam coverages allow for displacement of the cockpit from the centre line up to distances of the order of 12 m and are intended for use before and after curves.

2. See collective notes for Figures A2-12 to A2-21.

Figure A2-17. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required and where large offsets can occur



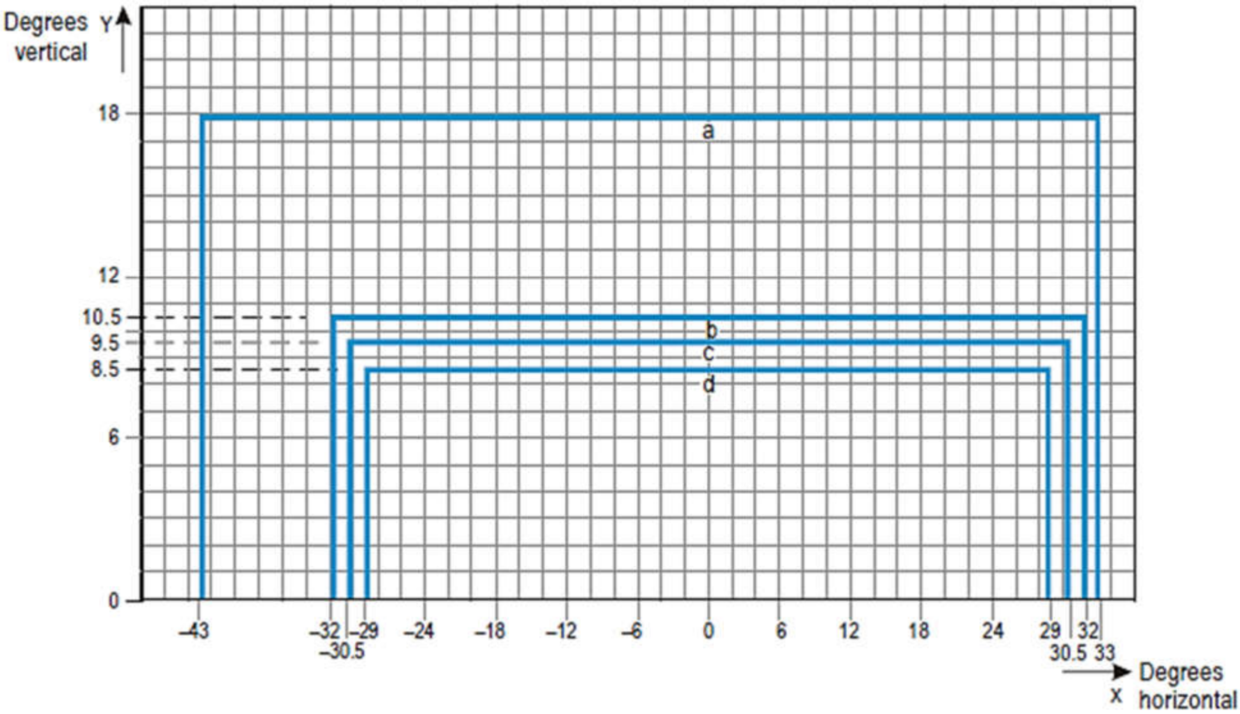
Curve	a	b	c	d	e
Intensity (cd)	8	20	100	450	1 800

Notes:

1. These beam coverages are generally satisfactory and cater for a normal displacement of the cockpit corresponding to the outer main gear wheel on the taxiway edge.

2. See collective notes for Figures A2-12 to A2-21.

Figure A2-18. Isocandela diagram for high-intensity taxiway centre line (15 m spacing), no-entry bar and stop bar lights in straight sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required

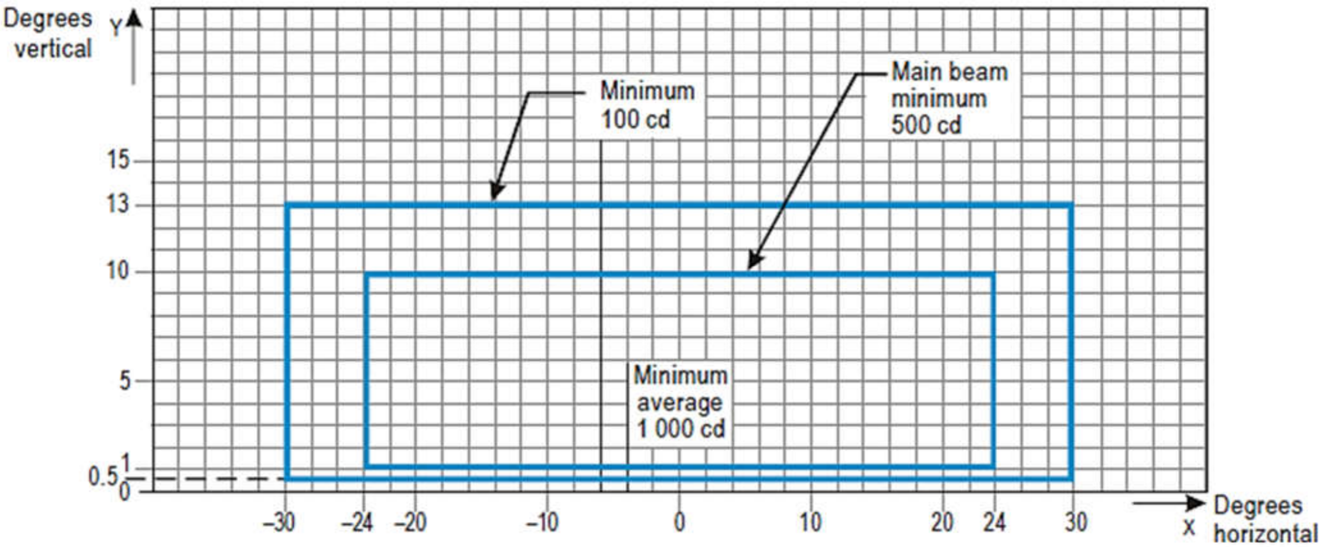


Curve	a	b	c	d
Intensity (cd)	8	100	200	400

Notes:

1. Lights on curves to be toed-in 17 degrees with respect to the tangent of the curve.
2. See collective notes for Figures A2-12 to A2-21.

Figure A2-19. Isocandela diagram for high-intensity taxiway centre line (7.5 m spacing), no-entry bar and stop bar lights in curved sections intended for use in an advanced surface movement guidance and control system where higher light intensities are required



Notes:

1. Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

2. See collective notes for Figures A2-12 to A2-21.

Figure A2-20. Isocandela diagram for high-intensity runway guard lights, Configuration B

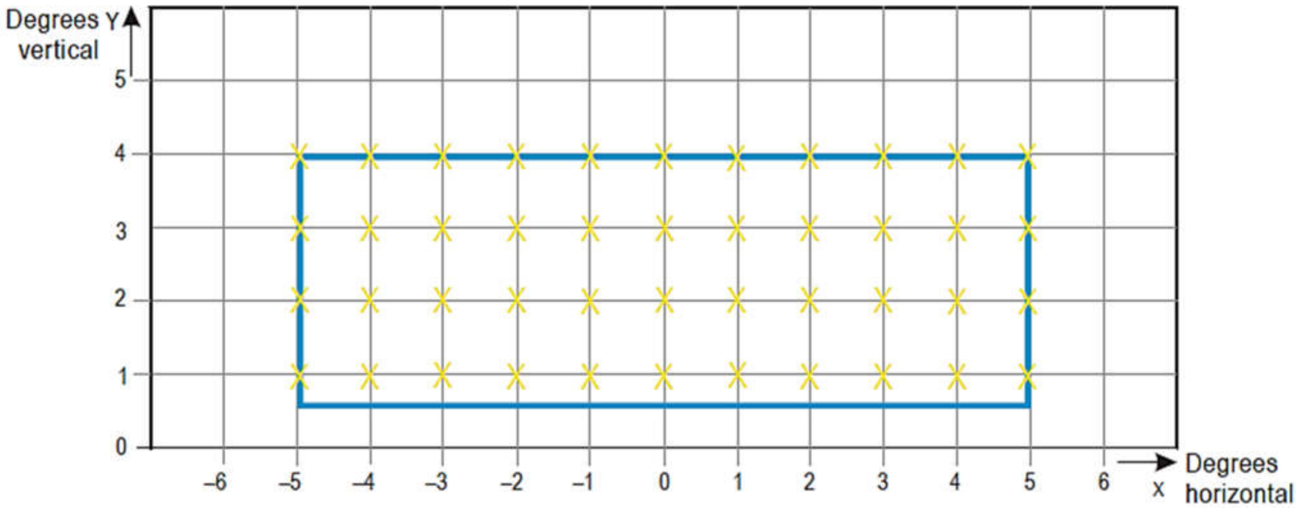


Figure A2-21. Grid points to be used for calculation of average intensity of taxiway centre line and stop bar lights

Collective notes to Figures A2-12 to A2-21

(1) The intensities specified in Figures A2-12 to A2-20 are in green and yellow light for taxiway centre line lights, yellow light for runway guard lights and red light for stop bar lights.

(2) Figures A2-12 to A2-20 show the minimum allowable light intensities. The average intensity of the main beam is calculated by establishing grid points as shown in Figure A2-21 and using the intensity values measured at all grid points located within and on the perimeter of the rectangle representing the main beam. The average value is the arithmetic average of the light intensities measured at all considered grid points.

(3) No deviations are acceptable in the main beam or in the innermost beam, as applicable, when the lighting fixture is properly aimed.

(4) Horizontal angles are measured with respect to the vertical plane through the taxiway centre line except on curves where they are measured with respect to the tangent to the curve.

(5) Vertical angles are measured from the longitudinal slope of the taxiway surface.

(6) The importance of adequate maintenance cannot be overemphasized. The intensity, either average where applicable or as specified on the corresponding isocandela curves, should never fall to a value less than 50 per cent of the value shown in the figures, and it should be the aim of airport authorities to maintain a level of light output close to the specified minimum average intensity.

(7) The light unit shall be installed so that the main beam or the innermost beam, as applicable, is aligned within one-half degree of the specified requirement.

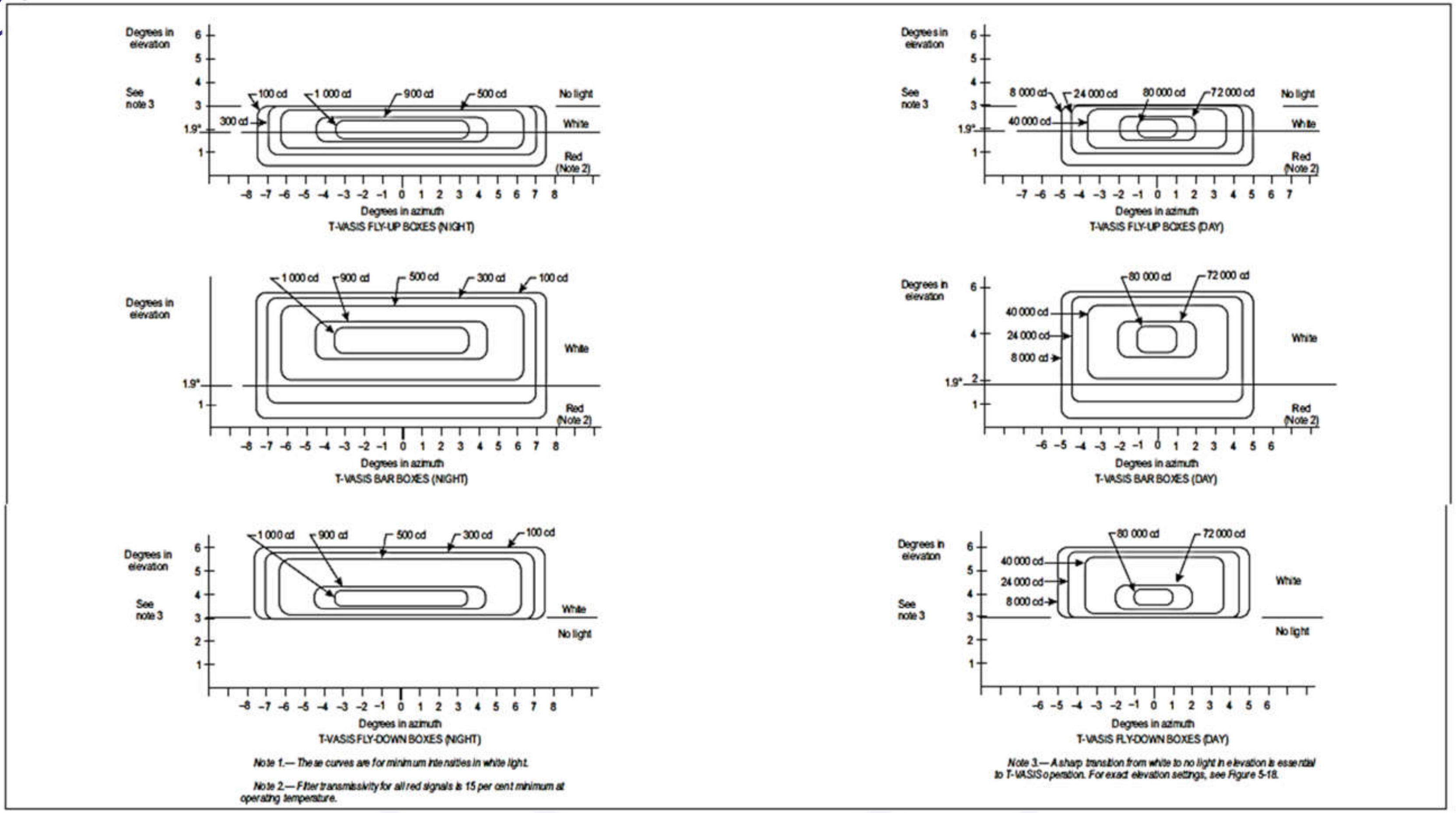
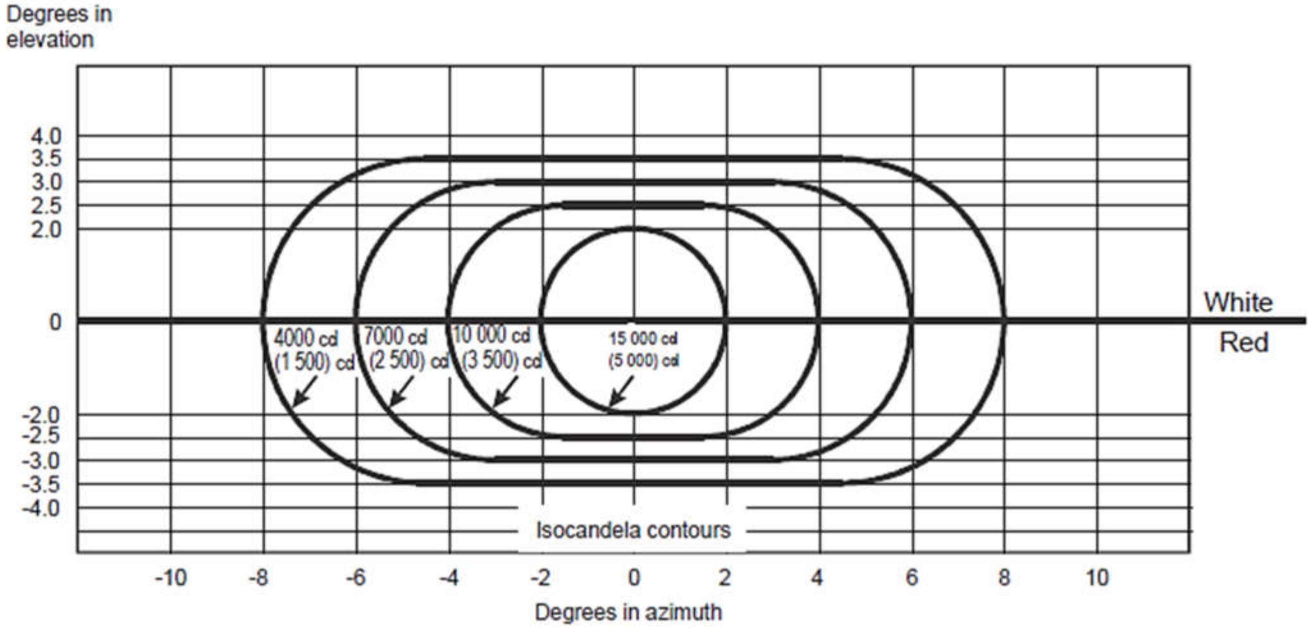


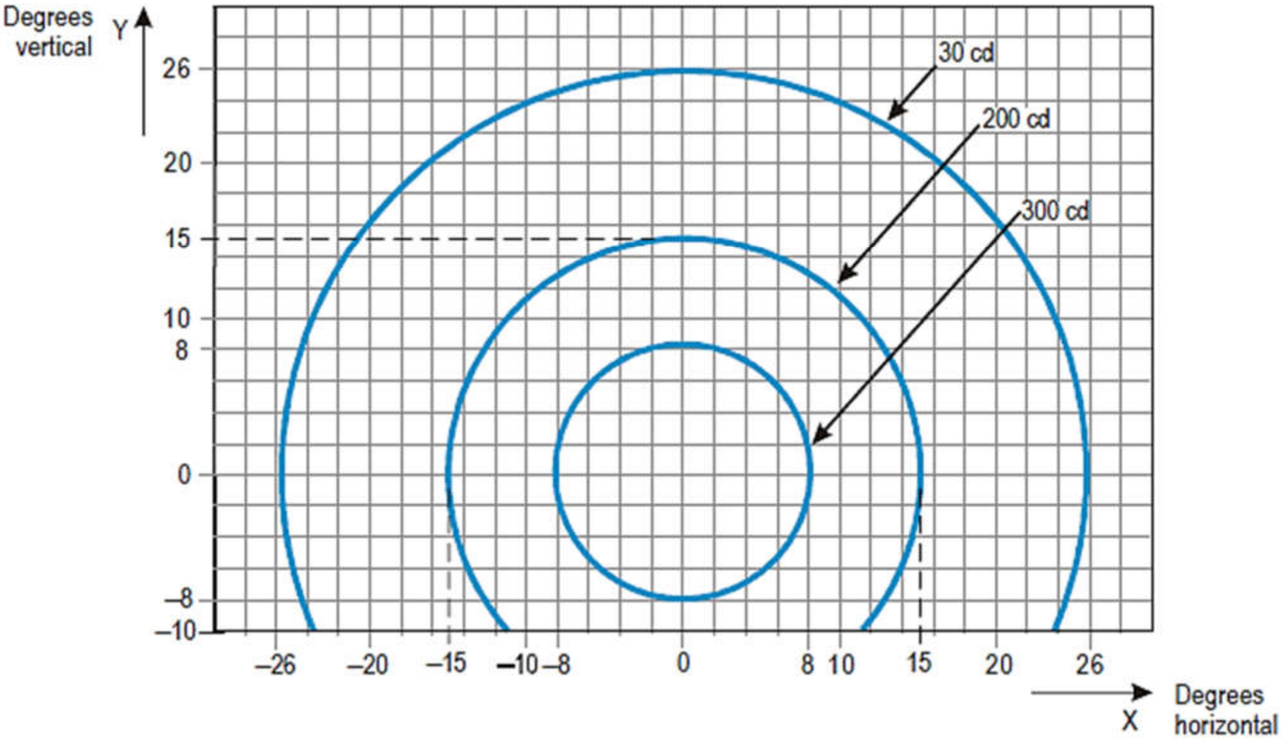
Figure A2-22. Light intensity distribution of T-VASIS and AT-VASIS



Notes:

1. These curves are for minimum intensities in red light.
2. The intensity value in the white sector of the beam is no less than 2 and may be as high as 6.5 times the corresponding intensity in the red sector.
3. The intensity values shown in brackets are for APAPI.

Figure A2-23. Light intensity distribution of PAPI and APAPI

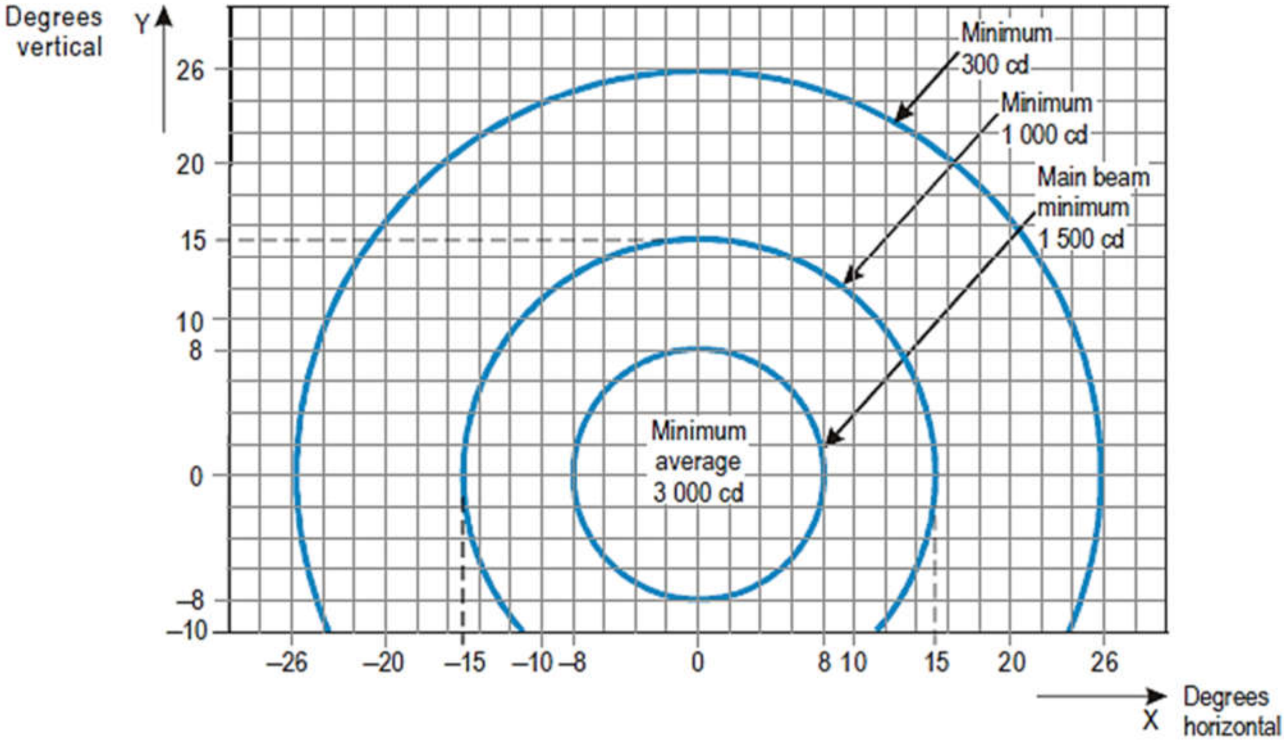


Notes:

1. Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

2. The intensities specified are in yellow light.

Figure A2-24. Isocandela diagram for each light in low-intensity runway guard lights, Configuration A

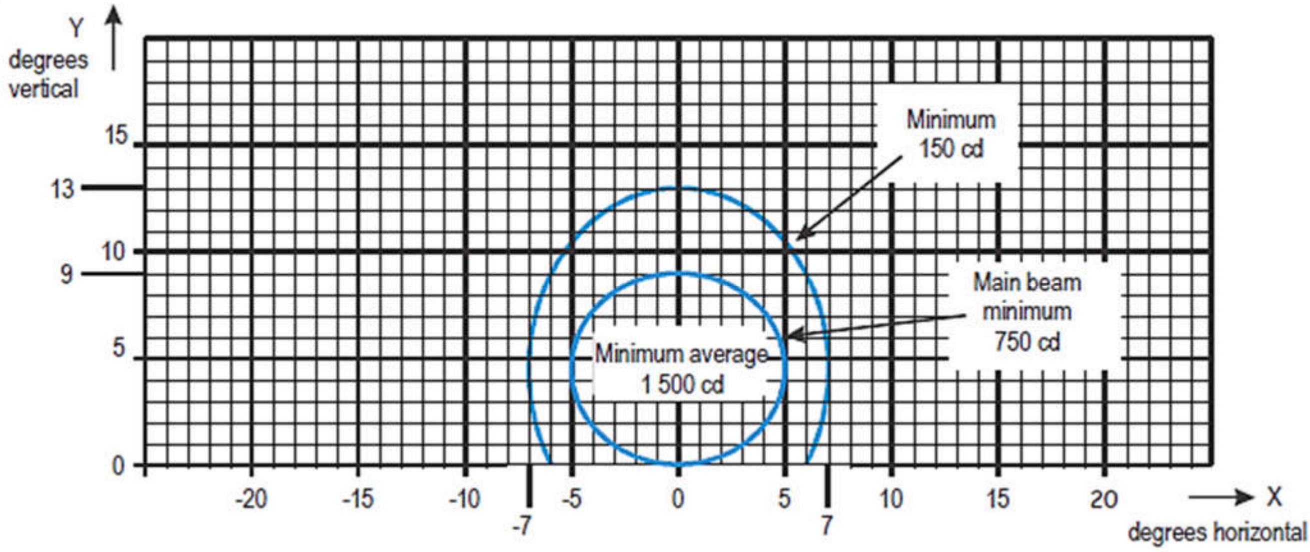


Notes:

1. Although the lights flash in normal operation, the light intensity is specified as if the lights were fixed for incandescent lamps.

2. The intensities specified are in yellow light.

Figure A2-25. Isocandela diagram for each light in high-intensity runway guard lights, Configuration A



Notes:

1. Curves calculated on formula $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

a	5.0	7.0
b	4.5	8.5

2. See collective notes for Figures A2-1 to A2-11 and A2-26.

Figure A2-26. Isocandela diagram for take-off and hold lights (THL) (red light)

IS 12.2.5.2 (p) - MANDATORY INSTRUCTION MARKINGS AND INFORMATION MARKINGS

Note 1.— See Sections 12.2.5.2(p) and 12.2.5.2(q), for specificationson the application, location and characteristics of mandatory instruction markingsand information markings.

Note 2. — This appendix details the form and proportions of the letters, numbers and symbols of mandatory instruction markings and information markings on a grid.

Note 3.— The mandatory instruction markings and information markings on pavements are formed as if shadowed (i.e., stretched) from the characters of an equivalent elevated sign by a factor of 2.5 as shown in Figure A3-1. The shadowing, however, only affects the vertical dimension. Therefore, the spacing of characters for pavement marking is obtained by first determining the equivalent elevated sign character height and then proportioning from the spacing values given in Table A4-1.

For example, in the case of the runway designator “10” which is to have a height of 4 000 mm (Hps), the equivalent elevated sign character height is 4 000/2.5=1 600 mm (Hes). Table A4-1(b) indicates numeral to numeral code 1 and from Table A4-1(c) this code has a dimension of 96 mm, for a character height of 400 mm. The pavement marking spacing for “10 is then (1 600/400) *96=384 mm.

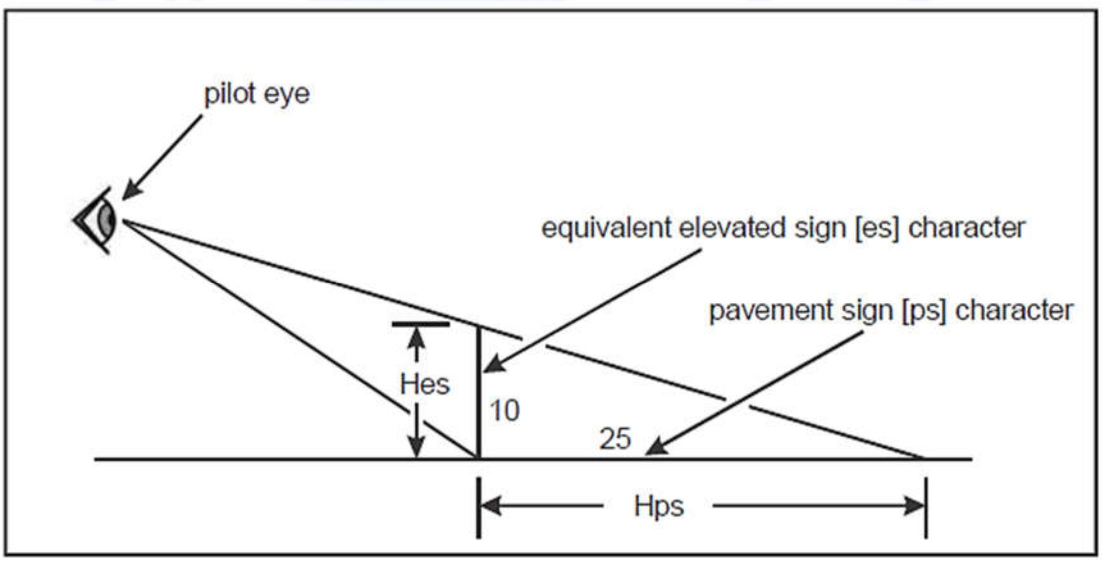
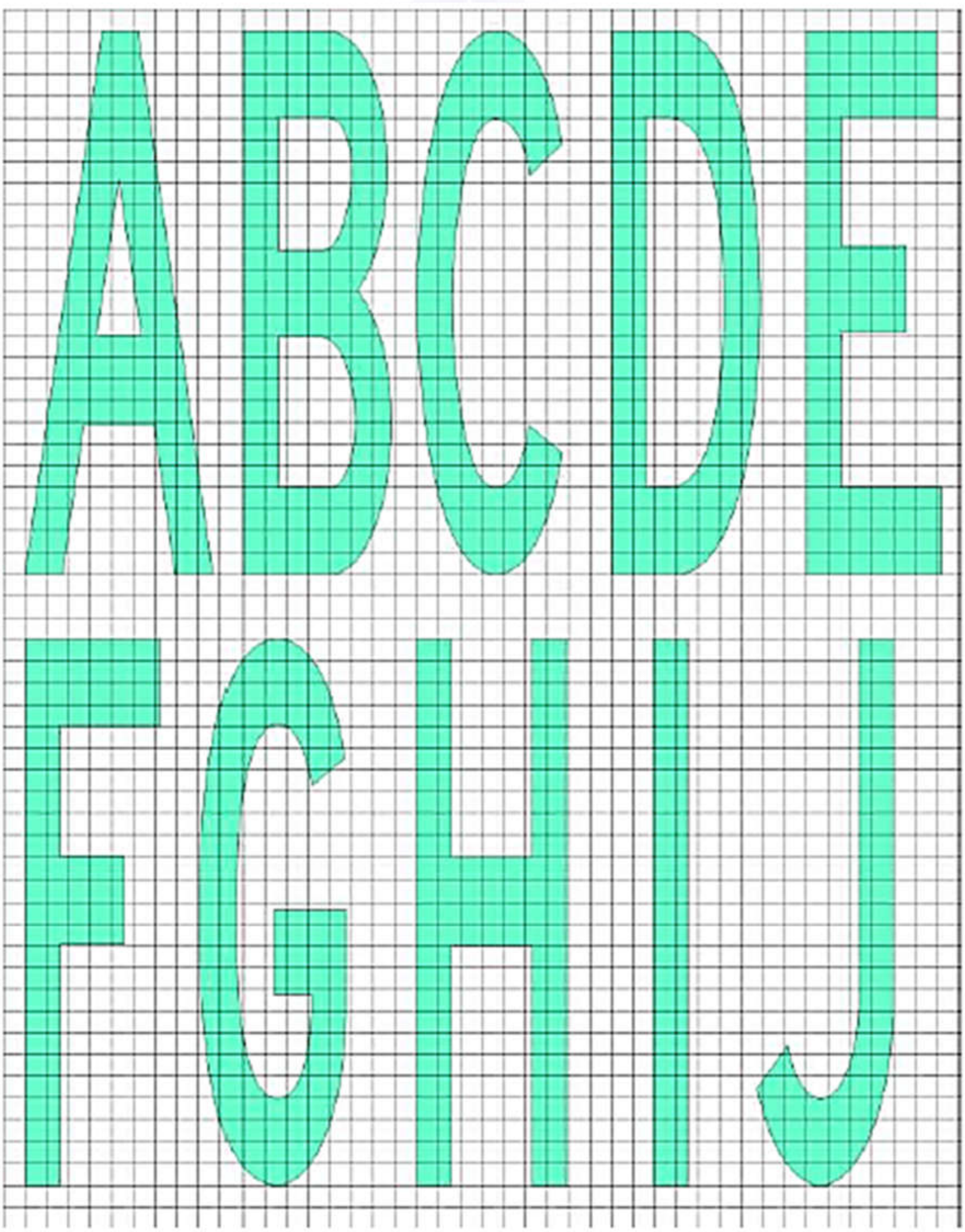
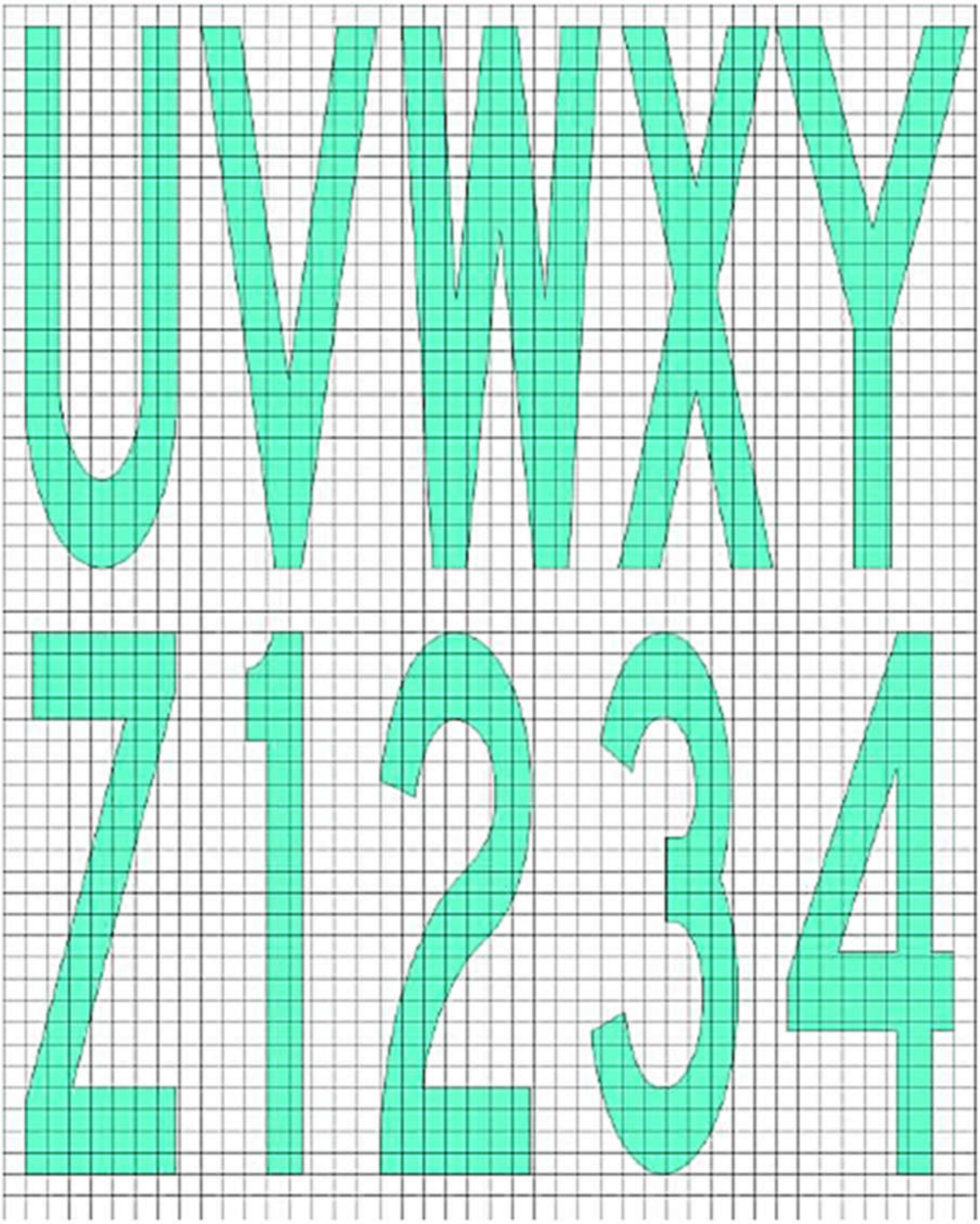
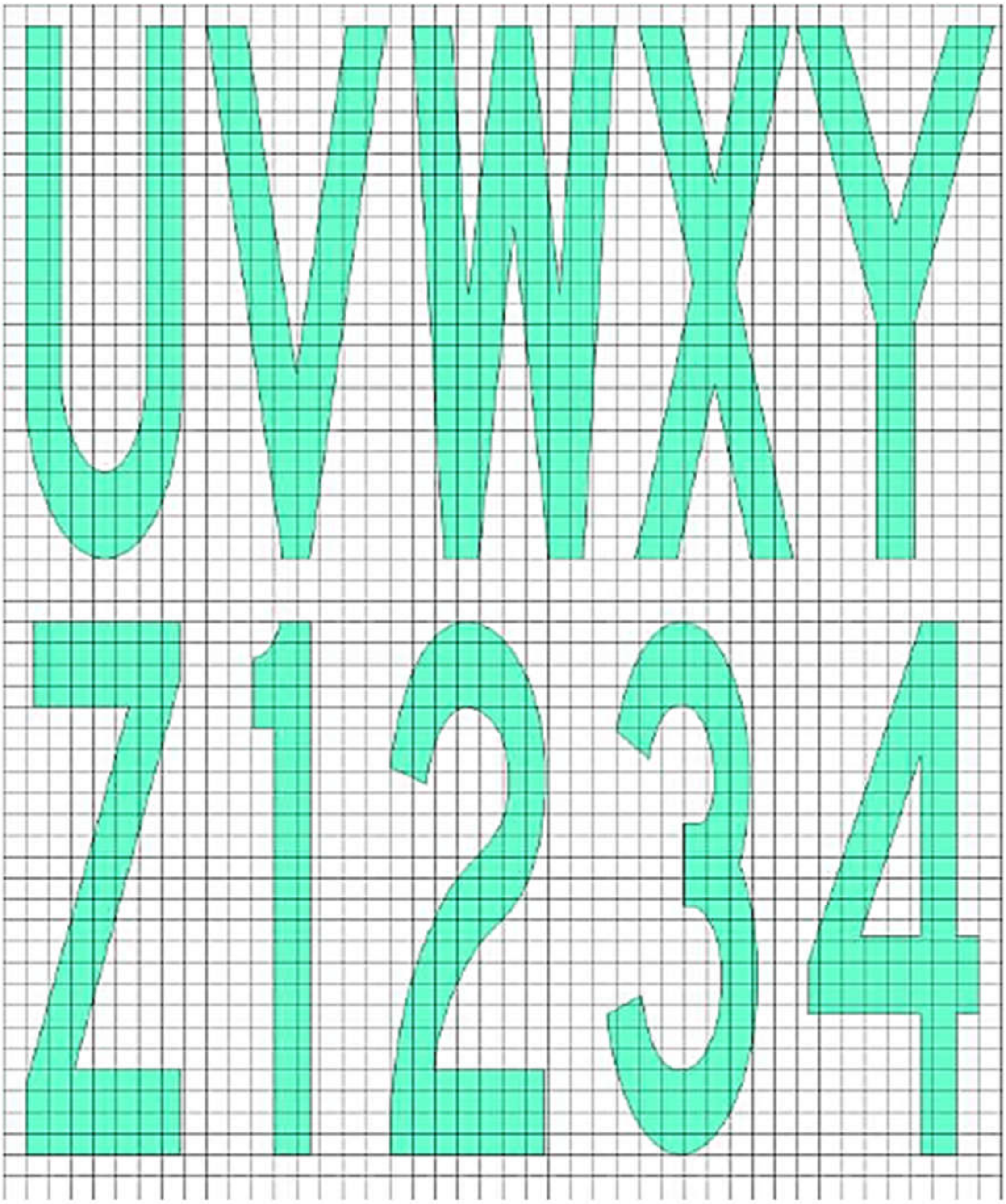


Figure A3-1


ABCDE
FGHIJ


KLMNO
PQRST


UVWXY
Z1234




5 6 7 8 9
0

IS 12.2.5.4 – REQUIREMENTS CONCERNING DESIGN OF TAXIING GUIDANCE SIGNS

Note. — See subsection 12.2.5.4 for specifications on the application, location and characteristics of signs.

(1) Inscription heights shall conform to the following tabulation.

Runway code number	Minimum character height		
	Mandatory instruction sign	Information sign	
		Runway exit and runway vacated signs	Other signs
1 or 2	300 mm	300 mm	200 mm
3 or 4	400 mm	400 mm	300 mm

Note. — Where a taxiway location sign is installed in conjunction with a runway designation sign (see paragraph 12.2.5.4(c)(22), the character size shall be that specified for mandatory instruction signs

(2) Arrow dimensions shall be as follows:

Legend height	***Stroke***
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

(3) Stroke width for single letter shall be as follows:

Legend height	***Stroke***
200 mm	32 mm
300 mm	48 mm
400 mm	64 mm

(4) Sign luminance shall be as follows:
   (a) Where operations are conducted in runway visual range conditions less than a value of 800 m, average sign luminance shall be at least:

Red	30 cd/m^2
Yellow	150 cd/m^2
White	300 cd/m^2

(b) Where operations are conducted in accordance with paragraphs 12.2.5.4 (a)(7)(ii) and 12.2.5.4(a)(8), average sign luminance shall be at least:

Red	10 cd/m^2
Yellow	50 cd/m^2
White	100 cd/m^2

Note. — In runway visual range conditions less than a value of 400 m, there will be some degradation in the performance of signs.

(5) The luminance ratio between red and white elements of a mandatory sign shall be between 1:5 and 1:10.

(6) The average luminance of the sign is calculated by establishing grid points as shown in Figure A4-1 and using the luminance values measured at all grid points located within the rectangle representing the sign.

(7) The average value is the arithmetic average of the luminance values measured at all considered grid points.

Note. — Guidance on measuring the average luminance of a sign is contained in the Aerodrome Design Manual (Doc 9157), Part 4.

(8) The ratio between luminance values of adjacent grid points shall not exceed 1.5:1. For areas on the sign face where the grid spacing is 7.5 cm, the ratio between luminance values of adjacent grid points shall not exceed 1.25:1. The ratio between the maximum and minimum luminance value over the whole sign face shall not exceed 5:1.

(9) The forms of characters, i.e., letters, numbers, arrows and symbols, shall conform to those shown in Figure A4-2.
The width of characters and the space between individual characters shall be determined as indicated in Table A4-1.

(10) The face height of signs shall be as follows:

Legend height	***Face height (min)***
200 mm	300 mm
300 mm	450 mm
400 mm	600 mm

(11) The face width of signs shall be determined using Figure A4-4 except that, where a mandatory instruction sign is provided on one side of a taxiway only, the face width shall not be less than:

(a) 1.94 m where the code number is 3 or 4; and

(b) 1.46 m where the code number is 1 or 2.

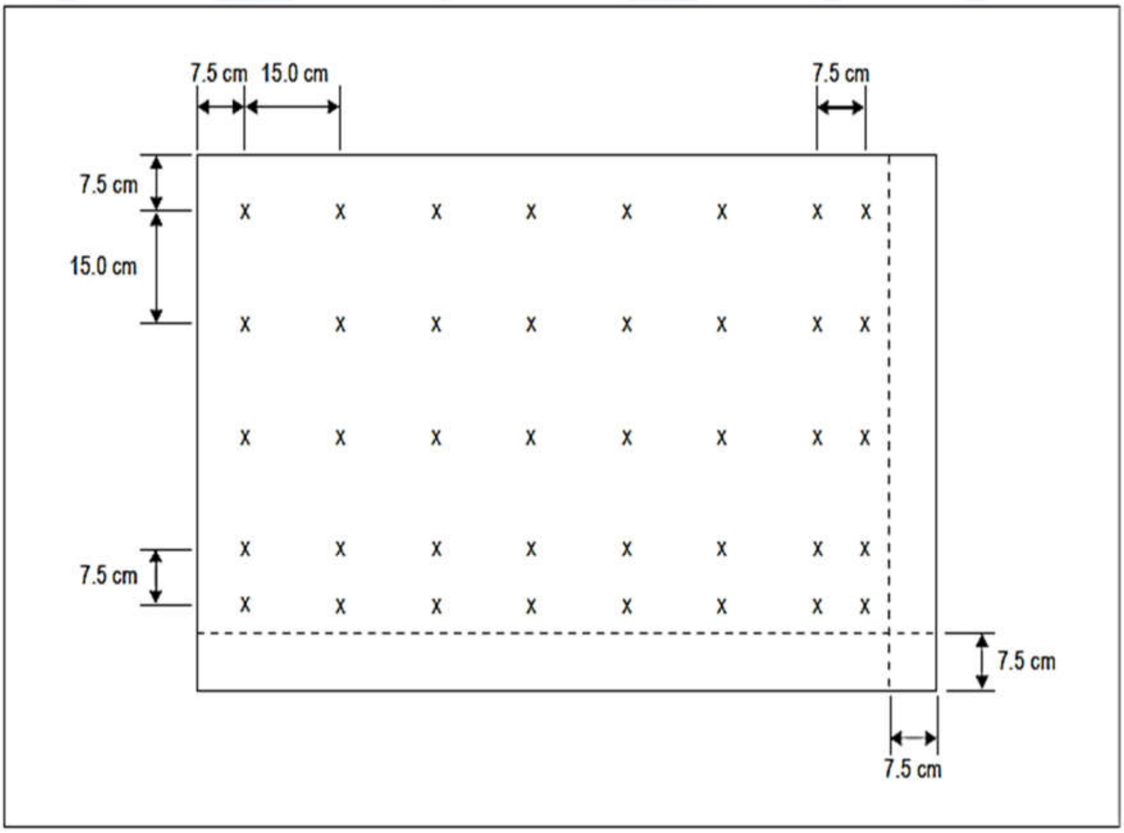
Note. — Additional guidance on determining the face width of a sign is contained in the Aerodrome Design Manual (Doc 9157), Part 4.

(12) Borders

(a) The black vertical delineator between adjacent direction signs should have a width of approximately 0.7 of the stroke width.

(b) The yellow border on a stand-alone location sign should be approximately 0.5 stroke width.

(13) The colours of signs shall be in accordance with the appropriate specifications in Appendix 1.



Note 1. — The average luminance of a sign is calculated by establishing grid points on a sign face showing typical inscriptions and a background of the appropriate colour (red for mandatory instruction signs and yellow for direction and destination signs) as follows:

(a) Starting at the top left corner of the sign face, establish a reference grid point at 7.5 cm from the left edge and the top of the sign face.

(b) Create a grid of 15 cm spacing horizontally and vertically from the reference grid point. Grid points within 7.5 cm of the edge of the sign face shall be excluded.

(c) Where the last point in a row/column of grid points is located between 22.5 cm and 15 cm from the edge of the sign face (but not inclusive), an additional point shall be added 7.5 cm from this point.

(d) Where a grid point falls on the boundary of a character and the background, the grid point shall be slightly shifted to be completely outside the character.

Note 2. — Additional grid points may be required to ensure that each character includes at least five evenly spaced grid points.

Note 3. — Where one unit includes two types of signs, a separate grid shall be established for each type.

Figure A4-1. Grid points for calculating average luminance of a sign

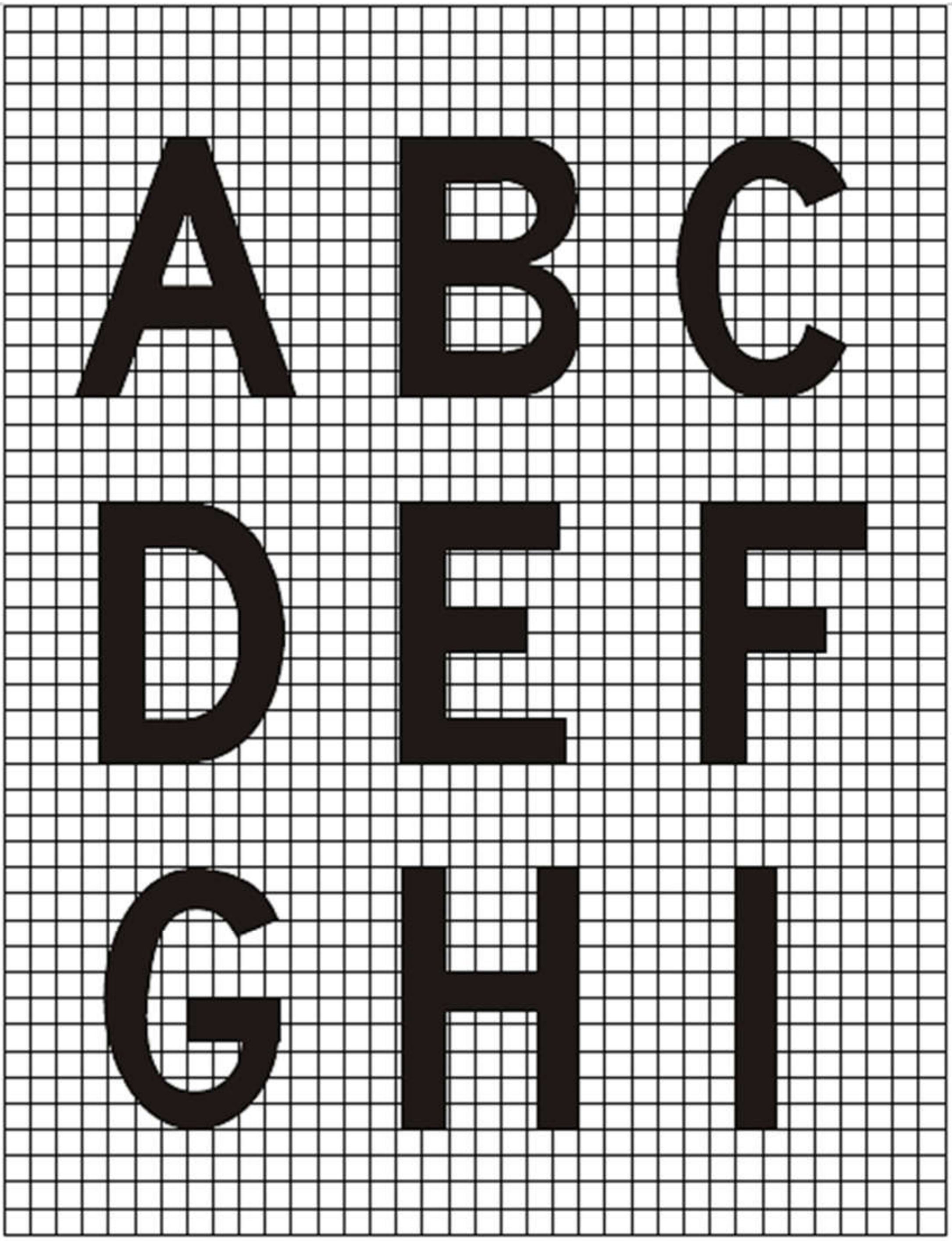


Figure A4-2. Forms of characters

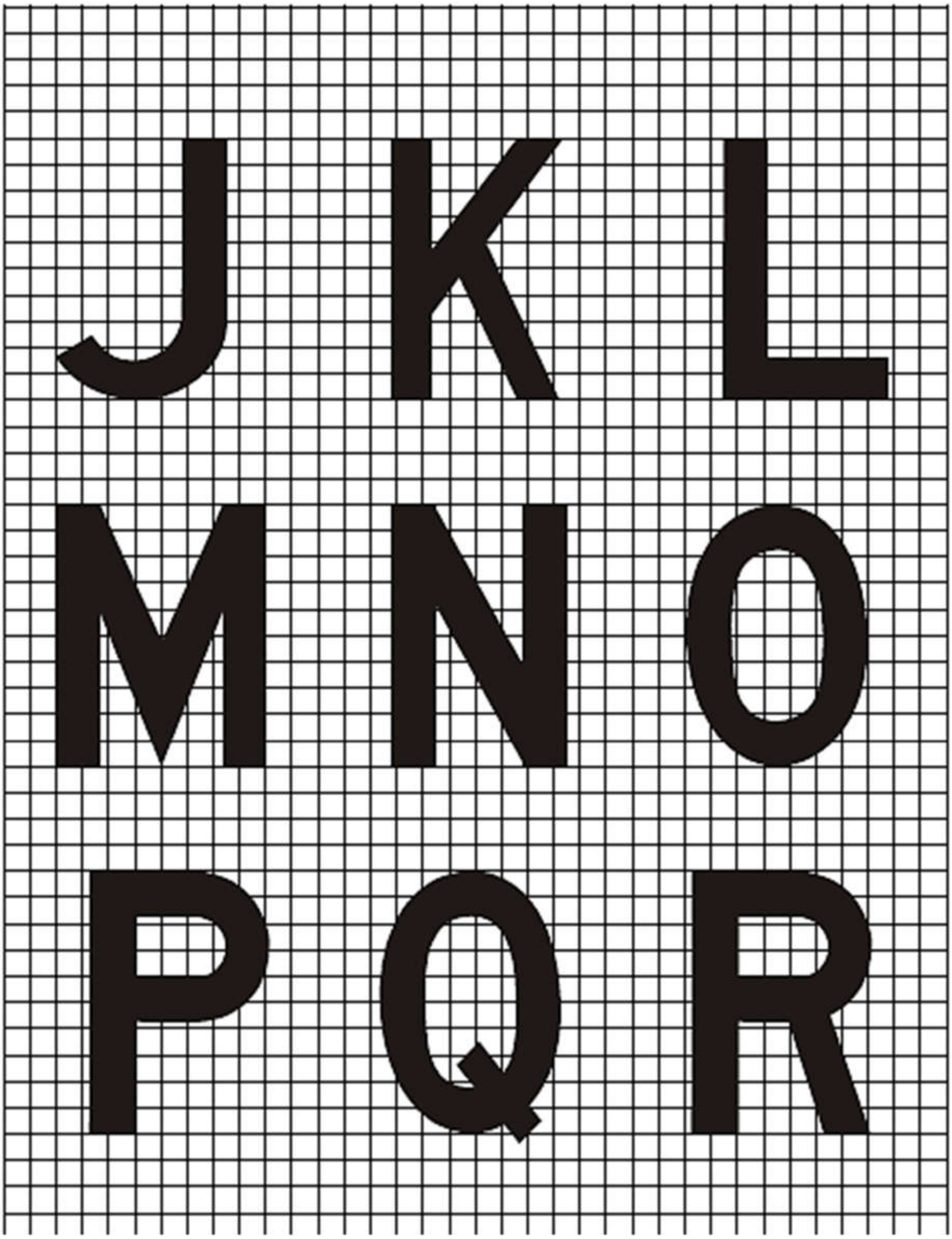


Figure A4-2. (cont.)

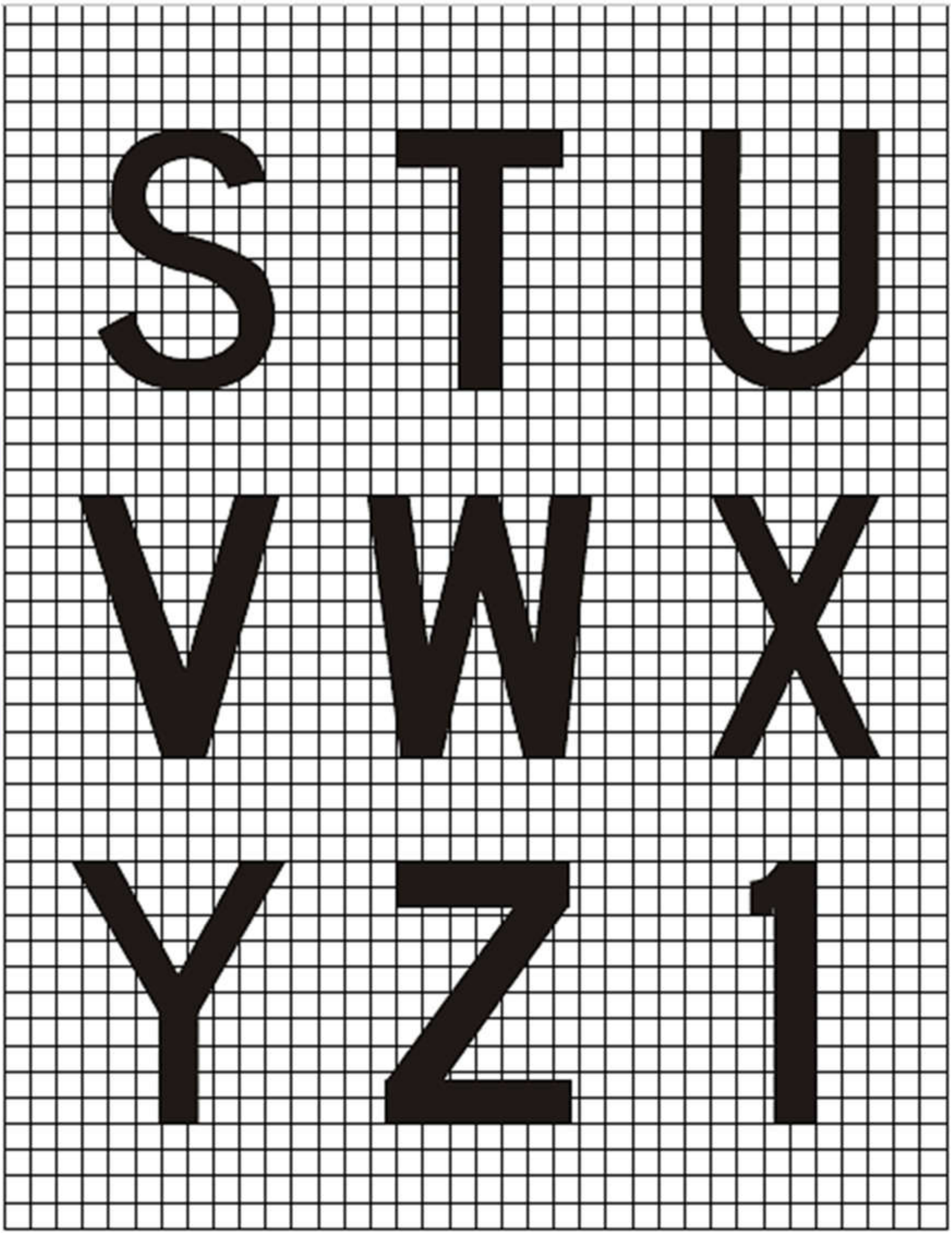


Figure A4-2. (cont.)

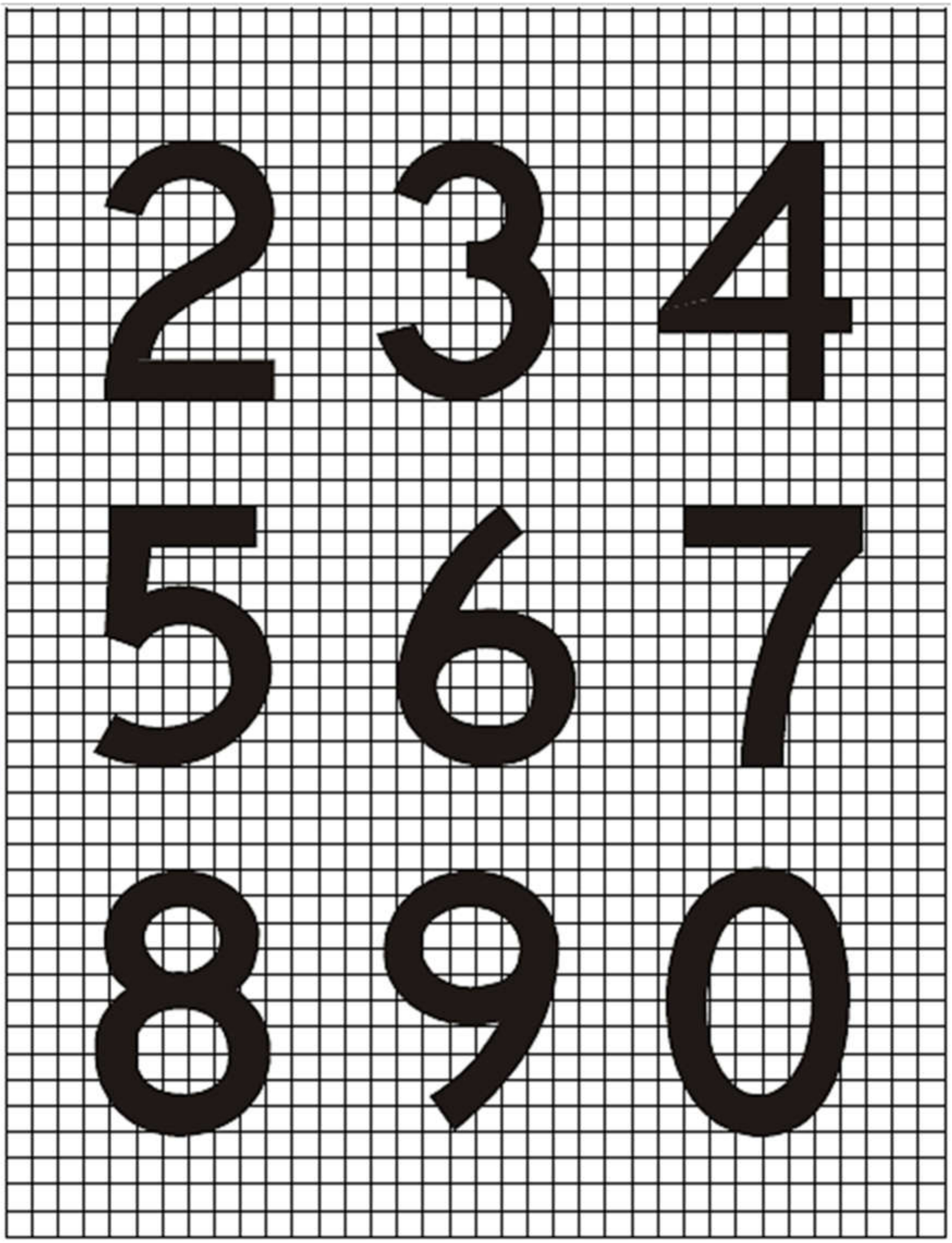


Figure A4-2. (cont.)

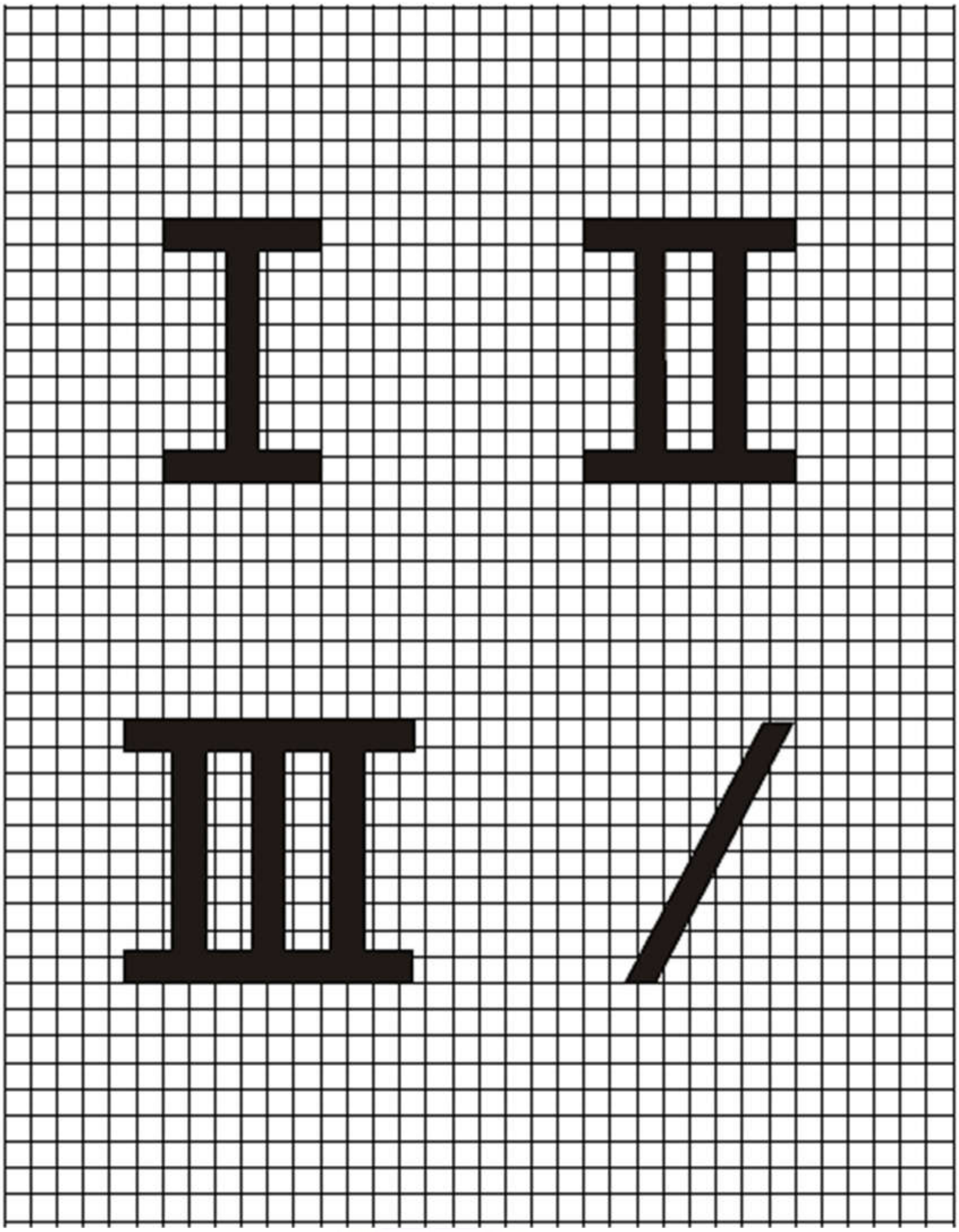
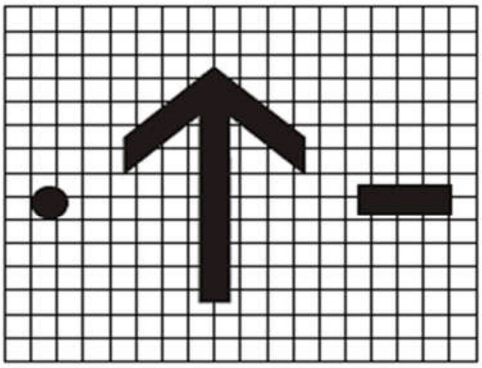


Figure A4-2. (cont.)

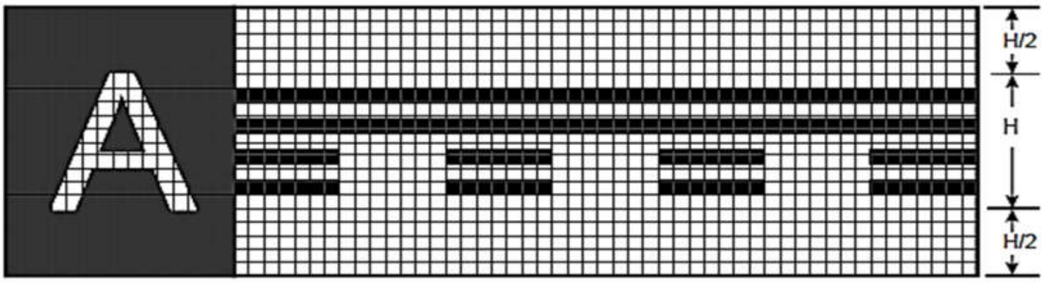


Arrow, dot and dash

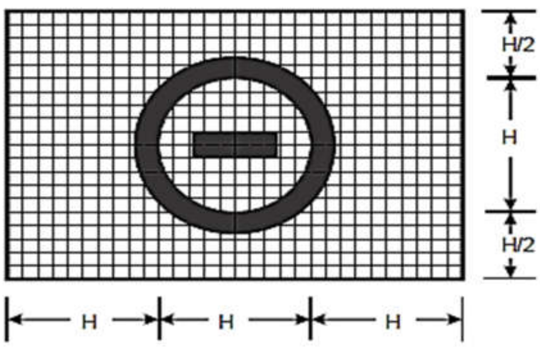
Note 1.—The arrow stroke width, diameter of the dot, and both width and length of the dash shall be proportioned to the character stroke widths.

Note 2.— The dimensions of the arrow shall remain constant for a particular sign size, regardless of orientation.

Figure A4-2.

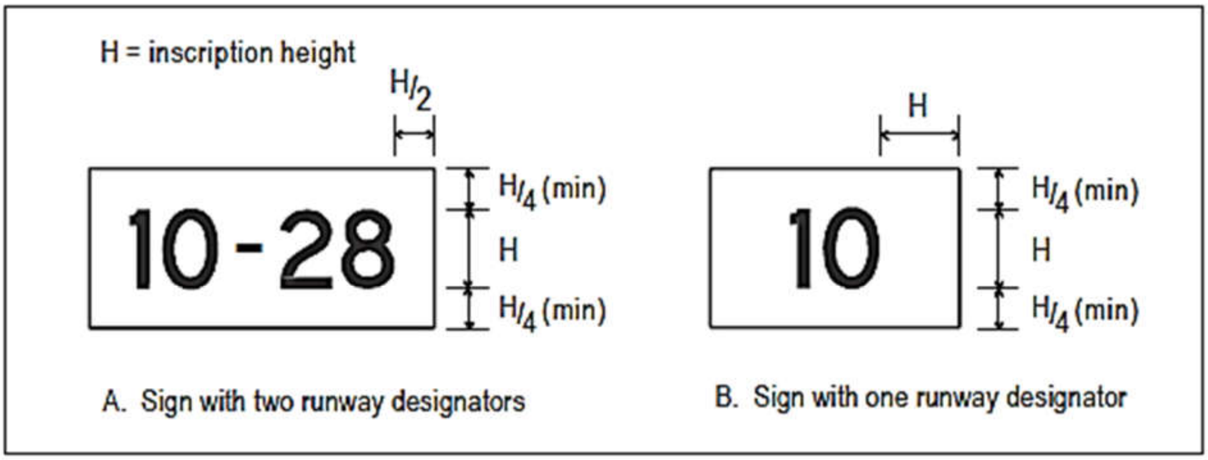


Runway vacated sign (with typical location sign)



NO ENTRY sign

Figure A4-3. Runway vacated and NO ENTRY signs



Explanatory Note to Figure A4-4: "H" stands for the inscription height.

Figure A4-4. Sign dimensions

Table A4-1. Letter and numeral widths and space between letters or numerals

a) Letter to letter code number

Preceding Letter	Following Letter		
	B, D, E, F, H, I, K, L, M, N, P, R, U	C, G, O, Q, S, X, Z	A, J, T, V, W, Y
	Code number		
A	2	2	4
B	1	2	2
C	2	2	3
D	1	2	2
E	2	2	3
F	2	2	3
G	1	2	2
H	1	1	2
I	1	1	2
J	1	1	2
K	2	2	3
L	2	2	4
M	1	1	2
N	1	1	2
O	1	2	2
P	1	2	2
Q	1	2	2
R	1	2	2
S	1	2	2
T	2	2	4
U	1	1	2
V	2	2	4
W	2	2	4
X	2	2	3
Y	2	2	4
Z	2	2	3

b) Numeral to numeral code number

Preceding Numeral	Following number		
	1, 5	2, 3, 6, 8, 9, 0	4, 7
	Code number		
1	1	1	2
2	1	2	2
3	1	2	2
4	2	2	4
5	1	2	2
6	1	2	2
7	2	2	4
8	1	2	2
9	1	2	2
0	1	2	2

d) Width of letter

Letter	Letter height (mm)		
	200	300	400
	Width (mm)		
A	170	255	340
B	137	205	274
C	137	205	274
D	137	205	274
E	124	186	248
F	124	186	248
G	137	205	274
H	137	205	274
I	32	48	64
J	127	190	254
K	140	210	280
L	124	186	248
M	157	236	314
N	137	205	274
O	143	214	286
P	137	205	274
Q	143	214	286
R	137	205	274
S	137	205	274
T	124	186	248
U	137	205	274
V	152	229	304
W	178	267	356
X	137	205	274
Y	171	257	342
Z	137	205	274

e) Width of numeral

Numeral	Numeral height (mm)		
	200	300	400
	Width (mm)		
1	50	74	96
2	137	205	274
3	137	205	274
4	149	224	298
5	137	205	274
6	137	205	274
7	137	205	274
8	137	205	274
9	137	205	274
0	143	214	286

a)	Space between characters		
	Character height (mm)		
	200	300	400
	Space (mm)		
1	48	71	96
2	38	57	76
3	25	38	50
4	13	19	26

INSTRUCTIONS

(1) To determine the proper SPACE between letters or numerals, obtain the code number from table a) or b) and enter table c) for that code number to the desired letter or numeral height.

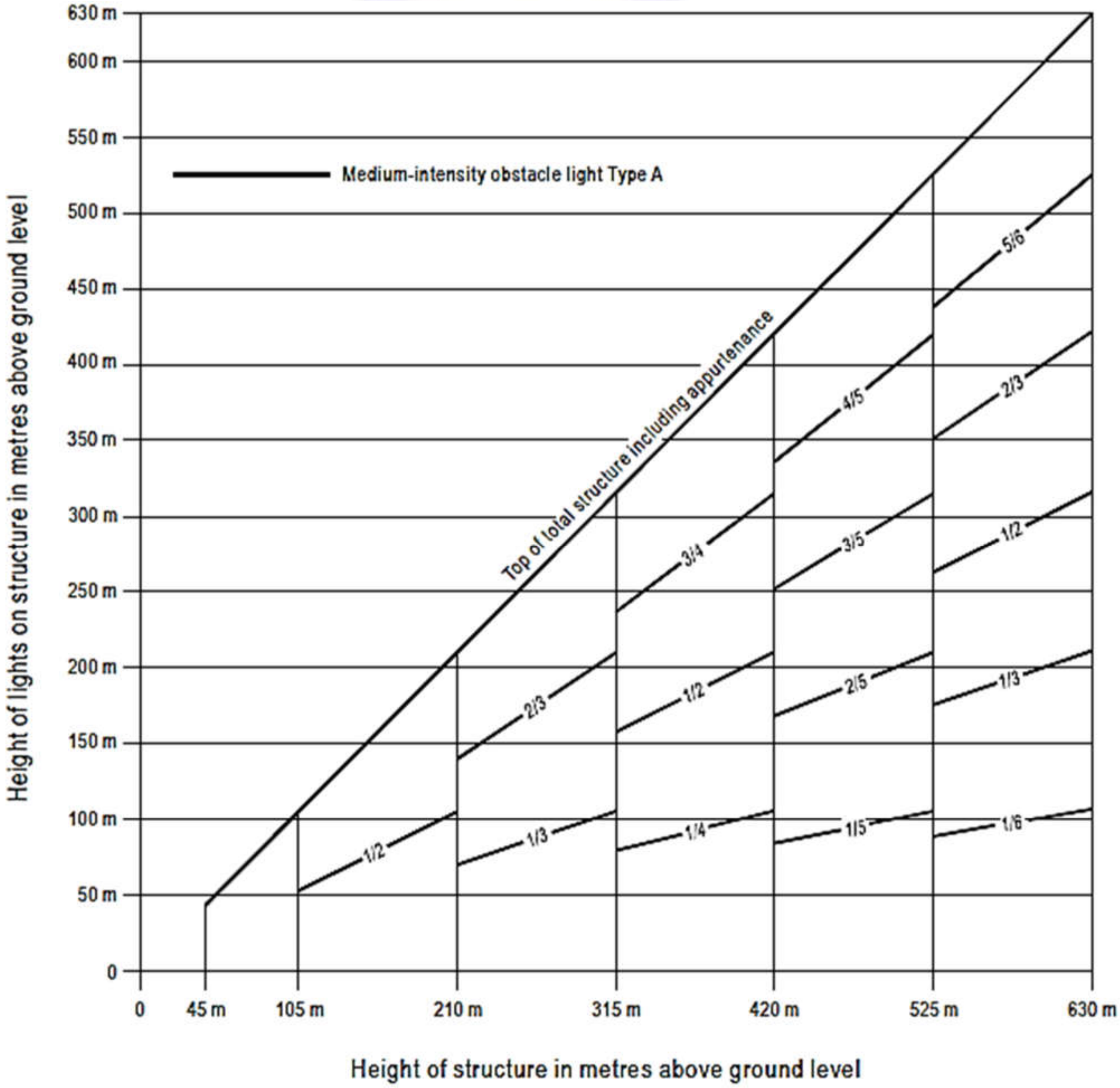
(2) The space between words or groups of characters forming an abbreviation or symbol should be equal to 0.5 to 0.75 of the height of the characters used except that where an arrow is located with a single character such as 'A → ', the space may be reduced to not less than one quarter of the height of the character in order to provide a good visual balance.

(3) Where the numeral follows a letter or vice versa use Code 1.

(4) Where a hyphen, dot, or diagonal stroke follows a character or vice versa use Code 1.

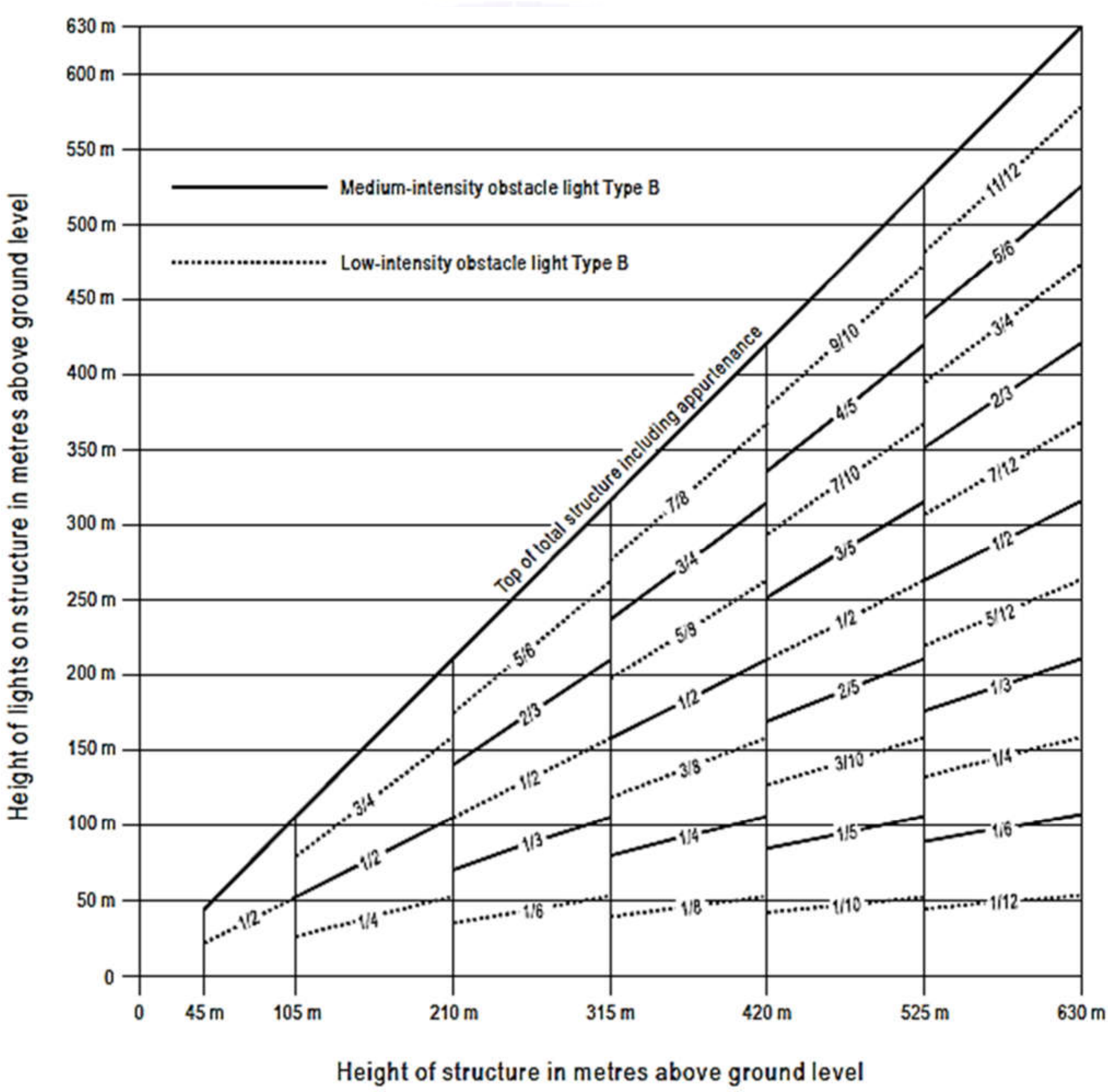
(5) For the intersection take-off sign, the height of the lower case "m" is 0.75 of the height of the preceding "0" (zero) and spaced from the preceding "0" at code 1 for the character height of the numerals.

IS 12.2.6.2 – LOCATION OF LIGHTS ON OBSTACLES



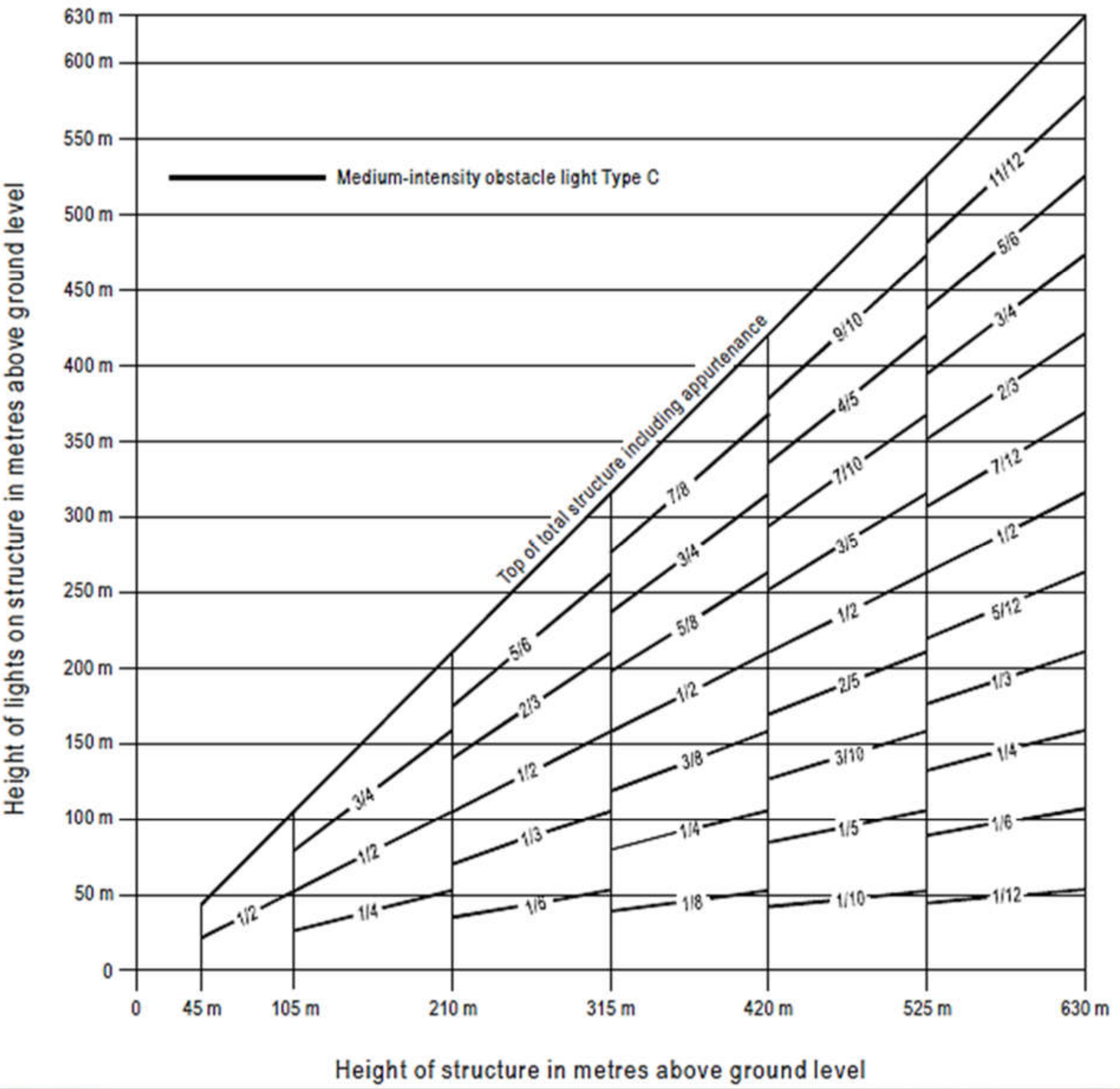
Note. — High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

Figure A5-1. Medium-intensity flashing-white obstacle lighting system, Type A



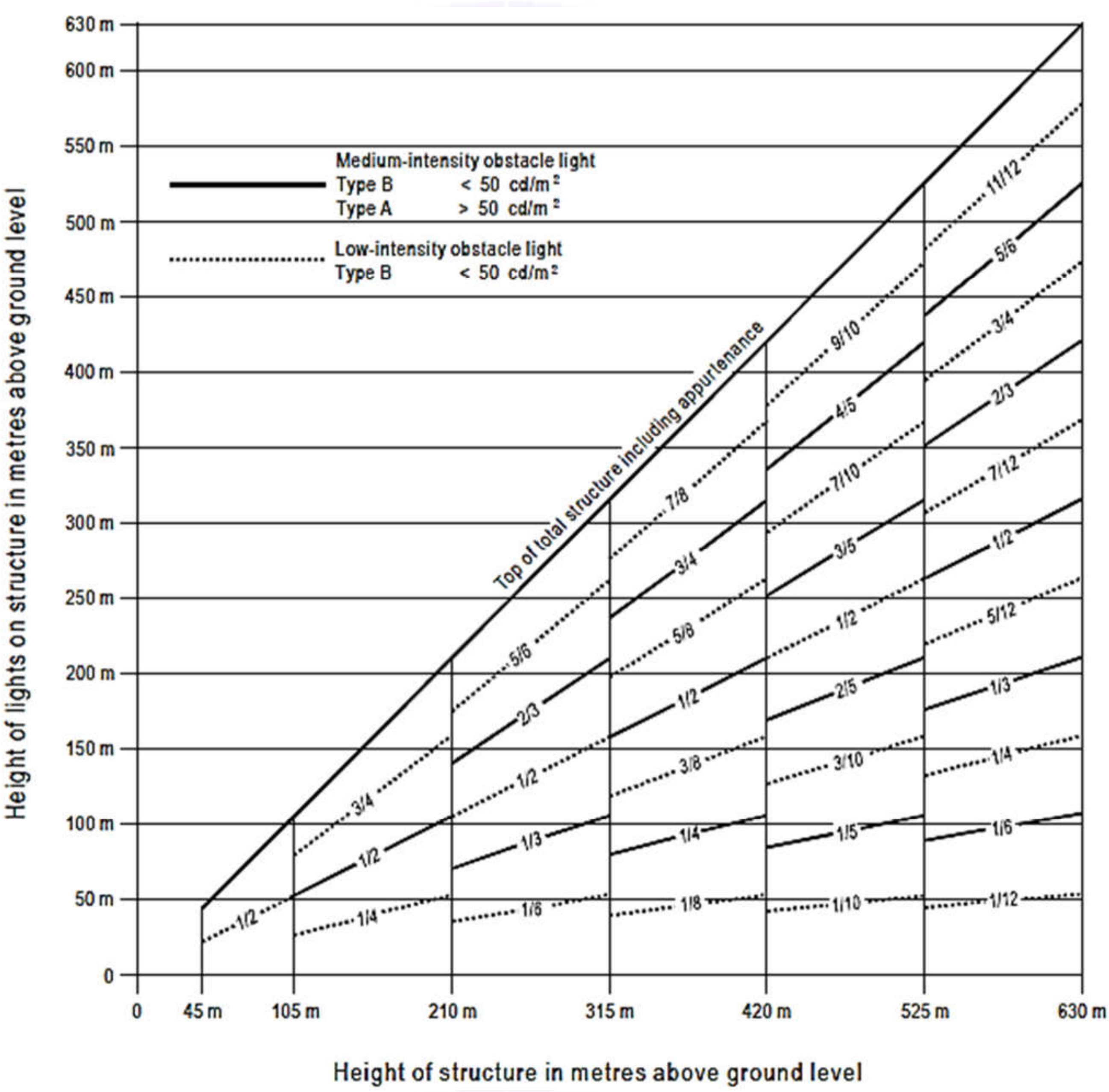
Note. — For night-time use only.

Figure A5-2. Medium-intensity flashing-red obstacle lighting system, Type B



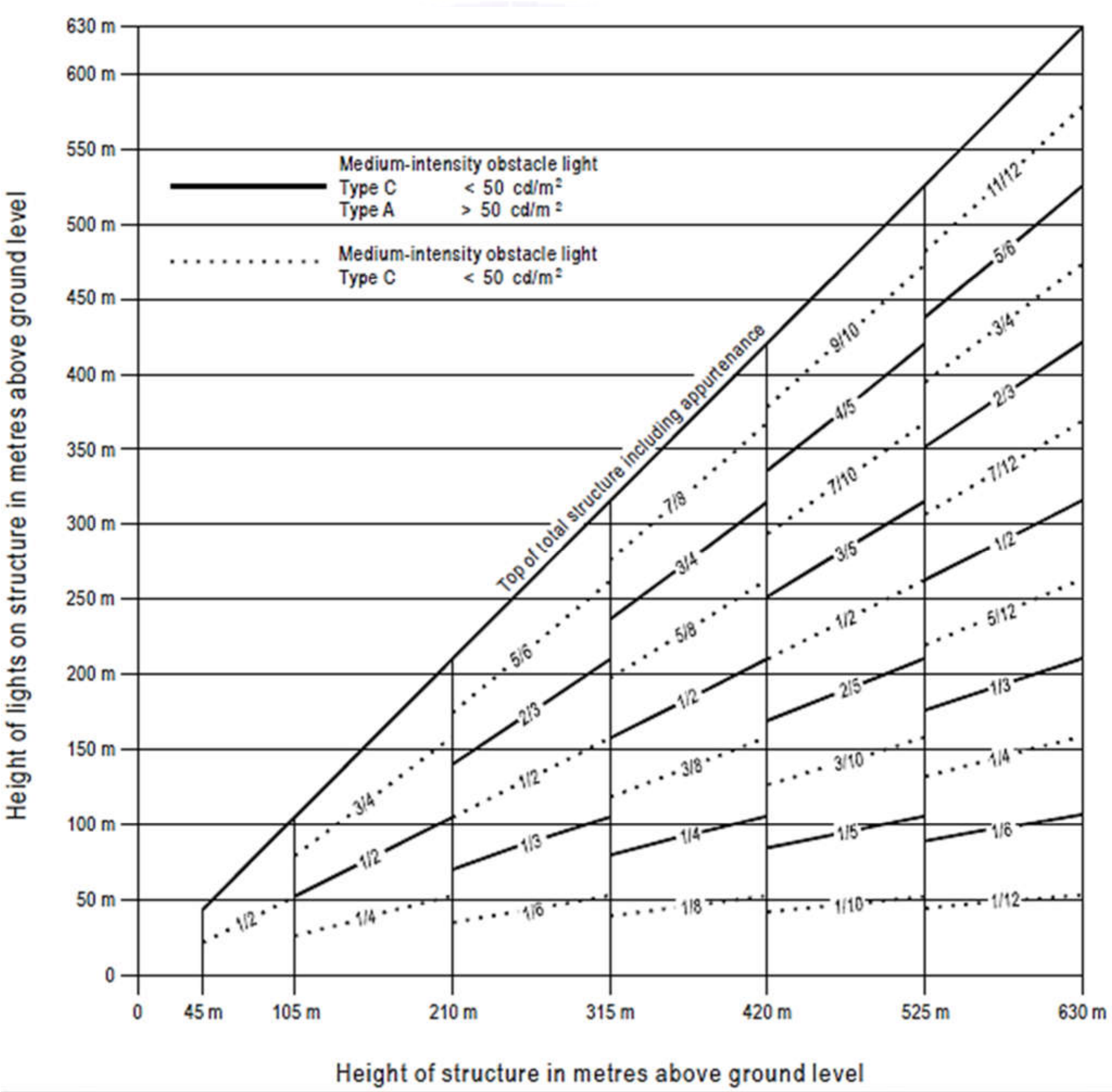
Note. — For night-time use only.

Figure A5-3. Medium-intensity fixed-red obstacle lighting system, Type C



Note. — High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

Figure A5-4. Medium-intensity dual obstacle lighting system, Type A/Type B



Note. — High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

Figure A5-5. Medium-intensity dual obstacle lighting system, Type A/Type C

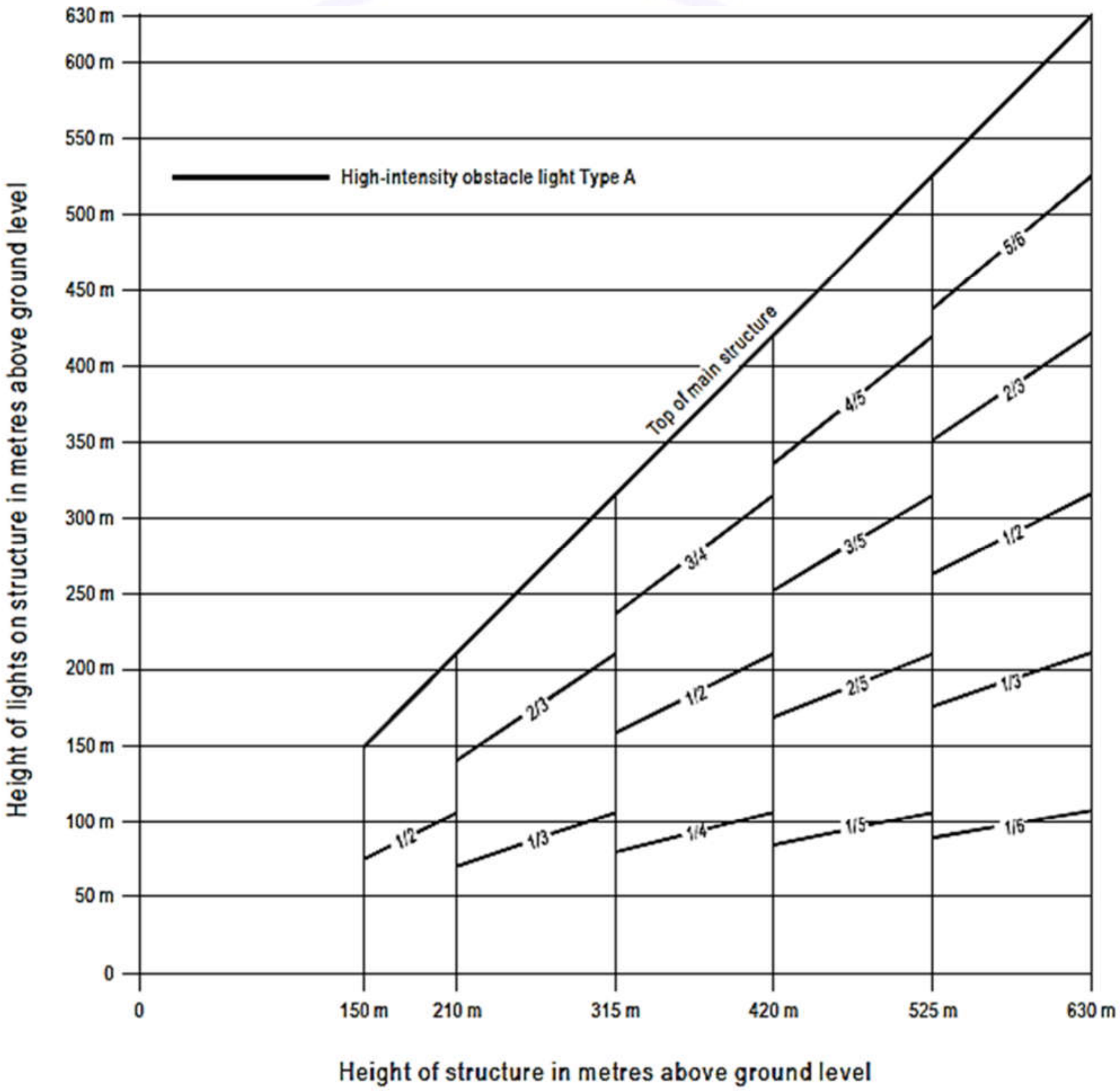


Figure A5-6. High-intensity flashing-white obstacle lighting system, Type A

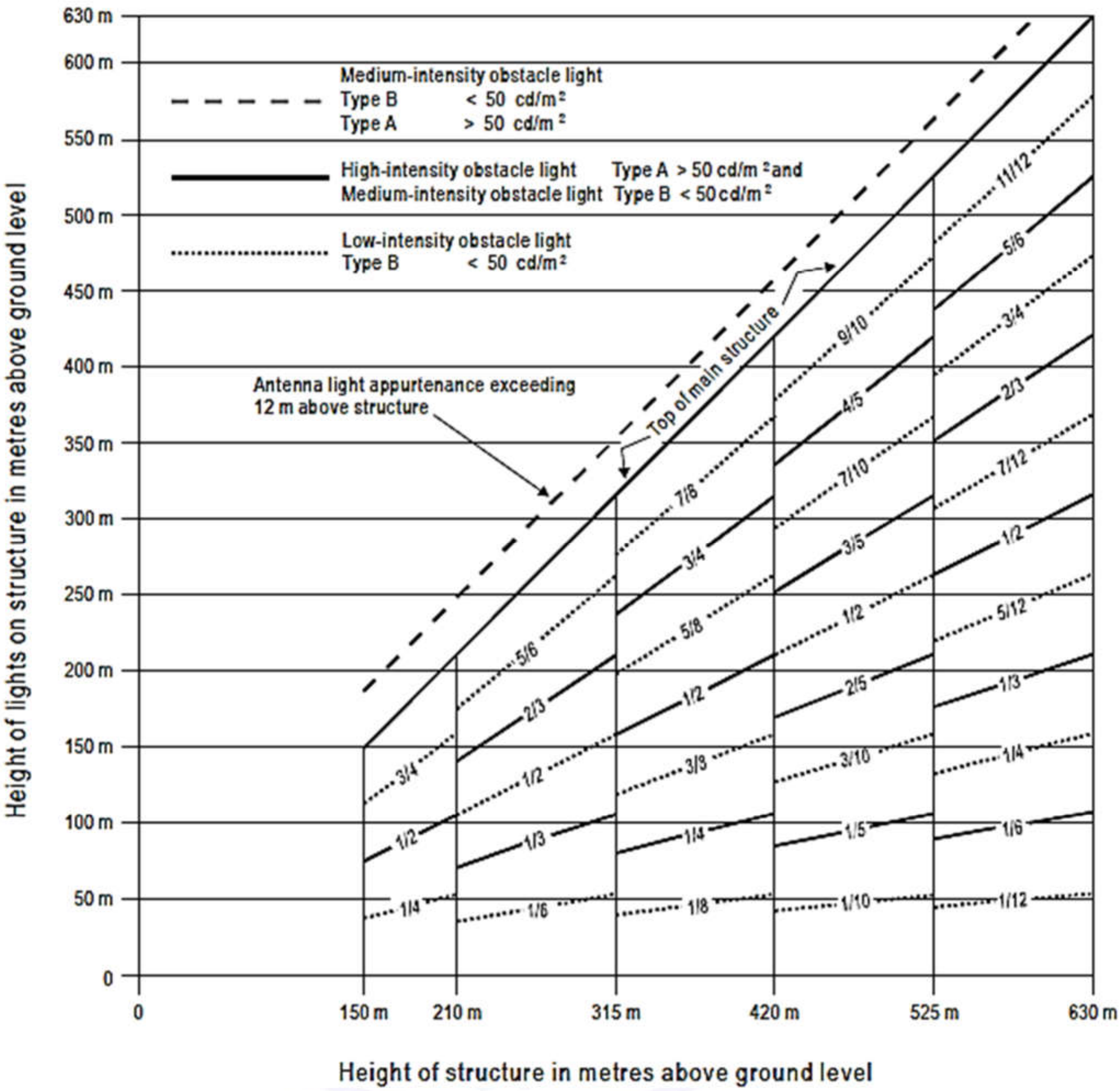


Figure A5-7. High-/medium-intensity dual obstacle lighting system, Type A/Type B

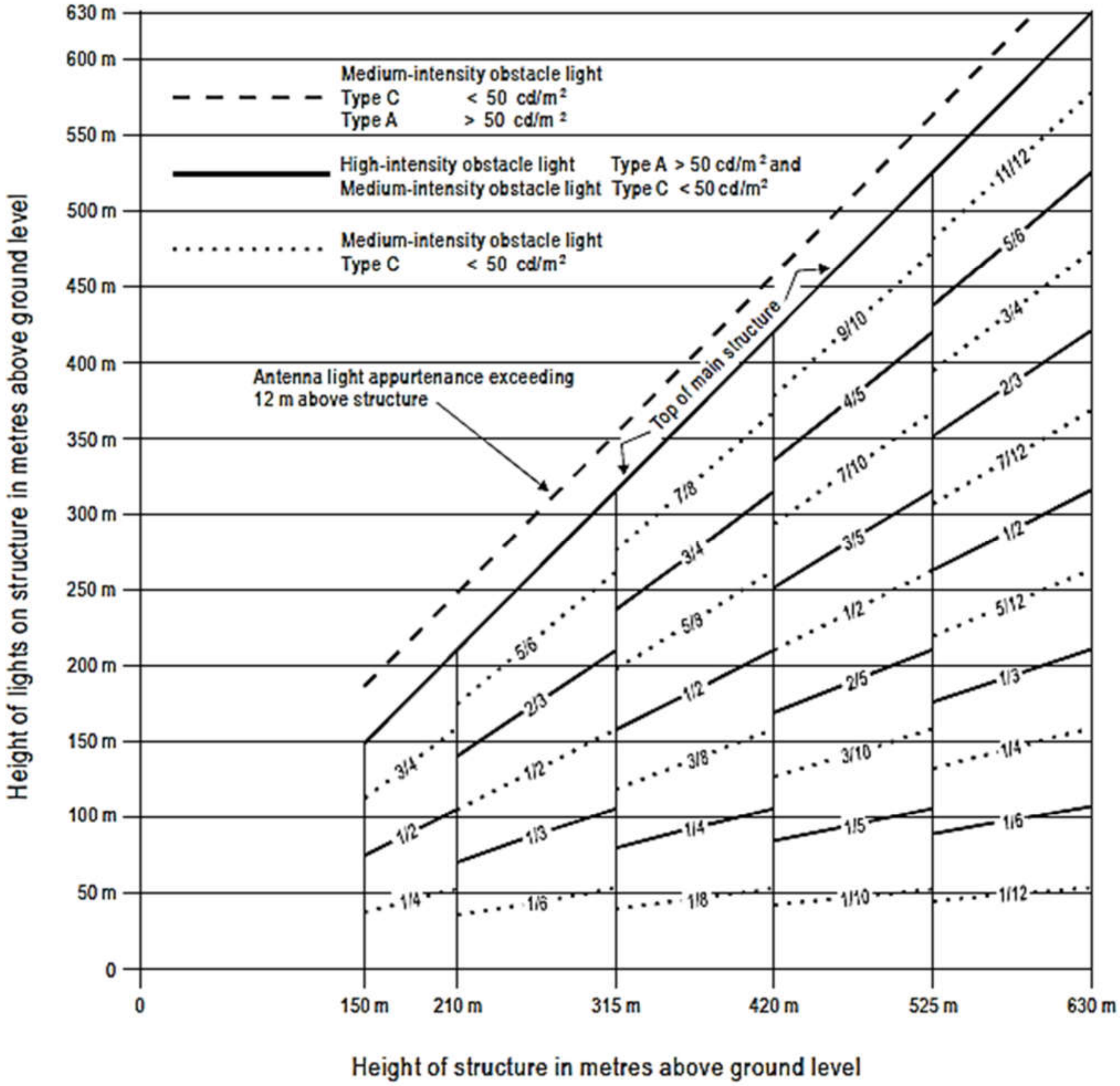


Figure A5-8. High-/medium-intensity dual obstacle lighting system, Type A/Type C

IS 12.2.9.1 AERODROME EMERGENCY PLANNING

The aerodrome operator shall establish a degree of supervision and control sufficient to manage the size and complexity of an emergency.

(a) CONTENT OF THE AERODROME EMERGENCY PLAN

In an emergency plan, the aerodrome operator shall, at a minimum:

(1) identify the potential emergencies, including:

(i) an aircraft accident or incident within and around the aerodrome boundaries,

(ii) an aircraft emergency declared by either air traffic services or a pilot,

(iii) a fuel spill that spreads at least 1.5m in any direction or exceeds 12mm in depth,

(iv) a medical emergency,

(v) a fire in which aerodrome operations or passenger safety is threatened,

(vi) any other emergency that is a threat or is likely to be a threat to the safety of persons or to the operation of the aerodrome;

(2) identify the other resources available at the aerodrome and in the surrounding communities for use during emergency response or recovery operations and provide their telephone numbers and other contact information;

(3) identify the on-scene commander and describe the commander's emergency response duties;

(4) provide Authorizations for a person to act as an on-scene commander or a supervisor if they are not aerodrome personnel;

(5) set out the measures to be taken to make the on-scene commander easily identifiable at all times by all persons responding to an emergency;

(6) if initial on-scene control has been assumed by a person from a responding organisation, describe the procedure for transferring control to the on-scene commander;

(7) describe any training and qualifications required for the on-scene commander and the aerodrome personnel identified in the emergency plan;

(8) describe the method for recording any training provided to the on- scene commander and aerodrome personnel;

(9) describe the communication procedures and specify the radio frequencies to be used to link the operator of the aerodrome with:

(i) the on-scene commander, and

(ii) the providers of ground traffic control services (if applicable) and air traffic control services or any other flight information unit at the aerodrome;

(10) describe the communication procedures allowing the on-scene commander to communicate with the organisations identified in the emergency plan;

(11) identify the alerting procedures that:

(i) activate the emergency plan,

(ii) establish the necessary level of response,

(iii) allow immediate communication with the organisations identified in the emergency plan in accordance with the required level of response,

(iv) if applicable, confirm the dispatch of each responding organisation;

(v) establish the use of standard terminology in communications, and

(vi) establish the use of the appropriate radio frequencies as set out in the emergency plan.

(12) specify:

(i) the aerodrome communication equipment testing procedures,

(ii) a schedule for the testing, and

(iii) the method of keeping records of the tests.

(13) specify the location of the emergency coordination centre used to provide support to the on-scene commander;

(14) describe the measures for dealing with adverse climatic conditions and darkness for each potential emergency set out in paragraph IS 12.2.9.1(b)(1);

(15) describe the procedures respecting the review and confirmation of the following to permit the return of the aerodrome to operational status after an emergency situation:

(i) emergency status reports,

(ii) co-ordination with the investigator designated by the accident investigation entity regarding the accident site conditions,

(iii) disabled aircraft removal,

(iv) airside inspection results,

(v) accident or incident site conditions, and

(vi) air traffic services and NOTAM coordination;

(16) describe the procedures for controlling vehicular flow during an emergency to ensure the safety of vehicles, aircraft and persons;

(17) specify the procedures for the issuance of a NOTAM in the event of an emergency affecting the critical category for firefighting required under subsection 12.2.9.2 or changes or restrictions in facilities or services at the aerodrome during and after an emergency;

(18) describe the procedures for preserving evidences as it relates to:

(i) aircraft or aircraft part removal, and

(ii) the site of the accident or incident;

(19) describe:

(i) the process for an annual review and update of the emergency plan, and

(ii) the administrative procedure for the distribution of copies of an updated version of the emergency plan to the aerodrome personnel who require them and to the community organisations identified in the plan ; and

(iii) the procedures to assist in locating an aircraft when the aerodrome receives notification that an Emergency Locator Transmitter (ELT) or any advanced system of tracking aircraft in an emergency has been activated.

(20) The aerodrome operator shall include a copy of the following documents in the emergency plan:

(i) the signed agreements, if any, between the aerodrome operator and the community organisations that provide emergency response services to the aerodrome; and

(ii) an aerodrome grid map.

(b) ON SCENE COMMANDER

(1) The on-scene commander shall be at the emergency site and shall not have other duties during an emergency, unless the life of a person is in danger nearby and the on-scene commander is alone and has the ability to assist the person.

(2) The aerodrome operator shall establish procedures that make the on-scene commander easily identifiable by all persons responding to an emergency.

(c) AIRCRAFT CRASH CHARTS AND AERODROME GRID MAPS

(1) For aircraft operating in a passenger or cargo configuration, the aerodrome operator shall make available to the emergency coordination centre aircraft crash charts specific to the aircraft used by the air operators that use the aerodrome, and shall provide copies of the charts to the organisations responsible for fire-fighting services that are identified in the emergency plan; and the on-scene commander.

(2) In the case of aircraft that have or may have a seating configuration of not more than nine passenger seats, the aerodrome operator may use, instead of the aircraft crash charts referred to in paragraph IS 12.2.9.1(d)(1), other documents containing equivalent information.

(3) The aerodrome operator shall develop and review and update annually, if necessary, an aerodrome grid map that includes a minimum of:

(i) an area covering at least one kilometer around each runway;

(ii) the aerodrome access roads and gates; and

(iii) the location of meeting points to which persons and vehicles that are responding to an emergency situation proceed in order to receive instructions.

(4) The aerodrome operator shall provide copies of the aerodrome grid map to the aerodrome personnel and organisations identified in the aerodrome emergency plan

(d) PERSONNEL AND TRAINING

(1) The aerodrome operator shall assign specific emergency response duties, other than those of an on-scene commander or a supervisor, only to those aerodrome personnel who are identified in the emergency plan and who:

(i) are knowledgeable of their duties as described in the plan; and

(ii) have the skills to carry out their duties.

(2) The aerodrome operator shall assign to act as an on-scene commander or a supervisor only those aerodrome personnel, or other persons authorised by the operator in the emergency plan, who are:

(i) knowledgeable about the contents of the emergency plan;

(ii) familiar with the procedures for the overall coordination of emergency operations at an emergency site; and

(iii) trained for the particular role that they perform.

(3) The aerodrome operator shall:

(i) keep records of the training that was received by persons to meet the requirements of paragraphs IS 12.2.9.2(d)

(ii) preserve the records of training for five years after the day on which the training was received; and

(iii) submit a copy of the training records to the Authority on request.

(e) TESTING OF THE EMERGENCY PLAN

(1) The aerodrome operator shall provide the Authority with a notice in writing of the date and time when a partial or full-scale exercise is to be carried out at least 90 days before the day of the exercise.

(2) After each exercise, the aerodrome operator shall conduct a debriefing with all the organisations identified in the plan and a representative of the aerodrome personnel who participated to evaluate the effectiveness of the emergency plan and identify deficiencies.

(3) The aerodrome operator shall implement an action plan to correct any deficiencies in the emergency plan that was identified during a debriefing session.

(4) The aerodrome operator shall record:

(i) the date of an exercise;

(ii) the type of exercise;

(iii) the minutes of the debriefing session after the exercise; and

(iv) any action plans to correct deficiencies that were identified during a debriefing session.

(5) The aerodrome operator shall keep an exercise record for 10 years after the day on which the record is made.

(6) The aerodrome operator shall submit debriefing minutes and corrective action plans relating to an exercise to the Authority on request.

(f) AUTHORIZATION

The Authority may, on application by the aerodrome operator, provide to the operator written Authorization not to conduct the full-scale exercise during an interval set out in subsection 12.2.9.1. if the operator demonstrates that the testing requirements for a full-scale exercise have been met through an activation of the emergency plan in response to an emergency during that interval.

IS 12.2.9.2 RESCUE AND FIRE FIGHTING

(a) STATISTICS OF THE NUMBER OF PASSENGERS AND AIRCRAFT MOVEMENT

(1) The aerodrome operator shall compile monthly statistics in respect of the number of arriving and departing passengers.

(2) The aerodrome operator shall compile monthly statistics setting out number of movements by operating aircraft in each aircraft category for firefighting. The aerodrome operator shall, at least once every six months, review the monthly statistics for the twelve months preceding the date of the review and determine the three consecutive months with the highest total number of movements by operating aircraft in all aircraft categories for firefighting.

(3) Where the review shows more than one period of three consecutive months having the same total number of movements by operating aircraft, the period to be used is the period involving the highest aircraft category for firefighting or where those periods involve the same highest aircraft category for firefighting, the period involving the greatest number of movements in that category.

(4) The operator of a designated aerodrome shall retain the monthly statistics referred to in paragraphs IS 12.2.9.2(a)(1) &(2) for five years after the date of the review; and provide them to the Authority at the Authority's request.

(b) AIRCRAFT FIRE FIGHTING VEHICLES

Rescue and Fire Fighting Vehicles shall comply with the specifications in ICAO Doc. 9137 Part 1.

(c) PERSONNEL

Staffing level shall be established through a task resource analysis based on the needs and demands of the aerodrome as prescribed in paragraph 12.2.9.2(ar).

(d) TRAINING OF PERSONNEL

(1) Knowledge and Skill Training

The aerodrome operator shall ensure that all personnel assigned to aerodrome fire-fighting duties are provided with knowledge and skill training in the following area:

(i) **Generic Training**

(A) RFF vehicles and Equipment;

(B) Emergency Communications Systems including Fire Alarms;

(C) Fire-Fighting Personnel Safety;

(D) Fire Chemistry;

(E) Extinguishing Agents;

(F) Portable Fire Extinguishers;

(G) Fire Hoses, Nozzles, Turrets, and Other Appliances Available for Fire Fighting;

(H) Fire-fighting Operations;

(I) Emergency Aircraft Evacuation Assistance;

(J) Aircraft Cargo Hazards;

(K) Live-Fire Training;

(L) First Aid.

(ii) **Site-Specific Training**

(A) Familiarisation with the aerodrome where the fire fighter will be carrying out fire-fighting duties;

(B) Familiarisation with the types of aircraft regularly operating at the aerodrome where the fire fighter will be carrying out fire-fighting duties; and

(C) Familiarisation with fire-fighting duties in the Aerodrome Emergency Response Plan for the aerodrome where the fire fighter will be carrying out fire-fighting duties.

(2) Level of Achievement to be Attained:

(i) **Generic Training**

(A) **With respect to AFF vehicles and equipment, the candidate shall be able to:**

- Describe each tool and item of equipment on each aircraft fire-fighting vehicle at the aerodrome, including a description of its designated use, required maintenance, proper storage; and demonstrate its use;

- Demonstrate knowledge and skills relative to routine inspection and maintenance of AFF vehicles as required by the manufacturer's specifications and maintenance manuals; and

- Demonstrate the knowledge and skill required to operate AFF vehicles, including manual back-up systems.

(B) **With respect to emergency communications systems, including fire alarms, the candidate shall be able to:**

- Identify the methods and procedures to be followed when an emergency alarm is received;
- Identify radio frequencies and channels assigned for use by the aerodrome to control vehicular traffic;
- Identify radio frequencies and channels assigned for use by the aerodrome Emergency Operations Centre;
- Identify radio frequencies and channels assigned for use by mutual aid organisations;
- Identify radio frequencies and channels assigned for use by responding units and organisations,
- Identify procedures concerning multiple alarms and mutual aid;
- Demonstrate knowledge of the phonetic alphabet;
- Demonstrate the use of all communication equipment utilized by the fire-fighting service;
- Provide an initial status report on a simulated aircraft accident; and
- Demonstrate standard hand signals used to communicate with aircrew personnel as it relates to aircraft firefighting.

(C) **With respect to fire-fighting personnel safety, the candidate shall be able to:**

- Identify the hazards associated with aircraft fire fighting;
- Identify the hazards associated with aircraft and aircraft systems on personnel;
- Identify potential stress effects on personnel involved in a mass-casualty response;
- Identify the purpose and limitations of protective clothing;
- Demonstrate donning protective clothing;

- Demonstrate techniques for action in a fire situation where trapped or disoriented, or when in a hostile environment;
- Identify the hazards associated with cut-in entries;
- Describe the hazardous respiratory environment encountered in aircraft fire fighting;
- Identify techniques for protection from communicable- disease hazards;
- Describe the proper techniques for approaching aircraft while engines are running;
- Identify the purpose of self-contained breathing apparatus (SCBA);
- Identify the components and operation of the SCBA provided;
- Identify the limitations of the SCBA provided;
- Demonstrate that the SCBA is in a safe operating condition for immediate use;
- Don SCBA equipment while wearing protective clothing;
- Use SCBA equipment in dense smoke, or a blacked-out environment;
- change a team member's exhausted air supply cylinder with and air cylinder;
- While wearing SCBA equipment, demonstrate those actions necessary in the event of one of the following emergency situations:
  - activation of low-air alarm;
  - exhausted air supply;
  - regulator malfunction;
  - damage to face piece;
  - damage to low pressure hose;
  - damage to high pressure hose.

(D) With respect to fire behaviour, the candidate shall be able to:

- Explain the fire tetrahedron;
- Describe the phases of a fire;
- Describe the main products of combustion;
- Describe the three methods of heat transfer;
- Describe the classes of fire and extinguishment methods;
- Define flash point, ignition temperature, flashover rollover, backdraft and explosion; and
- Describe the various aviation fuels' characteristics with respect to fire behaviour and explosion hazard.

(E) **With respect to extinguishing agents, the candidate shall be able to:**

- Identify the extinguishing properties of each agent, including advantages and disadvantages;
- Identify those agents used at the aerodrome;
- Identify the locations of agents kept in inventory for vehicle resupply
- State the quantity of each agent carried on each vehicle at the aerodrome;and
- Identify the preferred agent to use to suppress and extinguish fire in various case scenarios

(F) **With respect to portable fire extinguishers, the candidate shall be able to:**

- Identify the classification of fires as they relate to the use of fire extinguishers;
- Identify each type of portable fire extinguisher by classification and rating;
- Describe the agents' characteristics in the extinguishers used at the aerodrome;
- Identify the limitations and operating characteristics of each type of portable fire extinguisher;
- Identify the location of each portable fire extinguisher carried on each AFF vehicle used at the aerodrome;

- Identify the appropriate extinguisher for a given class of fire from a group of different fire extinguishers; and
- Operate the appropriate extinguisher on each class of fire.

(G) **With respect to fire hoses, nozzles, turrets and other appliances available for fire-fighting, the candidate shall be able to:**

- Identify the location of each tool and item of equipment used at the aerodrome;
- Identify the hazards associated with the use of each tool and item of equipment used at the aerodrome;
- Demonstrate the proper procedures for use of each tool and item of equipment used at the aerodrome;
- Describe the purpose of each hose, nozzle and adapter;
- Describe the location of each hose, and adapter used by the fire-fighting unit at the aerodrome;
- Describe the size and length of each hose carried on each AFF vehicle used at the aerodrome;
- Demonstrate the proper procedures for use of each hose, nozzle and adapter used at the aerodrome;
- Demonstrate the proper procedure to be used when advancing hose for fire attack;
- Demonstrate the proper procedure to be used when laying hose to establish re-supply of water;
- Identify the primary purpose, agent capacity, water capacity, type of agent carried, agent discharge rate and range, personnel requirement, and response limitation for each AFF vehicle used at the aerodrome;
- Demonstrate the operation of handlines and vehicle mounted discharge devices; and
- Demonstrate the procedure for resupply using a hydrant, structural vehicles, tank trucks and other vehicle for each AFF vehicle used at the aerodrome.

(H) **With respect to fire-fighting operations, the candidate shall be able to:**

- State the objective of aircraft fire fighting and the role of the

firefighter in response to an aircraft emergency;
- Describe fire-fighting tactics and evacuation of occupied aircraft;
- Describe fire-fighting tactics of unoccupied aircraft; (d) Select a strategy and tactics for incident control and termination;
- Select a strategy and tactics for incident control and termination;
- Perform fire-fighting tactics;
- Explain the correct procedures for fighting three- dimensional fires;
- Explain the correct procedures for fighting engine fires;
- Describe the correct procedures for securing and maintaining a fire free egress route;
- Describe the proper procedure to use when protecting an aircraft fuselage from fire exposure;
- Describe the correct procedures to be used when providing protective streams for personnel;
- Describe the hazards of a brake and wheel fire;
- Describe the correct procedures to be used when fighting a brake and wheel fire;
- Describe the correct procedures for controlling runoff from fire control operations and fuel spills;
- Describe the correct procedures to be used to stabilize aircraft wreckage;
- Describe the safety precautions for controlling fuel spills;
- Describe grounding, bonding and hazards associated with static electricity related to aircraft;
- Describe the hazards of a hydraulic fire; and
- Describe the correct procedures to use in the event of fighting a hydraulic fire.

(l) **With respect to emergency aircraft evacuation assistance, the candidate shall be able to:**
- Describe the correct procedures to use to protect evacuation points;
- Identify those openings to use to gain entry for a given aircraft and situation;
- Select the tools and equipment to use to gain entry for a given aircraft and situation;
- While wearing full protective clothing, demonstrate the ability to open:
  - aircraft doors and exits, or
  - equivalent training doors and exits.
- Identify potential locations for break-in entry using reference

materials, aircraft markings, or general guidelines for a given aircraft; and

- Demonstrate the correct procedures to use for a victim search inside and outside the aircraft.

(J) **With respect to aircraft cargo hazards, the candidate shall be able to:**

- Identify the dangerous goods' classifications;
- Identify the hazards indicated by each label; and
- Identify the emergency procedures to be followed when using the reference material in the event of a problem transporting hazardous materials at the aerodrome.

(K) **With respect to live-fire training, in order that the agent is applied with proper technique and the fire extinguished, the candidate shall be able to:**

- Extinguish a minimum of 9 m^2 fuel fire with a minimum of a 45 kg dry chemical extinguisher;
- Extinguish a minimum of 36 m^2 fuel fire with an AFF vehicle hand line and appropriate agent;
- Extinguish a minimum of 400 m^2 fuel fire with AFF vehicle turrets and appropriate agent;
- Extinguish a three-dimensional aircraft fuel fire with AFF vehicle hand lines and appropriate agent;
- Control simulated engine and auxiliary power unit (APU) fires on aircraft with an AFF vehicle hand line or turrets and appropriate agent; and
- Extinguish a simulated tire assembly fire with an AFF vehicle hand line and appropriate agent.

(L) **With respect to first aid, the candidate shall be able to:**

- Identifyprimary and secondary life-threatening injuries;
- Determine whether or not a victim has an open airway;
- Locate an open airway in a person who is not breathing;
- Recognize types and characteristics of external and internal bleeding;

- Demonstrate techniques to control bleeding;
- Perform cardiopulmonary resuscitation;
- Recognize shock;
- Recognize injuries to the skull, spine, chest, and extremities;
- Recognize internal injuries;
- Demonstrate procedures for moving patients;
- Treat burns; and
- Demonstrate knowledge concerning triage methodology.

(ii) **Site-Specific Training**

(A) **With respect to familiarisation with the aerodrome where the firefighter will be carrying out fire-fighting duties, the candidate shall be able to:**

- Describe the runwayand taxiway identification system;
- Describe the movement area pavement markings, signs, and lighting;
- Identify the various on-field aircraft navigation aids;
- Cite aerodrome rules and regulations concerning vehicle movement and access;
- Cite rules and regulations governing aerodrome security;
- Locate a given point at the aerodrome on a grid map, or other standard map;
- Identify terrain features using map symbols;
- Identify and locate all emergency access roads and standard routes across the movement area;
- Identify and locate all points giving access to the airside from non-operational areas;
- Identify and locate all points giving access to portions of the critical fire-fighting access area, located outside the aerodrome

perimeter;

- Identify installations and features in the critical fire- fighting access area that present a hazard to vehicle response;
- Identify installations and terrain features in the critical fire-fighting access area that limit vehicle response capability;
- Identify the direction of travel of fuel in a simulated leak in the fuel distribution system applicable to the aerodrome;
- Demonstrate the operation of fuel system valves and pumps to control the flow of fuel within the system applicable to the aerodrome;
- Identify hazardous materials that are frequently stored or used on the aerodrome property; and
- Identify elements of the aerodrome and surrounding water distribution system.

(B) **With respect to familiarisation with the types of aircraft regularly operating at the aerodrome where the firefighter will be carrying out fire-fighting duties, the candidate shall be able to:**

- Identify the types of aircraft regularly operating at their aerodrome;
- Identify the categories of aircraft propulsion systems;
- Use the correct terms to describe major aircraft structural components;
- Describe the types of batteries found on aircraft and their associated hazards;
- Identify the general location of portable fire extinguishers;
- Describe the materials used in aircraft construction;
- Explain the differences in aircraft construction as it relates to firefighting;
- Use an aircraft crash chart to identify and describe the location of normal and emergency exits, fuel tanks, passenger and crew compartments, oil tanks, hydraulic reservoirs, oxygen tanks, batteries, and break-in points for given aircraft;
- Use an aircraft crash chart to describe passenger, crew and fuel capacities for a given aircraft;

- Identify a flight data recorder and cockpit voice recorder;
- Locate normal entry doors, emergency exit openings and evacuation slides for a given aircraft;
- Describe the opening of all doors and compartments for a given aircraft;
- Describe the operation of evacuation slides and/or other emergency egress systems for a given aircraft;
- Identify aircrew and passenger locations for a given aircraft;
- Indicate the type of fuel used and location of fuel tanks for a given aircraft;
- Locate break-in points for a given aircraft;
- Locate the batteries for a given aircraft;
- Locate key components of the fuel, oxygen, hydraulic, electrical, fire protection, APU, brake, wheel systems, and pressurization systems for a given aircraft; and
- Describe aircraft hazards that may be unique or unusual for a given aircraft.

Note: Examples of unusual hazards include military aircraft equipped with ejection seats, tanks containing pesticides on crop-spraying aircraft, and aircraft equipped with additional fuel tanks for ferry purposes.

(C) **With respect to familiarization with firefighter duties under the Aerodrome Emergency Response Plan where the fire-fighter will be carrying out fire-fighting duties, the candidate shall be able to:**

- Describe each emergency listed in the plan;
- Describe the chain of command and authority, and identify the individuals associated with each position requiring a response from the aircraft fire-fighting service for each emergency listed in the plan;
- If applicable, describe the procedure for the change of command during any phase of the emergency requiring a response from the aircraft fire-fighting service for each emergency listed in the plan;

- With reference to the emergency response plan, identify other agencies involved in the plan requiring a response from the aircraft fire-fighting service, and describe their respective roles and responsibilities for each emergency listed in the plan; and

- Demonstrate knowledge of their individual role and duties during regular exercises under the plan.

(3) Additional Training

(i) Low-visibility Training

At an aerodrome certified for low-visibility operations for Category 3 approaches, firefighters shall practice the use of low-visibility equipment provided at that aerodrome in simulated Category 3 low-visibility conditions, and demonstrate the ability to:

(A) Locate a simulated accident site;

(B) Navigate the aircraft fire-fighting vehicle to the simulated accident site; and

(C) Negotiate terrain and obstacles with the AFF vehicle.

(ii) Command and Control Training

Where a firefighter is assigned operational command and control responsibilities for the aircraft fire-fighting service, training in command-and-control functions shall be provided to enable that fire-fighter to:

(A) Assess tactical priorities;

(B) Control and manage a fire stream;

(C) Control and manage resources;

(D) Select, employ and direct a defensive strategy;

(E) Assess fire-ground factors;

(F) Direct apparatus placement; and

(G) Explain command procedures.

(4) Recurrent Training General

Recurrent training shall be provided to enable each firefighter to maintain the level of proficiency established in this requirement. Except for live-fire training, every firefighter must complete training in each element of the requirements at least once every three years.

(5) Live-Fire Training

Live-fire drill training shall be provided to all fire-fighting personnel every 12 months as follows:

(i) A live-fire drill shall simulate a realistic fire-fighting situation, and be of sufficient size and intensity to provide a challenge to the firefighter in relation to the equipment used;

(ii) The conditions simulated in a live-fire drill shall emulate the type of fire which could be encountered on a typical aircraft at the aerodrome;

(iii) During the drill, each firefighter shall demonstrate the control and extinguishment of a simulated aircraft fire using:

(A) Handlines and or turrets using an AFF vehicle of a type used at the aerodrome, and

(B) Fire-fighting streams to protect firefighters and aircraft occupants using either handlines or turrets.

Note: It is intended that the live-fire drill will provide an opportunity for the fire-fighting team to become familiar with the use of all fire extinguishment equipment that will be used in the event of an accident.
If possible, a simulated evacuation of aircraft occupants will help in creating a realistic situation.

(e) Firefighter Qualifications

No aerodrome operator shall permit a person to act and no person shall act as an aircraft firefighter at an aerodrome unless the person has, within the previous 12 months, successfully completed the training specified in this Part.

(1) Training Records

The aerodrome operator shall:

(i) maintain, for each aircraft firefighter, a training record containing, as a minimum, the information specified below:

(A) the name of the individual being trained;

(B) the date of training;

(C) the place where training is received;

(D) the subjects covered and course methodology;

(E) the climatic conditions, in the case of practical training;

(F) the duration of training;

(G) any instructor comments;

(H) the performance evaluation;

(I) the name of the instructor; and

(J) the signature of the student.

(ii) Preserve the training record for three years after the aircraft firefighter leaves the service of the aerodrome; and

(iii) at the request of the Authority, provide the Authority with a copy of the training record.

(f) RESPONSE TEST

(1) The aerodrome operator shall carry out a response test to evaluate the response time and effectiveness of the aircraft fire-fighting service required to be maintained during the hours of operation specified, at least once every 3 months; and at any time at the request of the Authority, where the Authority has reasonable grounds to believe that the fire-fighting service at the aerodrome does not meet the requirements of this section.

(2) A response test at an aerodrome has a satisfactory result if it meets the requirement specified in paragraph 12.2.9.2(z),

(3) The aerodrome operator shall record the results of a response test and shall preserve the records for two years after the date of the test.

(4) If a response test does not have a satisfactory result, the aerodrome operator shall within six hours after the test, identify the deficiencies that caused the result and notify the appropriate air traffic control unit or any other flight information unit of the critical category for firefighting that corresponds to the level of service that can be provided, for publication in a NOTAM.

IS 12.2.9.4 WILDLIFE STRIKE HAZARD REDUCTION

(a) Wildlife hazard assessment and management is required for an aerodrome:

(1) that are located in a defined area and that in the opinion Authority should be certified in the public interest and to enhance the safe operation of the aerodromes;

(2) that has a waste disposal facility within 13km of the geometric centre of the aerodrome;

(3) that had an incident where a turbine-powered aircraft collided with wildlife other than a bird and suffered damage, collided with more than one bird or ingested a bird through an engine; or

(4) where the presence of wildlife or wildlife activity has been observed on the aerodrome or in the vicinity of the aerodrome.

(b) WILDLIFE HAZARD ASSESSMENT

(1) The following constitutes the information to be collected by the operator of an aerodrome when conducting wildlife hazard assessment:

(i) Wildlife strike data;

Note – when reporting a wildlife strike the form specified by the Authority will be used. Any information that the operator of an aerodrome has that is outlined on the form should be included.

(ii) Aircraft types; and

(iii) Ecological studies and wildlife inventories

(iv) Survey shall be conducted in the local communities surrounding the Aerodrome to identify attractant concentration and regular movement patterns. The survey includes:

(A) the proximity to the aerodrome and associated take-off and approach flight path

(B) numbers of birds;

(C) size/species of birds and

(D) site attractiveness whether it is used as sources of food, a roost or nesting site.

Note - An Aerodrome Wildlife Management Plan template may be used to assist operators with the layout of risk assessment and management plans

(2) The aerodrome operator shall, after consultation with a representative of the operators in respect of an aircraft, air operators and private operators that use the aerodrome, conduct a risk analysis that evaluates the collected information;

(3) The assessment shall be in writing and include:

(i) an assessment of the risks associated with the wildlife hazards; and

(ii) the measures that are necessary to manage or remove the hazards or to manage or mitigate the risks.

(4) The aerodrome operator shall, at the request of the Authority, make the wildlife hazard assessment available for inspection.

(c) WILDLIFE HAZARD MANAGEMENT PLAN

(1) A wildlife hazard management plan shall be prepared to at least

(i) reduce the risk identified from wildlife hazard assessment as much as practicable; and

(ii) strive to improve the effectiveness of the plan through ongoing evaluation by competent personnel;

(2) The aerodrome operator shall establish a bird / wildlife committee which will include all stakeholders in which bird/ wildlife issues will be discussed.

(3) The aerodrome operator shall review the plan every two years;

(4) The aerodrome operator shall amend the plan and submit the amended plan to the Authority within 30 days of the amendment if:

(i) the amendment is necessary as a result of the review conducted under paragraph IS 12.2.9.4(c)(2) above;

(ii) an incident has occurred in which a turbine-powered aircraft collided with wildlife other than a bird and suffered damage, collided with more than one bird or ingested a bird through an engine;

(iii) a variation in the presence of wildlife hazards has been observed in an aerodrome flight pattern or movement area; or

(iv) there has been a change:

(A) in the wildlife management procedures or in the methods used to manage or mitigate wildlife hazards;

(B) in the types of aircraft at the aerodrome; or

(C) in the types of aircraft operations at the aerodrome.

(5) The aerodrome operator shall develop an aerodrome management plan.

(6) The aerodrome operator shall submit the plan in the form of a manual and in duplicate to the Authority, on request by the Authority.

(7) The aerodrome operator shall keep a copy of the plan at the aerodrome and it shall on request be made available to the Authority.

(8) Aerodrome operator shall implement the plan.

(d) CONTENT OF WILDLIFE HAZARD MANAGEMENT PLAN

(1) An aerodrome wildlife management plan shall:

(i) identify and describe the risks associated with all wildlife hazards, at or near the aerodrome that might affect the safe operation of aircraft, including the proximity of any waste disposal facility or migration route affecting wildlife populations near the aerodrome;

(ii) specify the particular measures that are used by the aerodrome operator to manage or mitigate the risks;

(iii) identify and describe the actions that are used by the aerodrome operator to satisfy the requirements set out below;

(A) the identification of the species of any wildlife struck by aircraft;

(B) the regular maintenance of wildlife management logs indicating management activities, environmental changes; wildlife interactions and animal remains identified by species; and

(C) the evaluation of habitats, land uses and food sources, located at or near the aerodrome, that might attract wildlife which may affect the safe operation of the aerodrome including, if needed, arrangements for assessments, studies and monitoring.

(iv) set out procedures for the management of aerodrome habitats that might attract wildlife;

(v) set out procedures that prohibits the feeding of wildlife and the exposure of food wastes;

(vi) set out procedures to ensure that all endangered or protected wildlife at the aerodrome are inventoried;

(vii) identify the role of the personnel and agencies involved in wildlife management issues and provide the contact numbers for each; and

(viii) provide details of any wildlife hazard awareness program.

(e) TRAINING

(1) The aerodrome operator shall provide training for any person who has duties in respect of the aerodrome wildlife management plan at least once every three years regarding their assigned duties and the matters set out below:

(i) nature and extent of the wildlife management problem;

(ii) Regulations, and guidance material related to aerodrome wildlife management programs;

(iii) bird ecology and biology;

(iv) bird identification, including the use of field guides;
(v) mammal ecology and biology;

(vi) mammal identification, including the use of field guides;

(vii) rare and endangered species and species of special concern, including related Regulations and policies;

(viii) habitat management;

(ix) off-aerodrome land use issues;

(x) active wildlife control measures;

(xi) wildlife removal techniques;

(xii) firearm safety;

(2) The Aerodrome Operator shall maintain a record of each person's training for a period of ten(10) years and provide the Authority with a copy if requested.

(f) Communication and Alerting Procedure

(1) The aerodrome operator shall establish a communication and alerting procedure for wildlife management personnel to alert pilots as soon as possible of the wildlife hazards at the aerodrome and the risks associated with those hazards.

(2) The communication and alerting procedure to be used in order to alert pilots as soon as possible of the wildlife hazards at the airport and associated risks may include:

(i) where the aerodrome has air traffic services (ATS), bilateral radio communications or broadcast of airport advisories;

(ii) if an immediate alert is required, direct radio contact can be used, when available;

(iii) publication of a NOTAM in respect of the airport, whether in combination or not with the procedure referred to in paragraph (i) or (ii).

(g) WILDLIFE STRIKES

(1) The aerodrome operator shall keep records of all wildlife strikes at the aerodrome, including those reported by:

(i) pilots;

(ii) ground personnel; and

(iii) aircraft maintenance personnel when they identify damage to an aircraft as having been caused by a wildlife strike.

(2) Wildlife remains that are found within 60 meters of a runway or an airside pavement area are presumed to be a wildlife strike unless another cause of death is identified.

(3) The aerodrome operator shall submit a written and dated report to the Authority using the ICAO IBIS form for each wildlife strike, within 30 days of its occurrence.