Statutory Instrument No. 78 of 2022

CIVIL AVIATION ACT
(Cap. 71:01)

CIVIL AVIATION (AERODROMES DESIGN AND OPERATIONS) REGULATIONS, 2022

(Published on 23rd June, 2022)

ARRANGEMENT OF REGULATIONS

REGULATION

PART IV — *Aerodrome Data*

29. Aeronautical data
30. Aerodrome reference point
31. Aerodrome and runway elevation
32. Aerodrome reference temperature
33. Aerodrome dimensions and related information
34. Strength of pavements
35. Pre-flight altimeter check location
36. Declared distances
37. Condition of movement area and related facilities
38. Water on runway
39. Removal of disabled aircraft
40. Level of protection of rescue and fire fighting
41. Visual approach slope indicator system
42. Coordination between aeronautical information services and aerodrome authorities

PART V — *Wildlife Hazard Management*

43. Animals not allowed in restricted areas of aerodrome
44. Wildlife hazard management
45. Wildlife strike hazard reduction at aerodrome
46. National Committee on Wildlife Hazard Management
47. Assessment of wildlife strike hazards at aerodrome

PART VI — *Aerodrome Physical Characteristics*

48. Conditions for operating aerodrome
49. Standards for physical characteristics of aerodrome
50. Number and orientation of runways
51. Maximum permissible cross-wing component
52. Data to be used for calculation of the runway usability factor
53. Location of threshold
54. Determination of actual length of runways
55. Determination of width of runway
56. Determination of minimum distance between parallel runways
57. Slopes on runways
58. Strength of runways
59. Surface of runways
60. Runway shoulders
61. Runway turn pads
62. Runway strips
63. Slopes on runway strips
64. Runway end safety area
65. Clearways
66. Stop ways
67. Radio altimeter operating area
68. Taxiways
69. Rapid exit taxiways

110. Taxiway centreline marking
111. Taxi side stripe marking
112. Runway turn pad marking
113. Runway holding position marking
114. Intermediate holding position marking
115. VOR aerodrome checkpoint marking
116. Aircraft stand marking
117. Apron safety lines
118. Road-holding position marking
119. Mandatory instruction markings
120. Information marking
121. Lights which may endanger safety of aircraft
122. Laser emission which may endanger safety of aircraft
123. Lights which may cause confusion
124. Elevated approach lights
125. Elevated lights
126. Surface lights
127. Light intensity and control
128. Emergency lighting
129. Aeronautical beacons
130. Aerodrome beacons
131. Identification beacon
132. Simple approach lighting system
133. Precision approach category I lighting system
134. Precision approach category II and III lighting system
135. Visual approach slope indicator systems
136. Approach slope and elevation setting of light beams
137. PAPI and APAPI
138. Approach slope and elevation setting of light units
139. Obstacle protection, AVASIS, T-VASIS, PAPI and APAPI
140. Circling guidance lights
141. Runway lead-in lighting systems
142. Runway threshold identification lights
143. Runway edge lights
144. Runway threshold and wing bar lights
145. Runway end lights
146. Runway centre line lights
147. Runway touchdown zone lights
148. Simple touchdown zone lights
149. Rapid exit taxiway indicator lights
150. Stop way lights
151. Taxiway centreline lights
152. Taxiway centreline lights on taxiways
153. Taxiway centreline lights on other exit taxiways
154. Taxiway centreline lights on runways
155. Taxiway edge lights
156. Runway turn pad lights
157. Stop bars
158. Intermediate holding position lights
159. Runway guard lights

PART XII — *Aerodrome Operational Services, Equipment, Installations and Facilities*

PART XIII — *Aerodrome Maintenance*

IN EXERCISE of the powers conferred on the Minister of Transport and Public Works by section 89 of the Civil Aviation Act and on the recommendation of the Civil Aviation Authority, the following Regulations are hereby made —

PART I — *Preliminary Provisions*

Citation

1. These Regulations may be cited as the Civil Aviation (Aerodromes Design and Operations) Regulations, 2022.

Interpretation

2. In these Regulations, unless the context otherwise requires —

"accident" means 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 the person has 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 seriously injured as a result of —

(i) being in the aircraft,

(ii) direct contact with any part of the aircraft, including a part which has become detached from the aircraft, or

(iii) direct exposure to jet blast,

except when the injury is from a natural cause, self-inflicted or inflicted by another person, or when the injury is to a stowaway hiding outside an area normally available to passengers and crew;

(*b*) the aircraft sustains damage or structural failure which —

(i) adversely affects the structural strength, performance or flight characteristics of the aircraft, and

(ii) would normally require major repair or replacement of the affected component, except for engine failure or damage, which is limited to a single engine and its cowlings and accessories, propellers, wing tips, antennas, probes, vanes, tires, brakes, wheels, fairings, panels, landing gear doors, windscreen, small dents or puncture holes in the aircraft skin, minor damages to main rotor blades, tail rotor blades, landing gear, and those resulting from hail or bird strike including holes in the radome; or

(*c*) the aircraft is missing or is completely inaccessible;

"Advisory Circular" means a publication issued by the Authority to provide additional guidance to operators;

"aerodrome" means 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" means an aeronautical beacon used to indicate the location of an aerodrome from the air;

"aerodrome elevation" means the elevation of the highest point of the landing area;

"aerodrome facilities and equipment" means 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" means a sign placed on an aerodrome to aid in identifying the aerodrome from the air;

"aerodrome manual" means the manual that forms part of the application for a licence or a certificate under these Regulations, including any amendments to the manual, approved by the Authority;

"aerodrome mapping data – (AMD)" means data collected for the purpose of compiling aerodrome mapping information for aeronautical uses;

"aerodrome mapping database – (AMDB)" means a collection of aerodrome mapping data organized and arranged as a structured data set;

"aerodrome operator" means an operator of an aerodrome either Licensed or Certificated under these Regulations in Botswana;

"Aerodrome Operating Minima" means the limits of usability of an aerodrome for —

(*a*) take-off, expressed in terms of runway visual range or visibility and, if necessary, cloud conditions;

(*b*) landing in 2D instrument approach operations, expressed in terms of visibility or runway visual range, minimum descent altitude or height (MDA/H) and, if necessary, cloud conditions; and

(*c*) landing in 3D instrument approach operations, expressed in terms of visibility or runway visual range and decision altitude/height (DA/H) as appropriate to the type or category of the operation;

"aerodrome reference code" means a code used for planning purposes to classify an aerodrome with respect to the critical aircraft characteristics for which the aerodrome is intended;

"aerodrome reference point" means the designated geographical location of an aerodrome;

"aerodrome standards" means standards prescribed by the Authority applicable to aerodromes;

"aerodrome traffic density" means—

(*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;

"aerodrome traffic zone" means the airspace extending from aerodrome level to a height of two thousand feet over the area comprising the aerodrome and the surrounding land or water within a distance of two thousand yards of its boundaries;

"aeronautical beacon" means an aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth;

"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;

"aeronautical ground light" means any light specially provided as an aid to air navigation, other than a light displayed on an aircraft;

"aeronautical information circular" means a notice containing information that does not qualify for the origination of a NOTAM or for inclusion in the Aeronautical Information Publication, but which relates to flight safety, air navigation, technical, administrative or legislative matters;

"aeronautical information publication" means an aeronautical information publication of a lasting character essential to air navigation, issued by the Authority;

"aeroplane reference field length" means 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;

"air traffic service" means a flight information service, alerting service, air traffic advisory service, or air traffic control service;

"air traffic service unit" is a generic term meaning variously, air traffic control unit, flight information centre or air traffic services reporting office;

"Aircraft Classification Rating (ACR)" means a number expressing the relative effect of an aircraft on a pavement for a specified standard sub grade category;

"aircraft stand" means a designated area on an apron intended to be used for parking an aircraft;

"appeals tribunal" means the Appeals Tribunal established under section 79 of the Civil Aviation Act; (Cap. 71:01)

"apron" means a defined area, on an aerodrome, intended to accommodate aircraft for purposes of loading or unloading of passengers, mail or cargo, fuelling, parking or maintenance;

"apron management service" means a service provided to regulate the activities and the movement of aircraft and vehicles on an apron;

"approach surface" means an inclined plane or combination of planes preceding the threshold;

"arresting system" means a system designed to decelerate an aeroplane overrunning the runway;

"authorised person" means any person authorised by the Authority either generally or in relation to a particular case or class of cases and reference to an authorised person includes references to the holder for the time being of an office designated by the Authority;

"Autonomous Runway Incursion Warning System (ARIWS)" means 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;

"balked landing" means a landing manoeuvre that is unexpectedly discontinued at any point below the obstacle clearance altitude/height (OCA/H);

"balked landing surface" means an inclined plane surface located at a specified distance after the threshold, extending between the inner transitional surface;

"barrette" means 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;

"calendar" means discrete temporal reference system that provides the basis for defining temporal position to a resolution of one day;

"capacitor discharge lights" means a lamp in which high-intensity flashes of extremely short duration are produced by the discharge of electricity at high voltage through a gas enclosed in a tube;

"clearway" means a defined rectangular area under the control of the appropriate authority selected or prepared as a suitable area over which an aircraft may make a portion of its initial climb to a specified height;

"conical surface" means a surface sloping upwards and outwards from the periphery of the inner horizontal surface;

"controlled aerodrome" means an aerodrome where air traffic services are provided;

"critical aircraft" means the most demanding aircraft with regard to the aircraft performance and dimensions for a range of aircraft, for which the aerodrome facilities is intended;

"Cyclic Redundancy Check (CRC)" means a mathematical algorithm applied to the digital expression of data that provides a level of assurance against loss or alteration of data;

"dangerous goods" means articles or substances which are capable of posing a risk to health, safety, property or the environment;

"data accuracy" means a degree of conformance between the estimated or measured value and the true value;

"data integrity (assurance level)" means a degree of assurance that an aeronautical data and its value has not been lost nor altered since the data origination or authorised amendment;

"data integrity classification (aeronautical data)" means classification based upon the potential risk resulting from the use of corrupted data.

"data quality" means a degree or level of confidence that the data provided meets the requirements of the data user in terms of accuracy, resolution and integrity;

"datum" means any quantity or set of quantities that may serve as a reference or basis for the calculation of other quantities;

"declared distance" means —

(*a*) "accelerate-stop distance available (ASDA)" which is the length of the take-off run available plus the length of the stop way, if provided;

(*b*) "landing distance available (LDA)" which is the length of the runway which is declared available and suitable for the ground run of an aircraft landing;

(*c*) "take-off distance available (TODA)" which is the length of the take-off run available plus the length of the clearway, if provided;

(*d*) "take-off run available (TORA)" which is the length of runway declared available and suitable for the ground run of an aircraft taking off;

"dependent parallel approaches" means simultaneous approaches to parallel or near-parallel instrument runways where radar separation minima between aircraft on adjacent extended runway centre lines are prescribed;

"displaced threshold" means a threshold not located at the extremity of a runway;

"effective intensity" means 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 (Geodetic height)" means the height related to the reference ellipsoid, measured along the ellipsoidal outer normal through the point in question;

"field length" means a balanced length for aeroplane, if applicable, or take-off distance in other cases;

"fixed light" means a light having constant luminous intensity when observed from a fixed point;

"Foreign Object Debris (FOD)" means 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" means an object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft;

"geodetic datum" means 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" means the equipotential surface in the gravity field of the earth which coincides with the undisturbed Mean Sea Level extended continuously through the continents;

"geoid undulation" The distance of the geoid above (positive) or below (negative) the mathematical reference ellipsoid;

"Gregorian calendar" means 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***). (In the Gregorian calendar, common years have 365 days and leap years 366 days divided into twelve sequential months);

"hazard beacon" means an aeronautical beacon used to designate a danger to air navigation;

"heliport" means an aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters;

"holding bay" means a defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft;

"hot spot" means a location on an aerodrome movement area with a history or potential risk of collision or runway incursion, and where heightened attention by pilots or drivers is necessary;

"human factor principles" means 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" means human capabilities and limitations, which have an impact on the safety and efficiency of aeronautical operations;

"identification beacon" means an aeronautical beacon emitting a coded signal by means of which a particular point of reference can be identified;

"incident" means an occurrence other than an accident associated with the operation of an aircraft, which affects or may affect the safety of operation of aircraft;

"independent parallel approaches" means 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" means simultaneous departures from parallel or near-parallel instrument runways;

"inner approach surface" means a rectangular portion surface of the approach surface immediately preceding the threshold;

"inner horizontal surface" means a surface located in a horizontal plane above an aerodrome and its environs;

"inner transitional surface" means a surface similar to the transitional surface but closer to the runway;

"instrument runway" means one of the following types of runways intended for the operation of aircraft using instrument approach procedures —

(*a*) "non- precision approach runway" means a runway served by visual aid(s) supporting an instrument approach procedure with minima not lower than 75m (250ft)minimum descent height (MDH);

(*b*) "precision approach runway, category I", means a runway served by visual aids and non-visual aid(s) supporting an instrument approach procedure with a decision height (DH) not lower than 60m (200 ft);

(*c*) "precision approach runway, category II", means a runway served by visual aids and non-visual aid(s) supporting an instrument approach procedure with a decision height (DH);

(*d*) "precision approach runway category III" means a runway served by visual aids and non-visual aids supporting an instrument approach operation type B to and along the surface of the runway and with a decision height (DH) lower than 30 m (100 ft), or no decision height. (Visual aids need not necessarily be matched to the scale of non-visual aids provided. The criterion for the selection of visual aids are the conditions in which operations are intended to be conducted;

"intermediate holding position" means a designated position intended for traffic control at which taxiing aircraft and vehicles stop and hold until they are cleared to proceed, when so instructed by the aerodrome control tower;

"landing area" means that part of a movement area intended for the landing or take-off of aircraft;

"landing direction indicator" means a device to indicate visually the direction currently designated for landing and take-off;

"laser-beam critical flight zone (LCFZ)" means an airspace in the proximity of an aerodrome but beyond the LFFZ where the irradiance is restricted to a level unlikely to cause glare effects;

"laser-beam free flight zone (LFFZ)" means an airspace in the immediate proximity of the aerodrome where the irradiance is restricted to a level unlikely to cause any visual disruption;

"laser-beam sensitive flight zone (LSFZ)" means an 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;

"licence" means a licence to operate an aerodrome issued by the Authority under Part II of these Regulations;

"lighting system reliability" means the probability that the complete installation operates within the specified tolerances and that the system is operationally usable;

"manoeuvring area" means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons;

"marker" means an object displayed above ground level in order to indicate an obstacle or delineate a boundary;

"marking" means a symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information;

"movement area" means that part of the aerodrome to be used for take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and apron;

"near-parallel runways" means non-intersecting runways whose extended centre lines have an angle of convergence/divergence of 15 degrees or less;

"notify" means shown in Aeronautical Information Publications, Aeronautical Information Circulars, NOTAM, civil aviation publications or any other official publication issued for the purpose of enabling any of the provisions of these Regulations to be complied with;

"non-instrument runway" means a runway intended for the operation of aircraft using visual approach procedures;

"normal flight zone (NFZ)" means airspace not defined as LFFZ, LCFZ or LSFZ but which must be protected from laser radiation capable of causing biological damage to the eye;

"obstacle" means any fixed (whether temporary or permanent) and mobile object, or part thereof, that—

(*a*) is located on an area intended for the surface movement of aircraft; or

(*b*) extends above a defined surface intended to protect aircraft in flight; or

(*c*) stands outside those defined surfaces and that has been assessed as being a hazard to air navigation.

"obstacle free zone (OFZ)" means the airspace above the inner approach surface, inner transitional surfaces, the 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 frangibly mounted one required for air navigation purposes;

"obstacle limitation surfaces" means 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;

"operator" means a person operating an aerodrome licensed or certificated under these Regulations;

"orthometric height" means height of a point related to the geoid, generally presented as an MSL elevation;

"Outer Main Gear Wheel Span (OMGWS)" means the distance between the outside edges of the main gear wheels;

"Pavement Classification rating (PCR)" means a number expressing the bearing strength of a pavement;

"precision approach runway" has the same meaning as assigned to instrument runway;

"primary runway" means runway used in preference to others whenever conditions permit;

"protected flight zones" means an airspace specifically designated to mitigate the hazardous effects of laser radiation;

"recommended practice" means any specification for the physical characteristics configuration, material, performance or procedure, the uniform application of which is recognised as desirable in the interest of safety, regularity or efficiency of international air navigation;

"registration approval" means an approval to operate an aerodrome granted by the Authority under Part V of these Regulations;

"relevant authority" means any authority other than the Civil Aviation Authority whose action may be necessary or complimentary for the implementation of these Regulations;

"road" means an established surface route on the movement area meant for the exclusive use of vehicles;

"road holding position" means a designated position at which vehicles may be required to hold;

"runway" means a defined rectangular area on a land aerodrome prepared for the landing and take-off of aircraft;

"Runway Condition Assessment Matrix (RCAM)" means 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)" means a number describing the runway surface condition to be used in the runway condition report;

"Runway Condition Report (RCR)" means a comprehensive standardised report relating to runway surface conditions and its effect on the aeroplane landing and take-off performance;

"Runway End Safety Area (RESA)" means an area symmetrical about the extended runway centreline and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aircraft undershooting or overrunning the runway;

"runway guard lights" means a light system intended to caution pilots or vehicle drivers that they are about to enter an active runway;

"runway-holding position" means a designated position intended to protect a runway, an obstacle limitation surface, or an Instrument Landing System/Microwave Landing System critical or sensitive area at which taxiing aircraft and vehicles shall stop and hold, unless otherwise authorised by the aerodrome control tower;

"runway strip" means a defined area including the runway and stop way, if provided, intended —

(*a*) to reduce the risk of damage to aircraft running off a runway; and

(*b*) to protect aircraft flying over it during take-off or landing operations;

"runway surface condition" means a description of the condition 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;

"runway turn pad" means 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)" means the range over which a pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line;

"safety" means a state in which the risk of harm to persons or of property damage is reduced to, and maintained at or below unacceptable level through a continuing process or hazard identification and risk management;

"Safety Management System (SMS)" means a systematic approach to managing safety including the necessary organizational structure, accountabilities, policies and procedures;

"segregated parallel operations" means 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;

"shoulder" means an area adjacent to the edge of a pavement, prepared to provide a transition between the pavement and the adjacent surface;

"sign" means a —

(*a*) fixed message sign. A sign presenting only one message;

(*b*) variable message sign. A sign capable of presenting several predetermined messages or no message, as applicable;

"signal area" means an area on an aerodrome used for the display of ground signals;

"standard" means any specification for physical characteristics, configuration, material, performance, personnel or procedure, the uniform application of which is recognised as necessary for the safety of air navigation;

"state safety programme" means an integrated set of regulations and activities aimed at improving safety;

"station declination" means an alignment variation between the zero degree radial of a VOR and true north, determined at the time the VOR station is calibrated;

"stopway" means a defined rectangular area on the ground at the end of the 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)" means 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" means a runway intended for take-off only;

"take-off surface" means an inclined plane or other specified surface beyond the end of a runway or clearway;

"taxiway" means 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 which is a portion of an apron designated as a taxiway and intended to provide access to aircraft stands only;

(*b*) apron taxiway which is a portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron; and

(*c*) rapid exit taxiway which is a taxiway connected to a runway at an acute angle and designed to allow landing aircrafts to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times;

"taxiway intersection" means a junction of two or more taxiways;

"taxiway strip" means an area including a taxiway intended to protect aircraft operating on a taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway;

"threshold" means the beginning of that portion of the runway usable for landing;

"touchdown zone" means the portion of a runway beyond the threshold, intended for landing aircraft on first contact with the runway;

"transitional surface" means a complex along the surface side of the strip and part of the approach surface, the slopes upwards and outwards to the inner horizontal surface;

"unserviceable area" means a part of the movement area that is unfit and unavailable for use by aircraft;

"usability factor" means the per centage of time during which the use of a runway or system of runways is not restricted because of the cross-wind component (cross-wind component means the surface wind component at right angles to the runway centre line);

"vicinity" means a defined airspace around an aerodrome for control of obstacles that may infringe the obstacle limitation surfaces around the aerodrome, contained within a radius of sixteen kilometres from the aerodrome reference point up to a height of one thousand five hundred feet above ground level;

"visual traffic pattern" means the aerodrome traffic zone of the aerodrome;

"wheel base" means the distance from the nose gear to the geometric centre of the main gear;

"wildlife" means feral birds and animals, including domestic animals out of the control of their owners; and

"wildlife hazard" means a potential for a damaging aircraft collision with wildlife on or near an aerodrome.

Use common reference systems

3. (1) The World Geodetic System – 1984 (WGS-84) shall be used as the horizontal reference system to express aeronautical geographical coordinates for aerodromes.

(2) The Mean Sea Level datum shall be used as the vertical reference system (elevation) at aerodromes.

(3) The Gregorian calendar and Coordinated Universal Time shall be used as the temporal reference system except where notified in the Botswana Aeronautical Information publication or the Aeronautical Information circular.

(4) The International System of Units developed and maintained by the General Conference of Weights and Measures shall be used as the standard system of units of measurements unless otherwise specified by the Authority.

Categories of aerodromes and requirements for operation of aerodromes Cap. 71:01 (Sub. Leg.)

4. A person shall not operate an aerodrome in Botswana unless such person is certified, licensed or registered in accordance with Civil Aviation (Certification and Licensing of Aerodromes) Regulations, 2022.

PART II — *Construction of Aerodromes*

Application for aerodrome establishment certificate

5. (1) A person shall not construct an aerodrome without a valid aerodrome establishment certificate issued under Regulation 7.

(2) An applicant for an aerodrome establishment certificate shall submit to the Authority for approval an application in the prescribed form accompanied by —

(*a*) a detailed design of the proposed construction including related architectural requirements approved by the relevant authority;

(*b*) aerodrome data in accordance with the characteristics of the aircraft for which the aerodrome is intended; and

(*c*) a topographical map of the proposed aerodrome site as specified by the Authority indicating contours at one metre intervals.

(3) An application for an aerodrome establishment certificate shall be considered for approval where the Authority is satisfied that the —

(*a*) applicant holds proof of ownership or lease hold of the proposed site and a valid authorisation from a relevant authority for use of the place as an aerodrome;

(*b*) environment impact assessment report in line with the Environmental Impact Assessment Act is approved by authority responsible for national environment management; and (Cap. 65:07)

(*c*) applicant has obtained a letter of no objection from the Director of Wildlife, land board and tribal authority, where the site is on tribal land or Wildlife and National Park.

(4) The Authority shall, before issuance of an establishment certificate, assess the suitability of the place proposed for construction taking into consideration —

(*a*) the proximity of the place to other aerodromes and landing areas, including military aerodromes;

(*b*) obstacles, terrain and existing airspace restrictions; and

(c) that it is not against public interest that the place where the aerodrome is to be constructed shall be used as such.

Issuance and validity of aerodrome establishment certificate

6. (1) The Authority shall issue an aerodrome establishment certificate to an applicant where the applicant satisfies the requirements in regulation 5 and any other requirements as may be specified by any relevant authority.

(2) An aerodrome establishment certificate shall be valid for a period of two years.

Design and construction of aerodromes

7. (1) An applicant for an establishment certificate shall ensure that the design and construction of an aerodrome is undertaken by a person registered with the relevant professional body.

(2) The Authority shall inspect the site of an aerodrome during construction to ascertain compliance with standards prescribed and the terms of the aerodrome establishment certificate.

(3) An operator shall bear or pay any costs involved in providing transport for purposes of inspecting an aerodrome, in connection with the issuing or renewal of an establishment certificate.

Requirements for aerodrome design

8. (1) An aerodrome design shall —

(*a*) indicate the physical characteristics in accordance with these Regulations;

(*b*) indicate the obstacle limitation surfaces;

Cap. 71:01 Sub. Leg.

(*c*) integrate security measures in accordance with the Civil Aviation (Security) Regulations; and

(*d*) indicate the appropriate equipment and installations.

(2) The physical characteristics, obstacle limitation surfaces, visual aids and equipment and installations, required under subregulation (1) shall —

(*a*) be appropriate to the critical aircraft characteristics for which the aerodrome intends to serve;

(*b*) be at the lowest meteorological minima for each runway;

(*c*) provide ambient light conditions during the operations of aircraft; and

(*d*) comply with the aerodrome design regulations as set out in Part VII of these Regulations.

Aerodrome reference code

9. (1) An aerodrome reference code comprising of a code number and a code letter shall be used for aerodrome planning.

(2) The Authority shall determine the aerodrome reference code in accordance with the critical aircraft characteristics for which the aerodrome is intended.

(3) The aerodrome reference code numbers and code letters provided for under subregulation (1) shall be determined in accordance with Table S1-1 as set out in Schedule 1.

PART III — *Obligations of Aerodrome Operator*

Compliance with conditions

10. An operator shall comply with conditions, endorsed on a licence, certificate or registration approval granted under these Regulations.

Competence of operational and maintenance personnel

11. (1) An operator shall develop and submit for approval by the Authority, a Task Resource Analysis to ensure that there is an adequate number of operational, qualified and skilled personnel to perform activities for aerodrome operation maintenance.

(2) An operator shall only employ persons with the required certification as contained in the guidance material provided by the Authority, where the Authority or any other relevant authority requires competence certification for the personnel of an aerodrome.

(3) The provisions of this regulation shall not apply to category 1 and registered aerodromes.

Aerodrome operations and maintenance

12. (1) An operator shall maintain an aerodrome in accordance with the maintenance procedures set out in the aerodrome manual.

(2) The Authority may give written directives to an operator to alter the procedures set out in an aerodrome manual.

(3) An operator shall ensure proper and efficient maintenance of the aerodrome.

(4) An operator of an aerodrome where air traffic services are provided, shall coordinate with the air traffic services to ensure the safety of aircraft operating in the airspace, associated with the aerodrome.

Safety management system Cap. 71:01 (Sub. Leg.)

13. (1) An operator shall have a safety management system that complies with the requirements specified in the Civil Aviation (Safety Management) Regulations.

(2) The provisions of this regulation shall not apply to registered aerodromes in categories 1 and 2.

(3) The Authority may apply the provisions of this regulation to aerodromes in category 2 where it deems it necessary.

Storage of inflammable and other dangerous goods

14. A person shall not store fuel, pyrotechnic materials and other highly flammable or dangerous goods at an aerodrome except with the permission of the Authority and in accordance with these Regulations.

Safety measures against fire

15. (1) A person shall not —

(*a*) smoke within any place, or bring an open flame into any place, where that act is prohibited by a displayed notice;

(*b*) smoke within a place where there is no notice prohibiting smoking, or bring an open flame into that place, within a distance of an aircraft or, of any vehicle used for the supply of fuel to an aircraft, or a store, dump, liquid fuel or explosives, as may be determined by the Authority;

(*c*) willfully give a false fire alarm;

(*d*) tamper or interfere with any fire hose reel, hydrant or any other item provided for firefighting purposes;

(*e*) keep, store, discard or discharge any flammable liquid, gas, signal flares or other like material in an aircraft, except in the receptable appropriate for the purpose or in a place on the aerodrome specifically approved by the aerodrome operator for that purpose; or

(*f*) store, stack or use any material or equipment in a manner which constitues or is likely to constitute a fire hazard.

(2) An operator shall display in a conspicuous place appropriate signage in respect to the acts prohibited under subregulation (1).

Access to and operations within restricted areas

16. (1) A person shall not access a restricted area of an aerodrome unless authorised by the operator and subject to such conditions as the operator may impose.

(2) A person authorised to access a restricted area under subregulation (1) shall not —

(*a*) move an aircraft or a vehicle in the restricted area —

(i) except with the permission and directions issued by the air traffic services personnel, or

(ii) in a manner that endangers the safety of persons and property; or

(*b*) use a portion of the aerodrome for landing or taking off, other than the area designated for that purpose.

Entry into or exit from restricted areas of aerodrome

17. (1) A person, aircraft or vehicle shall not enter or exit the restricted area of an aerodrome except through points established by the aerodrome operator for the purpose of the aerodrome.

(2) A person —

(*a*) other than a person carried in an aircraft or in a vehicle, shall not enter or leave a restricted area of an aerodrome; or

(*b*) shall not move an aircraft on the surface of an aerodrome or a vehicle into or from the restricted area,

except in an emergency or at a point of entry or exit established by an operator for that purpose.

Test-running of aircraft engine

18. A person may test-run an aircraft engine at an aerodrome, at an approved aircraft maintenance facility of the aerodrome or a place designated for test running by an operator.

Prohibited acts on aerodrome

19. (1) A person shall not, on an aerodrome —

(*a*) obstruct or interfere with the use of the aerodrome;

(*b*) obstruct any person executing his or her duties at the aerodrome;

(*c*) remove or deface any notice, writing, document or marking erected or displayed by the aerodrome operator;

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

(*e*) dump any waste matter in an undesignated place; or

(*f*) dump or spill any substance capable of causing water pollution, whether solid, liquid, vapour, gas or a combination of these in an undesignated place.

(2) A person shall not, unless with the permission of the operator —

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

(*b*) climb any wall, fence, barrier, ceiling, gate or post on an aerodrome;

(*c*) handle any baggage or carry baggage for a passenger at an aerodrome;

(*d*) bring a vehicle into or drive into an aerodrome; or

(*e*) obstruct an entrance to or a passage at an aerodrome in a manner that inconvieniences other users of the entrance or passage.

Removal of obstructions from aerodrome movement surfaces

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

Maintenance of environmental management programme

21. An operator shall —

(*a*) establish and maintain an aerodrome environmental management programme for the area within the authority of the management operator and for the area where wildlife presents or is likely to present a hazard to aircraft operations; and

(*b*) ensure that the environmental management programme established under subregulation (*a*) minimises the effects of any hazards or potential hazards taking into account the provisions of the laws on environmental management.

Protection of navigation aids

22. An operator shall in consultation with the Authority prevent the —

(*a*) construction of any facility on the aerodrome, which may adversely affect the operation of any electronic or visual navigation or air traffic service facility on the aerodrome; and

(*b*) the interruption of visual or electronic signal of navigational aids, as far as it is within the authority of the opearator.

Responsibilities of operator

23. (1) An operator shall —

(*a*) maintain the aerodrome in a servicable condition, keep the aerodrome free of unauthorised person, vehicles and animals which are not under control or any other obstructions;

(*b*) mark all obstructions in accordance with any guidelines issued by the Authority;

(*c*) inform the Authority of any alterations to obstructions or works on the aerodrome;

(*d*) install approved wind direction indicators to show the surface direction of the wind and ensure that they function satisfactorily;

(*e*) maintain the prescribed markings in a conspicous conditions and ensure that they are readily visible to aircraft in the air or manoeuvring on the ground;

(*f*) avail facilities and ensure that they are in serviceable condition and that all apparatus installed function efficiently;

(*g*) appropriately mark the unserviceable areas on the landing terrain;

(*h*) inform the Authority where the aerodrome becomes unserviceable through any cause or where any portion of the surface of the landing area deteriorates to such an extent that the safe operation of aircraft may be endangered.

(*i*) submit to the Authority reports on the condition of the aerodrome as may be required by the Authority;

(*j*) ensure that organisations performing activities at the aerodrome comply with safety requirements specified by the operator;

(*k*) report all incidents and accidents at the aerodrome to the Authority; and

(*l*) require organisations performing activities at the aerodrome to comply with the aerodrome safety management requirements.

(2) An operator shall perform collaboratively between affected stakeholders including the aeroplane operator, ground handling agencies and the air navigation service providers.

(3) An operator and aeroplane operator shall document the introduction of an aeroplane type or subtype, new to the aerodrome and shall follow the following process —

(*a*) the aeroplane operator submits a request to the aerodrome operator to operate an aeroplane type or subtype to the aerodrome;

(*b*) the operator identifies possible means of accomodating the aeroplane type or subtype including access to movement areas and, where necessary, considers the feasibility and economic viability of upgrading the aerodrome infrastructure and makes an assessment; and

(*c*) the operator and aeroplane opearator discuss the assessement by the operator and whether operations of the aeroplane type or subtype can be accommodated and, where permitted, under what conditions.

(4) The aerodrome compatibility study shall include the following procedures —

(*a*) identify the aeroplane's physical and operational characteristics;

(*b*) identify the applicable regulatory requirements;
(*c*) estsblish the adequacy of the aerodrome infrastructure and facilities *vis-a-vis* the requirements of the new aeroplane;
(*d*) identify the changes required to the aerodrome; and
(*e*) perform the required safety assessments identified during the compatibility study.

(5)The result of the compatibility study should enable decisions to be made and provide —

(*a*) the operator with the information in order to make a decision on —
(i) allowing the operation of the specific aeroplane at the given aerodrome, and
(ii) the changes required to the aerodrome infrastructure and facilities to ensure safe operations at the aerodrome with due consideration to the harmonious future development of the aerodrome,
(*b*) the State with information necessary for its safety oversight and the continued monitoring of the conditions specified in the aerodrome certification;
(*c*) the impact of aeroplane characteristics on the infrustructure;
(*d*) the aeroplane's physical characteristics; and
(*e*) aeroplane operational characteristics.

Inspection of aerodromes and unhindered access by inspectors of Authority

24. (1) The Authority shall inspect and carry out tests on the aerodrome facilities, services and equipment, inspect documents and records of the aerodrome, verify the safety management system of the aerodrome, before an aerodrome licence or certificate is issued or renewed, and subsequently, at any other time, for the purpose of ensuring that safety at the aerodrome is maintaned.

(2) The Authority or an inspector shall, for purposes of subregulation (1) have unhindered access to any part of the aerodrome or any aerodrome facility, including personnel.

Notifying and reporting

25. (1) An operator shall notify and report to the Authority, the air traffic control unit and pilots, information on —

(*a*) any inaccuracies in the Aeronautical Information Publication;
(*b*) any changes to the aerodrome facilities, equipment and level of service planned in advance; or
(*c*) issues that may require immediate notification including obstacles, obstructions and hazards, levels of service, movement areas, and any other condition that affects aviation safety at the aerodrome and against which precautions are warranted.

(2) An operator shall give immediate notice, directly to the pilots where it is not feasible for the operator to arrange for the air traffic control and the flight operations unit to receive notice of the circumstances referred to in subregulation (1) (*c*).

Aerodrome movement area inspections

26. An operator shall carry out an inspection of the movement area at least —

(*a*) once a day for aerodromes in categories 1, 2 and 3 and atleast twice a day for aerodromes in categories 4, 5,6, 7, 8, 9 and 10; and
(*b*) once a week for registred aerodromes.

Special inspections

27. (1) An operator shall inspect an aerodrome —

(*a*) as soon as practicable after any accident or incident;
(*b*) during any period of construction or repair of the aerodrome facilities or equipment that is critical to the safety of air craft operation; and
(*c*) where there are conditions at the aerodrome that may affect aviation safety.

(2) An operator shall notify the Authority, within a time determined by the Authority by way of an Advisory Circular, information on any special inspection carried out.

Warning notices

28. An operator shall, where a low flying aircraft at or near an aerodrome or a taxiing aircraft is likely to be hazardous to people or vehicles —

(*a*) post hazard warning notices to that effect, on any public way that is adjacent to the manoeuvring area; or

(*b*) inform the relevant authority where the public way is not controlled by the operator.

PART IV — *Aerodrome Data*

Aeronautical data

29. (1) An operator shall —

(*a*) determine and report aerodrome related aeronautical data in accordance with the accuracy and integrity classification required to meet the needs of the end-user of aeronautical data; and

(*b*) make available to the aeronautical information services aerodrome mapping data for aerodromes where safety or performance based operations suggest possible benefits.

(2) The selection of the aerodrome mapping features to be collected, where made available in accordance with subregulation (1) (*b*), be made with consideration of the intended applications.

(3) Any digital data error detection technique shall be used during the transmission and storage of aeronautical data and digital data sets.

(4) The aerodrome mapping data shall be made available to the aeronautical information services for aerodromes deemed relevant by the state where safety and performance base opearations suggest possible benefits.

Aerodrome reference point

30. (1) An aerodrome reference point shall be —

(*a*) established for an aerodrome; and

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

(2 The position of the aerodrome reference point shall be measured and reported to the aeronautical information services authority in degrees, minutes and seconds.

Aerodrome and runway elevation

31. (1) An aerodrome elevation and geoid undulation at the runway aerodrome elevation position shall be measured to the accuracy of one-half elevation metre and reported to the aeronautical information service authority.

(2) An aerodrome used by international civil aviation for non-precision approaches, the elevation and geoid undulation of each threshhold, the elevation of the runway end and any significant high or low intermediate points along the runway shall be measured to the accuracy of one-half metre and reported to the aeronautical information services authority.

(3) The elevation and geoid undulation of the threshold, the elevation of the runway end and the highest elevation of the touchdown zone for precision approach runway, shall be measured to the accuracy of one-quarter metre and reported to the aeronautical information services authority.

(4) The geoid undulation must be measured in accordance with the appropriate system of coordinates.

Aerodrome reference temperature

32. The aerodrome reference temperature shall be —

(*a*) determined for an aerodrome in degrees Celcius; and

(*b*) the monthly mean of the daily maximum temperatures for the hottest month of the year, being the month with the highest monthly mean temperature, and the tempearure shall be, where possible averaged over a period of years.

Aerodrome dimensions and related information

33. (1) The following data shall be measured or described, as appropriate, for each facility provided on an aerodrome —

(*a*) 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 precision approach runway category 1, the existence of an obstacle free zone when provided;

(*b*) width to the nearest metre, surface type of the —

(i) strip,

(ii) runway end safety area length, and

(iii) stop way;

(*c*) arresting system-location, which runway end, and description;

(*d*) taxiway-designation, width, surface type;

(*e*) apron-surface type, aircraft stands;

(*f*) the boundaries of the air traffic control service;

(*g*) clearway-length to the nearest metre, ground profile;

(*h*) 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 syatems;

(*i*) location and radio frequency of any VOR aerodrome checkpoint;

(*j*) location and designation of standard taxi-routes; and

(*k*) distance to the nearest metre of localizer and glide path elements comprising an instrument landing system or azimuth and elevation antenna of a microwave landing syatem in relation to the associated runway extremities.

(2) The geographical coordinates of —

(*a*) each threshold shall be measured and reported to the aeronautical information service authority in degrees, minutes, seconds and hundredths of seconds;

(*b*) appropriate taxiway centre line points shall be measured and reported to the aeronautical information service in degrees, minutes, seconds and hundredths of seconds;

(*c*) each aircraft stand shall be measured and reported to the aeronautical information service in degrees, minutes, seconds and hundredths of seconds; and

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

Strength of pavements

34. (1) The bearing strength of a pavement shall be determined by the aircraft for which the pavement is intended for use.

(2) The bearing strength of a pavement intended for aircraft of apron mass greater than 5 700 kg shall be made available using the aircraft classification number, PCR method by reporting the following information —

(*a*) the PCR;
(*b*) pavement type for PCR determination;
(*c*) subgrade strength category;
(*d*) maximum allowable tyre pressure category or maximum allowable tyre pressure value; and
(*e*) evaluation method and if necessary, PCRs may be published to an accuracy of one-tenth of a whole number.

(3) 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.

(4) The different PCRs may be reported if the strength of the pavement is subject to significant seasonal variation.

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

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

(7) The information under subregulation (2) shall be reported using the following codes —

(*a*) pavement type for ACR-PCR determination —

Pavement type	Code
(i) rigid pavement,	R
(ii) flexible pavement;	F

(*b*) subgrade strength category —

Category	Code
(i) high strength – charaterized by K= 150 MN/m³ and 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
(ii) medium strength – characterized by K= 80 MN/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
(iii) low strength – characterized by K= 40 MN/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, and	C
(iv) ultra low strength – characterized by K= 20 MN/m³ and representing all K values below 25 MN/m³ for rigid pavements, and by CBR= 3 and representing all CBR values below 4 for flexible pavements;	D

(*c*) maximum allowable tire pressure category –

Tyre pressure category	Code
(i) unlimited – no pressure limit,	W
(ii) high – pressure limit to 1.75 MPa,	X
(iii) Medium – pressure limited to 1.25 MPa,	Y
(iv) low – pressure limited to 0.50 MPa,	Z

(*d*) evaluation method —

Method	Code
(i) technical evaluation – representing a specific study of the pavement characterised and application of pavement behaviour technology, and	T
(ii) using aircraft experience – representing a knowledge of the specific type and mass of aircraft satisfactorily being supported under regular use.	U

(8) The following examples shall be used to illustrate how pavement strength data are reported under the ACR-PCR method —

(*a*) if the bearing strength of a rigid pavement, resting on a medium strength subgrade, has been assessed by technical evaluation to be PCNR 80 and there is no tire pressure limitation, then the reported information would be PCR 80/R/B/W/T;

(*b*) if the bearing strength of a composite pavement , behaving like a flexible pavement and resting on a high strength subgrade, has been assessed by using aircraft experience to be PCR 50 and the maximum tire pressure allowable is 1.25 MPa, then the reported information would be PCR 50/F/A/Y/U;

(*c*) if the bearing strength of a flexible pavement, resting on a medium strength subgrade, has been assessed by technical evaluation to be PCN 40 and the maximum allowable tire pressure is 0.80 MPa, then the reported information would be PCR 40/F/B 0.80 MPa/T; and

(*d*) if a pavement is subject to a B747-400 all-up mass limitation of 390 000kg, then the reported information would include a note to the effect that the reported PCNR is subject to a B747-400 all-up mass limitation of 390 000kg.

(9) A criteria shall be used established to regulate the use of a pavement by aircraft with an ACR higher than the PCR reported for that pavement in accordance with subregulations (2) and (3).

(10) The bearing strength of a pavement intended for aircraft of apron mass equal to or less than 5 700kg shall be made available by reporting the following information —

(*a*) maximum allowable aircraft mass; and

(*b*) maximum allowable tyre pressure.

Pre-flight altimeter check location

35. (1) One or more pre-flight altimeter check locations shall be the altimer check established for an aerodrome.

(2) A pre-flight check location shall be located on an apron to enable an altimer check to be made prior to obtaining taxi clearance and to eliminate the need for stopping for that purpose after leaving the apron, in which case, an entire apron can serve as a satisfactory altimer check location.

(3) The elevation of a pre-flight altimer check location shall be given as the average elevation, rounded to the nearest metre, of the area on which it is located.

(4) The elevation of any portion of a pre-flight altimer check location shall be within 3 m of the average elevation for that location.

Declared distances

36. (1) The following distances shall be calculated to the nearest metre 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.

(2) The declared distances shall be calculated in accordance with Schedule 2 and guidelines determined by the Authority.

Condition of movement area and related facilities

37. (1) Any information on the condition of the movement area and the operational status of related facilities shall be provided to the appropriate aeronautical information services units, and similar information of operational significance to the air traffic service units, to enable those ubits to provide the necessary information to arriving and departing aircraft and the information shall be kept uo to date and changes in conditions reported without delay.

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

(*a*) construction or maintenance work;

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

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

(*d*) other contaminats on a runway, taxiway or apron such as mud, dust, sand, volcanic ash, oil and rubber;

(*e*) other temporary hazards, including parked aircraft;

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

(*g*) failure of the normal or secondary power supply.

(3) The movement area shall, in complance with subregulations (2) and (3), be inspected at least once each day where the code number is 1 or 2 and at least twice each day where the code is number 3 or 4.

(4) Any person assessing and reporting runway surface conditions required in compliance with subregulation (2) shall be trained and competent to meet criteria set by the Authority.

Water on runway

38. (1) A description of the runway surface conditions shall be made available where water is present on a runway using the following terms —

(*a*) damp – the surface shows a change of colour due to moisture;

(*b*) wet – the surface is soaked but there is no standing water;

(*c*) standing water – for aeroplane performance purposes, a runway where more than 25 per cent of the runway surface area, whether in isolated areas or not, within the required length and width being used is covered by water more than 3 mm deep.

(2) Information that a runway or portion thereof may be slippery when wet shall be made available.

(3) An operator shall notify aerodrome users when the friction level of a paved runway or portion thereof is less than that specified in accordance with these Regulations.

(4) The conducting of a runway surface friction characteristics evaluation programme including determining and expressing the minimum friction level shall be as set out in Schedule 2.

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

Removal of disabled aircraft

39. (1) An operator shall, on request from aircraft operators, provide the telephone number and email address of the office of the aerodrome coordinator responsible for the removal of an aircraft disabled on or adjacent to the movement area.

(2) An operator shall provide information on the capability to remove an aircraft disabled on or adjacent to the movement area and such capability to remove a disabled aircraft may be expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove.

Level of protection of rescue and fire fighting

40. (1) An operator shall provide information on the level of protection provided at an aerodrome for aircraft rescue and fire fighting purposes.

(2) The level of protection available at an aerodrome shall be expressed in terms of the category of the rescue and fire fighting services in accordance with the types and amounts of extinguishing agents available at the aerodrome.

(3) An operator shall, where changes in the level of protection normally available at an aerodrome for rescue and firefighting services occurs, notify the appropriate air traffic service units and aeronautical information services unit to enable those units to provide the necessary information to arriving and departing aircraft.

(4) An operator shall, where the changes in subsection (3) are corrected, notify the appropriate air traffic services units and aeronautical information services.

(5) A change shall be expressed in terms of the new category of the rescue and fire fighting services available at the aerodrome.

Visual approach slope indicator system

41. (1) The following information on the visual and slope approach, and slope indicator system installation shall be made available —

(*a*) the associated runway designation number;

(*b*) the type of system for an AT- VASIS, PAPI OR APAPI installation, the side of the runway on which the lights are installed;

(*c*) where the axis of the system is not parallel to the runway centre line, the angle of displacement and the direction of displacement;

(*d*) the nominal approach slope angle for a T-VASIS or an AT-VASIS this shall be an angle Θ according to the formula in Figure S1-23 in Schedule 1 and an a PAPI and an APAPI this shall be an angle (B+ C) ÷ 2 and (A+B) ÷ 2, respectively as in Figure S1-25; and

(*e*) the minimum eye height over the threshold of the on-slope signal —

(i) for a T-VASIS or an AT-VASIS this shall be the lower height at which only the wing bar is visible, however, the additional heights at which the wing bar plus one, two or three fly-down light units come into view may also be reported if such information would be beneficial to aircraft using the approach,

(ii) for a PAPI this shall be the setting angle of the third unit from the runway minus 2 minutes and for an APAPI this shall be the setting angle of the unit farther from the runway minus 2 minutes.

Coordination between aeronautical information services and aerodrome authorities

42. (1) An arrangement shall be made between aeronautical information services and aeodrome authorities responsible for aerodrome services to ensure that aeronautical information services units obtain information to enable them to provide up to date pre-flight information and to meet the need for in-flight information with minimum delay and —

(*a*) information on the status of certification of aerodromes and aerodrome conditions;

(*b*) the operational status of associated facilities, services and navigation aids within their area of responsibility; and

(*c*) any other information considered to be of operational significance.

(2) Where any changes to the air navigation system are being introduced, due account shall be taken by the services responsible for such changes of time needed by aeronautical information services for the preparation, production and issue of relevant material for promulgation.

(3) The provision of information to aeronautical information services shall be timely and to ensure this, close coordination between those services concerned is required.

(4) The most important changes to aeronautical information are those that affect charts and computer based navigation systems which qualify to be notified by the Aeronautical Information Regulation and Control (AIRAC) system.

(5) The predetermined, internationally agreed AIRAC effective date shall be observed by the responsible aerodrome services when submitting the raw information or data to aeronautical information services.

(6) The aerodrome services responsible for the provision of raw aeronautical information or data to the aeronautical information services shall do that while taking account the accuracy and integrity requirements required to meet the needs of the end-user of aeronautical data.

PART V — *Wildlife Hazard Management*

Animals not allowed in restricted areas of aerodrome

43. A person shall not bring, graze or permit an animal in the restricted area of an aerodrome or cause any animal to graze or feed in the restricted area of an aerodrome.

Wildlife hazard management

44. (1) An operator shall, in consultation with the authority responsible for wildlife, take necessary action to control wildlife hazards at an aerodrome.

(2) An operator shall ensure that procedures to deal with the danger posed to aircraft operations by the presence of wildlife in an aerodrome flight pattern or movement area are in place.

(3) The wildlife management plan of an aerodrome shall be approved by the Authority and shall form part of the aerodrome manual.

Wildlife strike hazard reduction at aerodrome

45. (1) An operator shall —

(*a*) develop a Wildlife Hazard Management Programme to minimise the risks associated with wildlife strike hazards; and

(*b*) take practical measures to control the wildlife habitat around an aerodrome and to disperse birds, which are a potential hazard to aircraft operations.

(2) A wildlife strike hazard on, or in the area of, an aerodrome shall be assessed through —

(*a*) the establishment of a national procedure for recording and reporting wildlife strikes to aircraft;

(*b*) 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

(*c*) an ongoing evaluation of the wildlife hazard by competent personnel.

(3) An operator shall —

(*a*) collect and forward wildlife strike reports to the Authority for submission to ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) database; and

(*b*) take action to —

(i) decrease the risk to aircraft operations by adopting measures to minimise the likelihood of collisions between wildlife and aircraft;

(ii) eliminate or to prevent the establishment of refuse collection sites, garbage disposal dumps, including landfills, or any other source which may attract wildlife to an aerodrome, or its vicinity, unless an appropriate wildlife assessement indicates that they are unlikely to create conditions conducive to a wildlife hazard problem.

(4) Subject to subregulation 3 (*b*) (ii), refuse collection sites, garbage disposal dumps and landfills shall be located no closer than a 13km radius circle centred on the aerodrome reference point and shall be located further, if located in the vicinity of an approach and take-off path of an aerodrome, except where studies of flight lines of birds attracted to these sites show that the birds will not cause a problem for the aerodrome.

(5) An operator and relevant authorities shall, where the elimination of existing sites is not possible, ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable.

(6) An operator shall —

(*a*) establish –

(i) a Local Wildlife Hazard Management Committee to manage wildlife hazard at an aerodrome; and

(ii) an aerodrome wildlife control unit, adequately equipped to control and manage wildlife hazard at an aerodrome;

(*b*) maintain records of all aspects of wildlife hazard control;

(*c*) monitor the local environment including any activities that may attract wildlife and in designing the wildlife hazard management programme, shall consider that environment and the activities that may attract wildlife; and

(*d*) give due considearation to aviation safety concerns related to land developments in the area of an aerodrome that may attract wildlife.

National Committee on Wildlife Hazard Management

46. (1) There shall be a National Committee on Wildlife Hazard Management established by the Authority.

(2) The Committee shall consist of 16 members and shall be constituted as follows —

(*a*) the Director Airport Services from the Authority, who shall be the Chairperson;

(*b*) officers not below the rank of Director to represent Ministries responsible for —

(i) civil aviation,

(ii) local government, and

(iii) defence;

(*c*) two representatives from aerodrome operators;

(*d*) two representatives from aircraft operators;
(*e*) two air navigation service providers;
(*f*) two agencies responsible for wildlife services; and
(*g*) the Chairpersons of the airport local wildlife hazard management committees.

(3) The National Committee on Wildlife Hazard Management shall be responsible for —

(*a*) analysing wildlife hazard problems at aerodromes;
(*b*) carrying out research and development on wildlife hazard management;
(*c*) acting as an interface between the aerodrome operators and air operators;
(*d*) advising aerodrome operators on wildlife hazard management; and
(*e*) reviewing the effectiveness of the wildlife hazard management programmes at aerodromes.

Assessment of wildlife strike hazards at aerodrome

47. An operator shall carry out a wildlife hazard assessment at the aerodrome and put in place measures to reduce the risk of a wildlife strike at an aerodrome.

PART VI — *Aerodrome physical characteristics*

Conditions for operating aerodrome

48. An operator shall not operate an aerodrome licensed or certified under these Regulations unless the facilities and characteristics of an aerodrome are effectively related and match the needs of the aircraft for which an aerodrome is intended.

Standard for physical characteristics of aerodrome

49. A person shall not operate an aerodrome unless the physical characteristics of the aerodrome comply with these Regulations.

Number and orientation of runways

50. (1) The number and orientation of a runway at an aerodrome shall be such that the usability factor of an aerodrome is not less than 95 per cent for the aircraft for which the aerodrome is intended to serve, taking into account the wind distribution for the location.

(2) The siting and orientation of runways at an aerodrome shall be such that the arrival and departure tracks minimise interference with areas approved for residential use and other noise sensitive areas close to the aerodrome in order to avoid future noise problems.

(3) Where a new instrument runway is being located, particular attention shall be given to areas over which aircraft will be required to fly when following instrument approach and missed approach procedures, so as to ensure obstacles in these areas or other factors will not restrict the operation of the aircraft for which the runway is intended.

Maximum permissible cross-wind component

51. (1) The cross-wind component for aircraft landing and taking off shall not exceed the cross-wind components, in determining the number of runways and orientation of runways at —

(*a*) 37km/h in the case of aircraft whose reference field length is 1500m or more, except that when poor runway braking action owing to an insufficient longitudinal co-efficient of friction is expereienced with some frequency, a cross-wind component not exceeding 24km/h shall be assumed;
(*b*) 24km/h in the case of aircraft whose reference field length is 1200m or up to but not including 1500m; and
(*c*) 19 km/h in the case of aircraft whose reference field length is less than 1200m.

(2) The factors that may affect the calculation of the estimate of the usability factor and allowance to be made to take account of the effect of unusual circumstances shall include —

(*a*) type of operation;

(*b*) climatological conditions including wind distribution, wind statistics and cross-wind components;

(*c*) topography of an aerodrome site, aircraft approach paths, and surroundings including –

(i) obstacle limitation surfaces, as applicable,

(ii) current and future land use,

(iii) construction costs, and

(iv) visual and non-visual aids; or

(*d*) air traffic in the area of an aerodrome including —

(i) proximity of other aerodromes or air traffic services routes,

(ii) traffic density, and

(iii) traffic control procedures where applicable and missed approach procedures.

Data to be used for calculation of runway usability factor

52. (1) The selection of data to be used for the calculation of the runway usability factor shall be based on reliable wind distribution statistics that extend over a period of not less than five years with wind observations made at least eight times daily and spaced at equal intervals of time.

(2) The wind distribution of a shorter period may be used for runways in categories 1 and 2 and registered aerodromes as determined by the operator and approved by the Authority.

Location of threshold

53. (1) A threshold shall be located at the extremity of a runway unless operational considerations justify the choice of another location.

(2) In determining that no obstacles penetrate above the approach surface, account shall be taken of mobile objects such as vehicles on roads and trains, at least within that portion of the approach area within 1200m longitudinally from the threshold and of an overall width of not less than 150m.

(3) The operator shall take into account the various factors which may have a bearing on the location of a threshold, where it is necessary to displace a threshold, either permanently or temporarily from its normal location.

(4) Where a 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 and an additional distance shall be provided to meet the requirements of the runway end safety area.

(5) Without prejudice to the generality of subregulation (3), the factors to be considered in the determination of the location of a displaced threshold shall be —

(*a*) obstacles in the approach surface;

(*b*) landing distance available;

(*c*) type of aircraft for which the runway is intended;

(*d*) visibility and cloud base conditions;

(*e*) obstacle clearance limit in the case of precision approach runways; and

(*f*) provision for obstacle free surfaces.

Determination of actual length of runways

54. (1) Notwithstanding the provisions of subregulation (3), the actual runway length to be provided for a primary runway shall be adequate to meet the operational requirements of the aircraft for which the runway is intended and shall not be less than the longest length determined by applying the corrections for local conditions to the operations and performance characteristics of the relevant aircraft, including elevation, temperature, runway slope, humidity and the runway surface characteristics.

(2) The length of a secondary runway shall be determined in accordance with subregulation (1) except that consideration shall only be given to the needs of those aircraft which require to use the secondary runway in addition to other runways in order to obtain a usability factor of at least 95 per cent.

(3) Where a runway is associated with a stop-way or clearway, an actual runway length less than that resulting from application of subregulation (1) or (2), may be considered satisfactorily, 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 aircraft the runway is intended to serve.

(4) The use of stop-ways and clearways shall be as set out in Schedule 2.

Determination of width of runway

55. (1) The width of a runway shall not be less than the appropriate width of dimension set out in Table S-2 in Schedule 1.

(2) The width of a precision approach runway shall not be less than 30 m where the code number is 1 or 2.

Determination of minimum distance between parallel runways

56. (1) The minimum distance of parallel non-instrument runways intended for simultaneous use shall be —

(*a*) 210m where the higher code number is 3 or 4;

(*b*) 150m where the higher code number is 2; and

(*c*) 120m where the higher code number is 1.

(2) The minimum distance between centre lines of parallel instrument runways intended for simultaneous use shall be —

(*a*) 1035m for independent parallel approaches;

(*b*) 915m for dependent parallel approaches;

(*c*) 760m for independent parallel departures; and

(*d*) 760m for segregated parallel operations, except that —

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

(ii) shall be increased by 30 m for each 150 m that the arrival runway is staggered away from the arriving aircraft; and

(*e*) for independent parallel approaches, combinations for minimum distances and associated conditions may be applied when it is determined that such combinations would not adversely affect the safety of aircraft operations.

Slopes on runways

57. (1) The longitudinal slope of a runway shall be computed by runways dividing the difference between the maximum and minimum elevation along the runway centre line by the runway length and shall not exceed —

(*a*) 1 per cent where the code number is 3 or 4; and

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

(2) The longitudinal slopes along any portion of a runway shall not exceed —

(*a*) 1.25 per cent where the code number is 4, save for the first and last quarter of the length of the runway, where the longitudinal slope shall not exceed 0.8 per cent;

(*b*) 1.5 per cent where the code number is 3, save 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

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

(3) Where slope changes cannot be avoided, the slope change between two consecutive slopes shall not exceed —

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

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

(4) The transition from one slope to another shall be accomplished by a curved surface with a rate of change not exceeding —

(*a*) 0.1 per cent per 30m (minimum radius of a curvature of 30 000m) where the code number is 4;

(*b*) 0.2 per cent per 30m (minimum radius of a curvature of 15 000m) where the code number is 3; and

(*c*) -0.4 per cent per 30m (minimum radius of a curvature of 7500m) where the code number is 1 or 2.

(5) Where slope changes cannot be avoided, the changes shall be such that there will be an obstructed line of sight from any point —

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

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

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

in any case, 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, and 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.

(6) Any undulations or appreciable changes in slope located close together along a runway shall be avoided and the distance between the points of intersection of two successive curves shall not be less than —

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

(i) 30 000m where the code number is 4,

(ii) 15 000m where the code number is 3, and

(iii) 5 000m where the code number is 1 or 2; or

(*b*) 45m whichever is greater.

(7) The runway surface shall, if practicable, to promote the most drainage of water, 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 raid drainage.

(8) The transverse slope shall, where possible be —

(*a*) 1.5 per cent where the code letter is C, D, E or F;

(*b*) 2 per cent where the code letter is A or B but 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 flatters slope may be necessary; and

(*c*) for a cambered surface the transverse slope on each side of the centre line shall be symmetrical.

(9) The transverse slope shall be substantially the same throughout the length of a runway except at an intersection with another runway, where an even transition shall be provided taking into account the need for adequate drainage.

58. A runway shall be capable of withstanding the air traffic for which the runway is intended to serve. Strength of runways

59. (1) The surface of a runway shall be constructed without irregularities that would impair the runway surface friction characteristics or otherwise adversely affect the take-off or landing of an aircraft. Surface of runways

(2) A paved runway shall be constructed or resurfaced as to provide surface friction characteristics at or above the minimum friction level specified by the Authority.

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

(4) The measurements of the surface friction characteristics of a new or resurfaced paved runway shall be made with a continous friction measuring device using self-wetting features.

(5) The average surface texture depth of a new surface shall not be less than 1.0mm, taking into consideration macro texture and micro texture in order to provide the required surface friction characteristics.

(6) The grooves or scorings of a grooved or scored surface shall either be perpendicular to the runway centre line or parallel to non-perpendicular transverse joints, where applicable.

60. (1) A runway where the code letter is D, E, or F shall be provided with runway shoulders. Runway shoulders

(2) An aeroplane with OMGWS from 9 m 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 —

(*a*) 60m where the code letter is D or E;

(*b*) 60m where the code letter is F with two or three engined aeroplanes; and

(*c*) 75m where the code letter id F with four or more engined aeroplanes.

(3) 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.

(4) 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 aircraft running off the runway, of supporting the aircraft without inducing.

(5) A runway shoulder shall be prepared or constructed so as to resist erosion and the ingestion of the surface material by aeroplane engines.

(6) The runway shoulders for code letter F aeroplanes shall be paved to a minimum overall width of runway and shoulder of not less than 60m.

61. (1) Where the end of a runway is not served by a taxiway or a taxiway turnaround and the code letter is — Runway turn pads

(*a*) D, E, or F, or

(*b*) A, B, or C,

a runway turn pad shall be provided to facilitate a 180 degree turn of the aircraft.

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

(3) The intersection angle of the runway turn pad with the runway shall not exceed 30 degrees.

(4) The nose wheel steering angle to be used in the design of the runway turn pad shall not exceed 45 degrees.

(5) The design of a runway turn pad shall be such that, when the cockpitof the aircraft for which the turn pad is intended remains over the turn pad marking, the clearance distance between any wheel of the aircraft landing gear and the edge of the turn pad shall not be less than that given by the following tabulation —

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

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

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

(7) 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 and where a runway turn pad is provided with flexible pavement, the surface shall be capable of withstanding the horizontal shear forces exerted by the main landing gear tyres during turning manoeuvers.

(8) The surface of a runway turn pad shall —

(*a*) not have surface irregularities that may cause damage to an aircraft using the turn pad; and

(*b*) be constructed or resurfaced so as to provide surface friction characteristics at least equal to that of the adjoining runway.

(9) 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 aircraft for which the turn pad is intended, and any possible foreign object damage to the aircraft engines, and as a minimum, the width of the shoulders shall be required to cover the outer engine of the most demanding aircraft and thus may be wider than the associated runway shoulders.

(10) The strength of the runway turn pad shoulders shall be capable of withstanding the occasional passage of the aircraft it is designed to serve without inducing structural damage to the aircraft and to the supporting ground vehicles that may operate on the shoulder.

(11) The provisions of this regulation shall only apply to aerodromes in categories A and B.

Runway strips

62. (1) A runway and any associated stop ways shall be included in a strip.

(2) A strip shall extend before the threshold and beyond the end of the runway or stop way for a distance of at least —

(*a*) 60m where the code number is 2, 3, or 4;

(*b*) 60m where the code number is 1 and the runway is an instrument one; and

(*c*) 30m where the code number is 1 and the runway is a non-instrument one.

(3) A strip including a precision approach runway shall, wherever practicable, extend laterally to a distance of at least —

(*a*) 140m where the code number is 3 or 4; and

(*b*) 70m 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.

(4) A strip including a non-precision approach runway shall extend laterally to a distance of at least —

(*a*) 140m where the code number is 3 or 4; and

(*b*) 70m 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.

(5) 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 —

(*a*) 75m where the code number is 3 or 4;

(*b*) 40m where the code number is 2; and

(*c*) 30m where the code number is 1.

(6) An object situated on a runway strip which may endanger aircraft shall be regarded as an obstacle and shall, as far as practicable, be removed.

(7) A fixed object shall not be permitted on any part of a runway strip of a precision approach runway delineated by the lower edges of the inner transition surfaces, 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 satisying the relevant frangibility requirement.

(8) A mobile object shall be permitted on the runway strip during the use of the runway for landing or take-off.

(9) A portion of a strip of an instrument runway within a distance of at least —

(*a*) 75m where the code number is 3 or 4; and

(*b*) 40m 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 aircraft running off the runway.

(10) A portion of a strip of a non-instrument runway within a distance of at least —

(*a*) 75m where the code number is 3 or 4;

(*b*) 40m where the code number is 2; and

(*c*) 30m 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 aircraft runnung off the runway.

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

(12) The areas in subregulation (11) shall be able to withstand the occassional passage of the critical aircraft for runway pavement design, where they have paved surfaces.

Slopes on runway strips

63. (1) A longitudinal slope along a portion of a strip to be graded runway strips shall not exceed —

(*a*) 1.5 per cent where the code is number 4;

(*b*) 1.75 per cent where the code number is 3; and

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

(2) Any slope changes on a portion of a strip to be graded shall be as gradual as practicable and abrupt changes or sudden reversals of slopes avoided.

(3) The transverse slopes on a portion of a strip to be graded shall be adequate to prevent the accumulation of water on the surface but shall not exceed —

(*a*) 2.5 per cent where the code number is 3 or 4; and

(*b*) 3 per cent where the code number is 1 or 2,

except that, to facilitate drainage the slope for the first 3 m 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.

(4) 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.

(5) A portion of a strip of an instrument runway within a distance of at least —

(*a*) 75m where the code number is 3 or 4; and

(*b*) 40m 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 minimise hazards arising from differences in load-bearing capacity to aeroplanes which the runway is intended to serve in the event of an aircraft running off the runway.

(6) A portion of a strip containing a non-instrument runway within a distance of at least —

(*a*) 75m where the code number is 3 or 4;

(*b*) 40m where the code number is 2; and

(*c*) 30m 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 aircraft running off the runway.

Runway end safety area

64. (1) A runway end safety area shall be provided at each end of a safety area runway strip where the code number is —

(*a*) 3 or 4; and

(*b*) 1 or 2 and the runway is an instrument one.

(2) 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.

(3) A runway end safety area shall extend from the end of a runway strip to a distance of at least twice that of the associated runway.

(4) The width of a runway end safety area shall —

(*a*) be at least twice that of the associated runway; and

(*b*) wherever practicable, be equal to that of the graded portion of the associated runway strip.

(5) An object situated on a runway end safety area which may endanger aeroplanes shall be regarded as an obstacle and shall, as far as practicable, be removed.

(6) A runway safety area shall provide a cleared and graded area for aeroplanes which the runway is intended to serve in the event of an aircraft undershooting or overunning the runway.

(7) 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.

(8) The longitudunal slopes of a runway end safety area shall not exceed a downward slope of 5 per cent and longitudinal slope changes shall be as gradual as practicable with abrupt changes or sudden reversals of slopes avoided.

(9) The transverse slopes of a runway end safety area shall not exceed an upward or downward slope of 5 per cent, and the transitions between differing slopes shall be as gradual as practicable.

(10) A runway end safety area shall be so prepared or constructed as to reduce the risk of damage to an aircraft undershooting or overrunning the runway, enhance aircraft deceleration and facilitate the movement of rescue and fire fighting vehicles.

Clearways

65. (1) The origin of a clearway shall be provided, at the end of the take-off run available.

(2) The length of a clearway shall not exceed half the length of the take-off run available.

(3) A clearway shall extend laterally on each side of the extended centre line of the runway, to a distance of at least —

(*a*) 75m for instrument runways; and

(*b*) half of the width of the runway strip.

(4) 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 —

(*a*) is perpendicular to the vertical plane containing the runway centre line; and

(*b*) passes through a point located on the runway centre line at the end of the take-off run available.

(5) Any 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 and in such cases, any portion of the clearway within a distance of 22.5m 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.

(6) An object situated on a clearway which may endanger aeroplanes in the air shall be regarded as an obstacle and shall be removed.

(7) The provisions of this regulation shall only apply to aerodromes in categories A and B.

Stop ways

66. (1) A stop way shall have the same width as the runway with which it is associated.

(2) Any slope or changes in the slope on a stop way, and the transition from a runway to a stop way, shall comply with the provisions of regulations 60 to 66 for the runway with which the stop way is associated except that —

(*a*) the limitation in regulation 60 of 0.8 per cent slope for the first and last quarter of the length of a runway need not be applied to the stop way; and

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

(3 A stop way shall be prepared or constructed so as to be capable, in the event of an abandoned take-off, of supporting the aircraft which the stop way is intended to serve without inducing structural damage to the aircraft.

(4) The surface of a paved stop way shall be so constructed or resurfaced as to provide surface friction characteristics at or above those of the associated runway.

Radio altimeter operating area

67. (1) A radio altimeter operating area shall —

(*a*) be established in the operating area pre-threshold area of a precision approach runway;

(*b*) extend before the threshold for a distance of at least 300m; and

(*c*) extend laterally, on each side of the extended centre line of the runway, to a distance of 60m, except that, when special circumstances so warrant, the distance may be reduced to no less than 30m if an aeronautical study indicates that such reduction would not affect the safety of an aircraft.

(2) Any slope changes on a radio altimeter operating area shall be avoided or kept to a minimum and where slope changes cannot be avoided, abrupt changes or sudden reversals of slope shall be as gradual as practicable and the rate of change between two consecutive slopes shall not exceed 2 per cent per 30m.

Taxiways

68. (1) A taxiway shall be provided to permit the safe and expeditious surface movement of aircraft.

(2) There shall be sufficient entrance and exit taxiways provided for a runway to expedite the movement of aeroplanes to and from the runway and provision of rapid exit taxiways considered when traffic volume is high.

(3) The design of a taxiway shall be such that, when the cockpit of the aircraft for which the taxiway is intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aircraft and the edge of the taxiway shall be no less than —

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

(4) The design of a taxiway shall be such that, when the cockpit of the aircraft for which the taxiway was intended remains over the taxiway centre line markings, the clearance distance between the outer main wheel of the aircraft and the edge of the taxiway shall be no less than —

	Up to but not including 4.5m	4.5m up to but not including 6m	6m up to but not including 9m	9m up to but not including 15m
Taxiway width	7.5m	10.5m	15m	23m

where the code letter is F and the traffic density is high, a wheel to edge clearance greater than 4.5m may be provided to permit higher taxiing speeds.

(5) A straight portion of a taxiway shall have a width of no less than —

Code letter	Taxiway width
A	7.5m
B	10.5m
C	15m if the taxiway is intended to be used by an aeroplane with a wheel base less than 18m and 18m if the taxiway is intended to be used by an aeroplane with a wheel base equal to or greater than 18m.
D	18m if the taxiway is intended to be used by an aeroplane with an outer main gear wheel span of less than 9m and 23m if the taxiway is intended to be used by an aeroplane with an outer main gear wheel span equal to or greater than 9m
E	23m
F	25m

(6) An operator shall ensure that –

(*a*) changes in direction of taxiways shall be as few and small as possible;

(*b*) the radii of the curves shall be compatible with the manoeuvring capability and normal taxiing speeds of the aircraft for which the taxiway is intended; and

(*c*) the design of the curve shall be such that, when the cockpit of the aircraft remains over the taxiway centre line markings, the clearance distance between the outer main wheels of the aircraft and the edge of the taxiway shall be no less than those specified in subregulation (3).

(7) An operator shall provide fillets at junctions and intersections of taxiways with runways, aprons and other taxiways in order to facilitate the movement of aeroplanes.

(8) The design of the fillets shall ensure that the minimum wheel clearance specified in subregulation (3) are maintained when aeroplanes are manoeuvring through the junctions or intersections and consideration shall be given to the aircraft datum length when designing fillets.

(9) 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 as set out in Table S1-3 of Schedule 1 except that it may be permissable to operate with lower separation distances at an existing aerodrome.

(10) Notwithstanding the provisions of subregulation (9) it may be permissable to operate with a lower distance at an existing aerodrome if an aeronautical study indicates that such distance would not adversly affect the safety or significantly affect the regularity of operations of aeroplanes.

(11) The longitudinal slope of a taxiway shall not exceed —

(*a*) 1.5 per cent where the code letter is C, D, E or F; and

(*b*) 3 per cent where the code letter is A or B.

(12) Any slope changes on a taxiway which 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 —

(*a*) 1 per cent per 30m with a minimum radius of curvature of 3000m where the code letter is C, D, E or F; and

(*b*) 1 per cent per 25m with a minimum radius of curvature of 2500m where the code letter is A or B.

(13) Any slope change on a taxiway which cannot be avoided, the change shall be such that, from any point —

(*a*) 3m above the taxiway, the whole surface of the taxiway for a distance of at least 300m from that point is visible where the code letter is C, D, E or F;

(*b*) 2m above the taxiway, the whole surface of the taxiway for a distance of at least 200m from that point is visible where the code letter is B; and

(*c*) 1.5m above the taxiway, the whole surface of the taxiway for a distance of at least 150m from that point is visible where the code letter is A.

(14) The transverse slopes of a taxiway shall prevent the accumulation of water on the surface of the taxiway but shall not exceed —

(*a*) 0 per cent where the code letter is C, D, E or F; and

(*b*) 2 per cent where the code letter is A or B.

(15) 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.

(16) The surface of a taxiway shall not have irregularities that cause damage to aeroplane structures.

(17) The surface of a paved taxiway shall be so constructed or resurfaced as to provide suitable surface friction characteristics.

Rapid exit taxiways

69. (1) A rapid exit taxiway shall be designed with a radius of turn taxiways off curve of at least —

(*a*) 550m where the code number is 3 or 4; and

(*b*) 275m above the taxiway 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.

(2) The radius of the fillet on the inside of the curve at a rapid exit taxiway provide a widened taxiway throat in order to facilitate early recognition of the entrance and turn-off into the taxiway.

(3) A rapid exit taxiway shall include a straight distance after the turn-off curve for an existing aircraft to come to a full stop clear of any intersecting taxiway.

(4) The intersection angle of a rapid exit taxiway with the runway shall not be greater than 45 degrees and not less than 25 degress and preferably shall be 30 degrees.

Taxiway on bridges

70. (1) The width of a 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.

(2) The operator shall provide access 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 is intended.

(3) A bridge shall be constructed on a straight section of the taxiway with a staright section on both ends of the bridge to facilitate the alignment of aeroplanes approaching the bridge.

Taxiway shoulders

71. (1) The 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 —

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

(2) Where increased pavement is provided, on taxiway curves, junctions or intersections, the shoulder width shall not be less than that on the adjacent straight portions of the taxiway.

(3) A taxiway intended to be used by turbine-engined aeroplanes, the surface of the taxiway shoulders shall be built to resist erosion and the ingestion of the surface material by aircraft engines.

Taxiway strips

72. (1) A taxiway, other than an aircraft stand taxilane, shall be included in a strip.

(2) A taxiway strip shall extend symmetrically on each side of the centre line of the taxiway throughout the length of the taxiway to atleast the distance from the centre line set out in Table S1-3, column 11 of Schedule 1.

(3) An operator shall ensure that the taxiway is clear of objects which may endanger taxiing aircraft taking into consideration the location and design of drains, including suitably designed drain covers, to prevent damage to an aircraft accidentally running off a taxiway.

(4) The centre portion of a taxiway strip shall provide a graded area to a distance from the centre line of the taxiway of at least —

(*a*) 10.25m where the OMGWS is less than 4.5m;
(*b*) 11m where the OMGWS is 4.5m and higher but less than 6m;
(*c*) 12.50m where the OMGWS is 6m and higher but less than 9m;
(*d*) 18.50m where the OMGWS is 9m and higher but less than 15m where the code letter is D;
(*e*) 19m where the OMGWS is 9m and higher but less than 15m, where the code letter is E; and
(*f*) 22 m where the OMGWS is 9 m and higher but less than 15m, where the code letter is F.

(5) 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 —

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

the upward slope being measured with reference to the transverse slope of the adjacent taxiway surface and not the horizontal.

(6) The downward transverse slope shall not exceed 5 per cent measured with reference to the horizontal.

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

Holding bays, runway holding positions, intermediate holding positions and road holding positions

73. (1) A holding bay shall be provided at aerodromes where the runway traffic density is medium or heavy holding positions, intermediate holding positions and road holding positions.

(2) A runway holding position or positions shall be established —

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

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

(4) 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.

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

(6) The distance between a holding bay, runway holding position established at a taxiway or runway intersection or road-holding and the centre line of a runway shall be in accordance with Table S1-4 of Schedule 1 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.

(7) The distance of 90m set out in Table S1-4 for a precision approach runway code number 4 shall be increased at elevations greater than 700m as follows —

(*a*) up to an elevation of 2000m, 1 m for every 100m in excess of 700m;

(*b*) elevation higher than 2000m up to 4000m, 13m plus 1.5m for every 100m in excess of 2000m; and

(*c*) elevation higher than 4000m up to 5000m, 43m plus 2m for every 100m in excess of 4000m.

(8) The distance set out in Table S1-4 in Schedule 1 shall, 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 be further increased by 5m for every metre the bay or position is higher than the threshold.

(9) The location of a runway-holding position established in accordance with subregulation (3) shall be such that a holding aircraft or vehicle will not infringe the obstacle free zone, approach surface, take-off climb surface or instrument landing system or microwave landing system critical sensitive area or interfere with the operation of radio navigation aids.

Aprons

74. (1) An apron shall be provided where necessary to permit the on and off loading of passengers, cargo or mail and servicing of aircraft without interfering with the aerodrome traffic.

(2) The total apron area of an apron shall be adequate to permit expeditious handling of the aerodrome traffic at its maximum anticipated density and consideration shall, on aprons, be given to the provision of service roads and to manoeuvring and storage area for ground equipment.

(3) Any part of an apron shall be capable of withstanding the traffic of the aircraft it is intended to serve, due consideration shall be 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 stationery aircraft, to higher stresses than a runway.

(4) A slope, including those on an aircraft stand taxilane, shall be sufficient to prevent accumulation of water on the surface of the apron but shall be kept as level as drainage requirements permit.

(5) The maximum slope on an aircraft stand shall, where applicable not exceed 1 per cent.

(6) An aircraft stand shall provide the minimum clearance between an aircraft using the stand and any adjacent building, aircraft on another stand and other objects as follows —

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

(7) The clearances in subregulation (6) may be reduced at a nose in aircraft stand —

(*a*) between the terminal, including any fixed passenger bridge, and the nose of an aircraft; and

(*b*) over any portion of the stand provided with azimuth guidance by a visual docking guidance system,

where the code letter is D, E or F and special circumstances warrant.

Isolated aircraft parking

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

(2) The isolated aircraft parking position shall —

(*a*) be located at the maximum distance practicable and in any case not less than 100m from other parking positions, building or public areas; and

(*b*) 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.

(3) This regulation shall only apply to aerodromes in categories A and B.

PART VII — *Obstacle restrictions and removal*

Erection of obstacles

76. (1) A person shall not cause or permit —

(*a*) the erection or growth of an obstacle at or in the vicinity of an aerodrome, where the obstacle may prevent an aircraft operation from being conducted safely or the aerodrome from being usable; and

(*b*) any object to penetrate the obstacle limitation surface, without the written permission of the Authority, where the object may cause an increase in an obstacle clearance altitude or in the height for an instrument approach precedure or of any associated visual circling procedure.

(2) The object in regulation 1 (*b*) includes a new object or an extension of an existing object above the obstacle limitation surface.

(3) The obstacle clearance altitude and height applicable to obstacle limitation surface, and the obstacle limitation requirements contained under this Part and set out in Schedule 3 and shall comply with these Regulations.

(4) The Authority may issue more limiting requirements for Obstacle Limitation Surfaces where it is deemed for safety and or security reasons.

Establishment of obstacle limitation surfaces

77. (1) An operator shall ensure that obstacle limitation surfaces are established for the aerodrome in accordance with the standards issued in these Regulations.

(2) An operator shall monitor the established obstacle limitation surfaces around the aerodrome for infringement by objects, buildings or other structures.

(3) An aerodrome operator shall —

(*a*) establish a systematic means of surveying and monitoring any object that penetrates obstacle limitation surfaces around the aerodrome and report any penetration immediately to the Authority;

(*b*) notify through the Aeronautical Information Services any object that penetrates obstacle limitation surfaces around the aerodrome; and

(*c*) work jointly with the Authority to plan and determine the allowable height limits for new developments in the vicinity of and outside its aerodrome and the type of instrument or visual flight operations that may be permitted taking the obstacle survey plan into account.

Obstacle limitation surfaces

78. The obstacle limitation surfaces shall comprise of the following surfaces as set out in Schedule 3 of these Regulations —

(*a*) conical surface;

(*b*) inner horizon surface;

(*c*) approach surface;

(*d*) inner approach surface;

(*e*) transitional surface;

(*f*) inner transitional surface; and

(*g*) balked landing surface.

Conical surfaces

79. (1) The limits of the characterists of a conical surface shall comprise of —

(*a*) a lower edge coincident with the periphery of the inner horizontal surface; and

(*b*) an upper edge located above the inner horizontal surface at a height as set out in Table S1-5 in Schedule 1.

(2) 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

80. (1) The radius or outer limits of an inner horizontal surface shall be measured from a reference point or points established for such purpose.

(2) The height of the inner horizontal surface shall be measured above an elevation datum established for such purpose.

Approach surface

81. (1) The limits of an approach surface shall comprise of —

(*a*) an inner edge of specified length, horizontal and perpendicular to the extended centre line of the runway and located at a distance as set out in Table S1-5 of Schedule 1 before the threshold;

(*b*) two sides originating at the ends of the inner edge and diverging uniformly at a rate set out in Table S1-5 of Schedule 1 from the extended centre line of the runway; and

(*c*) an outer edge parallel to the inner edge.

(2) The surfaces provided at subregulation 1 shall be varied when lateral offset, offset or curved approaches are utilised, 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.

(3) The elevation of the inner edge shall be equal to the elevation of the midpoint of the threshold.

(4) The slope of the approach surface shall be measured in the vertical plane containing the centre line of the runway.

Inner approach surface

82. The limits of the inner approach surface shall comprise of —

(*a*) an inner edge coincident with the location of the inner edge of the approach surface but of its own length as set out in Table S1-5 of Schedule 1;

(*b*) 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

(*c*) an outer edge parallel to the inner edge.

Transitional surface

83. (1) The limits of the transitional surface shall comprise of —

(*a*) 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

(*b*) an upper edge located in the plane in the inner horizontal surface.

(2) The elevation of a point on the lower edge shall be —

(*a*) along the side of the approach surface, equal to the elevation of the approach surface at that point; and

(*b*) along the strip, equal to the elevation of the nearest point on the centre line of the runway or its extension.

(3) Notwithstanding the provisions of subregulation (2) (*b*), the transitional surface along the strip shall be curved if the runway profile is curved, or plane if the runway profile is a straight line and the intersection of the transitional surface with the inner horizontal surface shall also be a curved or straight line depending on the runway surface.

(4) The slopes of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway.

Inner transitional surface

84. (1) The inner transitional surface shall be the controlling obstacle limitation surface for navigation aids, aircraft, buildings and vehicles that must be near the runway and shall not be penetrated except for frangible objects.

(2) The limits of an inner transitional surface shall comprise of —

(*a*) 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 to the point where the side intersects the inner horizontal surface; and

(*b*) an upper edge located in the plane of the inner horizontal surface.

(3) The elevation of a point on the lower edge shall be —

(*a*) along the side of the inner approach surface balked landing surface, equal to the elevation of the particular surface at that point; and

(*b*) along the strip, equal to the elevation of the nearest point on the centre line of the runway or its extension.

(4) Notwithstanding the provisions of subregulation (3) (*b*), the transitional surface along the strip shall be curved if the runway profile is curved or plane if the runway profile is a straight line, the intersection of the inner transitional surface with the inner horizontal surface shall also be a curved or a straight line depending on the runway profile.

(5) The slope of an inner transitional surface shall be measured in a vertical plane at right angles to the centre line of the runway plane.

Balked landing surface

85. (1) The limits of a balked landing surface shall comprise of —

(*a*) an inner edge horizontal and perpendicular to the centre line of the runway and location at a specified distance after the threshold;

(*b*) 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

(*c*) an outer edge parallel to the inner edge and located in the plane of the inner horizontal surface.

(2) The elevation of the inner edge shall be equal to the elevation of the runway centre line at the location of the inner edge.

(3) 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

86. (1) The limits of a take-off surface shall comprise of —

(*a*) 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 a clearway when such is provided and its length exceeds the specified distance;

(*b*) two sides originating at the ends of the inner edge and diverging uniformly at a specified rate from the take-off track to a specified final width and continuing thereafter at the width for the remainder of the length of the take-off climb surface; and

(*c*) an outer edge horizontal and perpendicular to the specified take-off track.

(2) 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.

(3) The slope of the take-off climb surface, in the case of a straight take-off flight path shall be measured in the vertical plane containing the centre line of the runway.

(4) The take-off climb surface shall, in the case of a take-off flight plan involving a turn, 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 of a straight take-off flight path.

Obstacle limitation requirements for non-instrument runways

87. (1) The requirements for obstacle limitation surfaces shall be specified on the basis of the intended use of a runway, that is, take-off or landing and type of approach, and shall be applied when such use is made of the runway and in cases where operations are conducted to or from both directions of a runway, then the function of certain surfaces may be nullified due to more stringent requirements of another lower surface.

(2) The following obstacle limitation surfaces shall be established for a non-instrument runway —

(*a*) conical surface;

(*b*) inner horizontal surface;

(*c*) approach surface; and

(*d*) transitional surface.

(3) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those set out in Table S1-5 of Schedule 1.

(4) A new object or an extension of an existing object shall not be permitted above an approach or transitional surface except where the new object or extention would be shielded by an existing immovable object.

(5) The circumstances under which the shielding principle may reasonably be applied are set out in Schedule 3.

(6) A new object or an extension of an existing object shall not be permitted above the conical surface or inner horizontal surface, except where the object would be shielded by an existing immovable object, or after an aeronautical study, it is determined that the object would not adversely affect the safety of aeroplane operations.

(7) An existing object above any of the surfaces provided for in subregulation (2) shall be removed except where, in the opinion of the Authority, the object is shielded by an existing immovable object, or after aeronautical study and it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aeroplanes.

(8) The inner edge or portions of the inner edge of the approach surface may, due to transverse or longitudinal slopes on a strip, in certain cases, be below the corresponding elevation of the strip.

(9) The strip may not have to be graded to conform with the inner edge of the approach surface or the terrain or objects which are above the approach surface, and in addition, terrain or objects which are above the approach surface beyond the end of the strip, but below the level of the strip, may not have to be removed unless it is considered that they may endanger aircraft.

(10) The possible future development of an instrument runway and consequent requirement for more stringent obstacle limitation surfaces shall, in considering a proposed construction, be taken into account.

Obstacle limitation requirements for non-precision approach runways

88. (1) The following obstacle limitation surfaces shall be established for a non-precision approach runway —

(*a*) conical surface;

(*b*) inner horizontal surface;

(*c*) approach surface; and

(*d*) transitional surface.

(2) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those set out in Table S1-5 of Schedule 1, except in the case of the horizontal section of the approach surface as per the provisions of subregulation (3).

(3) The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects —

(*a*) a horizontal plane 150m above the threshold elevation; or

(*b*) the horizontal plane passing through the top of any object that governs the obstacle clearance altitude or height, whichever is the higher.

(4) A new object or an extension of an existing object shall not be permitted above approach surface beyond 3000m of the inner edge or above a transitional surface except when the new object or extension would be shielded by an existing immovable object.

(5) A new object or an extension of an existing object shall not be permitted above the approach surface beyond 3000m from the inner edge, the conical surface or inner horizontal surface except where the object would be shielded by an existing immovable object, or after an aeronautical study and it is determined that the object would not adversely affect the safety of aeroplane operations.

(6) An existing object above any of the surfaces provided for in subregulation (1) shall be removed except where the object is shielded by an existing immovable object, or after an aeronautical study and it is determined that the object would not adversely affect the safety of aeroplane operations.

Obstacle limitation requirements for precision approach runways

89. (1) The following obstacle limitation surfaces shall be established for a precision approach runway category I —

(*a*) conical surface;

(*b*) inner horizontal surface;

(*c*) approach surface; and

(*d*) transitional surface.

(2) The following obstacle limitation surfaces may be established for a precision approach runway category I —

(*a*) inner approach surface;

(*b*) inner transitional surface; and

(*c*) balked landing surface.

(3) The following obstacle limitation surfaces shall be established for a precision approach runway category II or III —

(*a*) conical surface;

(*b*) inner horizontal surface;

(*c*) approach surface;

(*d*) transitional surface;

(*e*) inner transitional surface; and

(*f*) balked landing surface.

(4) The heights and slopes of the surfaces shall not be greater than, and their other dimensions not less than, those set out in Table S1-5 of Schedule 1, except in the case of the horizontal section of the approach surface as per the provisions of subregulation (5).

(5) The approach surface shall be horizontal beyond the point at which the 2.5 per cent slope intersects —

(*a*) a horizontal plane 150 m above the threshold elevation; or

(*b*) the horizontal plane passing through the top of any object that governs the obstacle clearance limit, whichever is the higher.

(6) A fixed object shall not be permitted above the inner approach surface, the inner transitional surface or the balked landing surface, except for frangible objects which, due to their function must be located on the strip.

(7) A mobile object shall not be permitted above the surfaces referred to in subregulation (6) during the use of the runway for landing.

(8) A new object or an extension of an existing object shall not be permitted above an approach surface or a transitional surface except where, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

(9) A new object or an extension of an existing object shall not be permitted above the conical surface and the inner horizontal surface except where the object would be shielded by an existing immovable object, or after an aeronautical study and it is determined that the object would not adversely affect the safety of aeroplane operations.

(10) An existing object above an approach surface, a transitional surface, the conical surface and the inner horizontal surface shall be removed except where an object is shielded by an existing immovable object, or after an aeronautical study it is determined that the object would not adversely affect the safety of aeroplane operations.

Obstacle limitation requirements for runways meant for take-off

90. (1) A take-off climb surface shall be established for a runway meant for take-off.

(2) The dimensions of the surface shall not be less than the dimensions set out in Table S1-4 in Schedule 1, except that a lesser length may be adopted or the take-off climb surface where such lesser length would be consistent with procedural measures adopted to govern the outward flight of aeroplanes.

(3) The operational characteristics of aeroplanes for which the runway is intended shall be examined to see if it is desirable to reduce the slope set out in Table S1-4 in Schedule 1 when critical operating conditions are to be catered to.

(4) Where a specified slope is reduced under subregulation (3), corresponding adjustment in the length of take-off climb surface shall be made so as to provide protection to a height of 300m.

(5) Where, local conditions differ widely from sea level standard atmospheric conditions, it may be advisable for the slope set out in Table S1-4 in Schedule 1 to be reduced.

(6) The degree of reduction under subregulation (5) shall depend on the divergence between local conditions and sea level standard atmospheric conditions, and on the performance characteristics and operational requirements of the aeroplane for which the runway is intended.

(7) A new object or an extension of an existing object shall not be permitted above a take-off climb surface except where, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

(8) Where no object reaches the 2 per cent 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 per cent.

(9) An existing object extended above a take-off climb surface shall be removed except where, in the opinion of the Authority, the object is shielded by an existing immovable object, or after an aeronautical study and it is determined that the object would not adversely affect the safety of operations of aeroplanes.

(10) The take-off climb surface may, due to transverse slopes on a strip, clearway or in certain cases portions of the inner edge of the take-off climb surface, be below the corresponding elevation of the strip, or clearway.

(11) The strip, or clearway may not have to be graded to conform with the inner edge of the take-off climb surface, and in addition, terrain or object which are above the take-off climb surface beyond the end of the strip or clearway, but below the level of the strip or clearway, may not have to be removed unless it is considered that they may endanger aircraft.

Objects outside obstacle limitation surfaces

91. (1) An aerodrome operator shall consult the Authority concerning proposed construction beyond the limits of the obstacle limitation surfaces that extend above a height determined by the Authority, in order to permit an aeronautical study of the effect of such construction on the operation of aeroplanes.

(2) In areas beyond the limits of the obstacle limitation surfaces, at least those objects that extend to a height of 150 m 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 of aeroplanes.

Other objects

92. (1) An object that does 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.

(2) Any thing which may, in the opinion of the operator, after aeronautical study, endangers 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.

(3) An object that does not project above any of the surfaces described in these Regulations, may constitute a hazard to an aeroplane.

Authorisation to construct within vicinity of aerodrome

93. (1) A person shall not construct a building or a structure within the vicinity of an aerodrome unless authorised by the Authority.

(2) The Authority shall, where authorisation is sort under subregulation (1), cause an aeronautical study of the effect of the construction on operation of aircraft, to be carried out.

(3) Subject to these Regulations, new obstacles or extensions of existing objects may be permitted above an obstacle limitation surface of an aerodrome where, in the opinion of the Authority —

(*a*) the new object or extension shall be shielded by an existing immovable object in accordance with Schedule 2 to these Regulations; or

(*b*) after an aeronautical study it is determined that the object would not adversely affect the safety or significantly affect the regularity of operations of aircraft.

Removal of obstacle

94. (1) A person shall remove any obstacle in the vicinity of an aerodrome, except, where, after an aeronautical study by the operator, the Authority determines that the obstacle does not adversely affect the safety or significantly affect the regularity of operations of aircraft.

(2) The Authority may direct the removal of any obstacle which, in the opinion of the Authority, constitutes a hazard to aircraft operations.

(3) The Authority shall arrange to have an obstacle removed at the cost of a person, where a person fails to remove an obstacle within the time directed by the Authority.

PART VIII — *Aeronautical Ground Lighting*

Application of this part

95. This Part shall apply to aerodromes in categories 2, 3, 4, 5, 6, 7, 8, 9 and 10.

Establishment and maintenance of aeronautical ground lights

96. (1) An operator shall —

(*a*) establish and maintain aeronautical ground lights and any other lights for the safe operation of aircraft and for runways, taxiways, aprons, thresholds and stop ways;

(*b*) ensure that aeronautical ground light and any other light are installed on the aerodrome where, an aerodrome is used at night or during conditions of poor visibility; and

(*c*) ensure that the colours for aeronautical ground lights are as set out in Schedule 4.

(2) Without prejudice to the generality of subregulation (1) (*a*), the location, characteristics, intensity control and settings of aeronautical ground lights shall be as set out in Schedule 5.

(3) A non-aeronautical ground light, which, by reason of its intensity, configuration or colour, may prevent or cause confusion in the clear interpretation of aeronautical ground lights, shall be extinguished, screened or modified to eliminate such possibility.

(4) A person shall not establish, maintain or alter, without the permission of the Authority, the character of —

(*a*) an aeronautical beacon except an aeronautical beacon which is or may be visible from the waters; and

(*b*) any aeronautical ground light, other than an aeronautical beacon, at an aerodrome, or any aeronautical ground light which forms part of the lighting system for use by aircraft taking off or landing at the aerodrome.

(5) A person shall not —

(*a*) intentionally or negligently damage an aeronautical ground light; or

(*b*) interfere with an aeronautical ground light without the permission of the operator.

97. An operator shall not operate or maintain an aerodrome provided with runway lighting without a secondary power supply. Secondary power supply

98. (1) An operator shall provide, at each aerodrome intended for use at night, an aerodrome beacon, where — Aeronautical beacons

(*a*) aircraft navigate predominantly by visual means and reduced visibility is frequent; or

(*b*) it is difficult to locate the aerodrome from the air due to surrounding light or terrain.

(2) An aerodrome beacon shall be provided at an aerodrome intended for use at night if one or more of the following conditions exists —

(*a*) aircraft navigate predominantly by visual means;

(*b*) reduced visibilities are frequent; or

(*c*) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

(3) The location and characteristics of an aerodrome and identification beacon described in subregulations (1) and (2) shall be in accordance with these Regulations.

PART IX — *Visual Aids and Navigation*

99. (1) An operator shall provide and maintain atleast one wind direction indicator for an aerodrome. Wind direction indicators

(2) The wind direction indicator provided for at subregulation (1) shall be located so as to be visible to an aircraft while in flight or on the movement area and in such a way as to be free from the effects of air disturbance caused by nearby objects.

(3) The chracteristics of the wind direction indicator, the methods and procedures for installation and maintenance shall be in accordance with these Regulations.

100. (1) A landing direction indicator shall be located in a conspicuous place on the aerodrome. Landing direction indicator

(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 set out in Figure S1-6 in Schedule 1.

(4) The landing "T" shall either be, white or orange, the choice being dependent on the colour that contrasts best with the background against which the indicator will be viewed.

(5) The landing "T" shall either be illuminated or outlined by white lights, where required for use at night.

101. (1) An operator shall ensure that a signalling lamp is provided at a controlled aerodrome in the aerodrome control tower. Signalling lamp

(2) A signalling lamp shall be capable of producing red, green and white signals and shall —

(*a*) be aimed manually at any target as required;

(*b*) give a signal in any one colour followed by a signal in either of the two other colours; and

(*c*) transmit a message in any one of the three colours by MORSE CODE up to a speed of at least four words per minute.

Signal panel and signalling area

102. (1) The Authority may, where it deems necessary, require a signaling panel and a signalling area to be provided at an aerodrome for safe operation of aircraft.

(2) The location and the characteristics of the signal area shall, where provided, be in accordance with these Regulations.

(3) The colour of the panel shall be as set out in Schedule 4.

Markings

103. (1) An operator shall provide markings for paved runway centreline, paved runway edge, paved runway threshold, paved touchdown zone, paved runway holding position, aiming point, paved runway side stripe, paved runway turn pad, and intermediate holding positions at an aerodrome, in accordance with these Regulations.

(2) The markings, of the more important runway at an intersection of two or more runways, shall be displayed and the markings of the other runways shall be interrupted, except for the runway side stripe marking.

(3) The runway side stripe marking of the more important runway may be either continued across the intersection or interrupted.

(4) The markings of a runway shall, at an intersection of a runway and taxiway, be displayed and the markings of the taxiway interrupted, except that runway side stripe markings may be interrupted.

(5) The runway marking shall be white in colour.

(6) The taxiway markings, runway turn pad markings and aircraft stand markings shall be yellow in colour.

(7) The apron safety lines shall be of a conspicuous colour, which shall contrast with that used for aircraft stand markings.

(8) The pavement markings shall, at aerodromes where operations take place at night, be made with reflective materials designed to enhance the visibility of the markings.

(9) An unpaved taxiway shall be provided with the markings prescribed for paved taxiways.

(10) The application, location and the characteristics of markers for unpaved runway edge markers, stop way edge markers, taxiway edge markers, taxiway centreline markers and boundary markers shall be as set out in these Regulations and Schedule 4.

Runway designation marking

104. (1) A runway designation marking shall be —

(*a*) provided at the threshold of paved runway and shall be as far as practicable, at the threshold of an unpaved runway; and

(*b*) located at a threshold as set out in Figure S1-7 in Schedule 1.

(2) A sign showing the designation of the runway may be provided for aeroplanes taking off, if the runway threshold is displayed from the extremity of the runway.

(3) A runway designation marking shall consist of a two-digit number, and on parallel runways shall be supplemented with a letter provided that, 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.

(4) Where there are 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 provided that, when the above rule would give a single digit number, it shall be preceded by a zero.

(5) Where there are 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 —

(*a*) for two parallel runways, "L" "R";

(*b*) for three parallel runways, "L" "C" "R";

(*c*) for four parallel runways, "L" "R" "L" "R";

(*d*) five parallel runways, "L" "C" "R" "L" "R" or "L" "R" "L" "C" "R"; and

(*e*) for six parallel runways, "L" "C" "R" "L" "C" "R".

(6) The numbers and letters shall be in the form and proportion set out in Figure S1-9 in Schedule 1.

(7) The dimensions of the numbers and letters shall not be less than those set out in Figure S1-9 in Schedule 1, but where the numbers are incorporated in the threshold marking, larger dimensions shall be used to fill adequately the gap between the stripes of the threshold marking.

Runway centre line marking

105. (1) A runway centre line marking shall —

(*a*) be provided on a paved runway and it shall be located along the centre line of the runway between the runway designation markings as set out in Figure S1-7 in Schedule 1, except when interrupted in compliance with Regulation 144; and

(*b*) consist of a line of uniformly spaced stripes and gaps and the length of —

(i) a stripe and the gap shall not be less than 50m or more than 75m, and

(ii) each stripe shall be at least equal to the length of the gap or 30m, whichever is greater.

(2) The width of the stripes shall not be less than —

(*a*) 0.90m on precision approach categories II and III runways;

(*b*) 0.45m on non-precision approach runways where the code number is 3 or 4, and precision approach category I runway; and

(*c*) 0.30m on non-precision approach runways where the code number is 1 or 2, and on non-instrument runways.

(3) The stripes of the threshold marking shall commence 6m from the threshold as set out in Figure S1-7 in Schedule 1.

Threshold markings

106. (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 for a runway intended for use by international commercial air transport shall be provided at the threshold of a paved instrument runway where the code is 3 or 4.

(3) A threshold marking shall be provided at the thresholds of an unpaved runway.

(4) The stripes of the threshold marking shall commence 6m from the threshold.

(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 set out in Figure S1-7 (A) and (B) in Schedule 1, for a runway width of 45m.

(6) 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, may be as set out in Figure S1-7 (C) in Schedule 1.

(7) The stripes required by subregulations (4) and (5) shall extend laterally to within 3m of the edge of a runway or to a distance of 27m on either side of a runway centreline whichever results in the smaller lateral distance.

(8) 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 within a threshold marking.

(9) Where a runway designation marking is placed above a threshold marking, the stripes shall be continued across the runway.

(10) The stripes referred to in subregulations (4) and (5) shall be atleast 30 m long and approximately 1.80m wide with spacing of approximately 1.80m between them except where, the stripes are continued across a runway, double spacing shall be used to separate the two stripes nearest the centre line of the runway, and where the designation marking is included within the threshold marking this spacing shall be 22.5m.

(11) 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 shall be added to the treshold marking as set out in Figure S1-9 of Schedule 1.

(12) A transverse stripe shall not be less than 1.80m wide and where a runway threshold is permanently displaced, arrows conforming to Figure S1-9 (B) set out in Schedule 1, shall be provided on the portion of the runway before the displaced threshold.

(13) A runway threshold temporarily displaced from the normal position shall be marked as prescribed by the Authority.

Aiming point marking

107. (1) An aiming point marking shall be provided at each approach end of a paved —

(*a*) instrument runway where the code number is 2, 3, or 4;

(*b*) non-instrument runway where the code is 3 or 4; and

(*c*) instrument runway where the code number is 1, when additional conspicuity of the aiming point is desirable.

(2) The aiming point marking shall commence no closer to the threshold than the distance set out in Table S1-7 in Schedule 1, except where, on a runway equipped with visual approach slope indicator system, the beginning of the marking shall concide with the visual approach slope origin.

(3) 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 Table S1-7 set out in Schedule 1.

(4) The lateral spacing between the markings shall be the same as that of the touchdown zone marking where a touchdown marking is provided.

Touchdown zone marking

108. (1) A touchdown zone marking shall be provided in the touchdown zone of a —

(*a*) paved precision approach runway where the code number is 2, 3 or 4; and

(*b*) 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.

(2) 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 in accordance with the following —

Landing distance available	Pair of marking ditance between thresholds
less than 900m	1
900m or more but not including 1 200m	2
1 200m or more but not including 1 500m	3
1 500m or more but not including 2 400m	4
2 400m or more	6

(3) A 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.

Runway side stripe marking

109. (1) A runway side stripe marking shall be provided —

(*a*) between stripes marking the thresholds of a paved runway where there is a lack of contrast between the runway edges and the shoulders or the surrounding terrain; and

(*b*) on a precision approach runway irrespective of the contrast between the runway edges and the shoulders or the surrounding terrain.

(2) 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 where the runway is greater than 60m in width, the stripes shall be located 30m from the runway centre line.

(3) The runway side stripe marking shall, where a runway turn pad is provided, be continued btween the runway and the runway turn pad.

(4) A runway side stripe shall have an overall width of atleast 0.5m on runways 30m or more in width and atleast 0.45m on narrower runways.

Taxiway centre line marking

110. (1) A taxiway centre line shall be provided on a paved taxiway and apron where the code number is —

(*a*) 3 or 4 in such a way as to provide continuous guidance between the runway centre line and aircraft stands; and

(*b*) 1 or 2 in such a way as to provide continuous guidance between the runway centre line and aircraft stands.

(2) A taxiway centre line marking shall be provided on a paved runway, where the runway is part of a standard taxi-route and —

(*a*) there is no runway centre line marking; or

(*b*) where the taxiway centre line is not coincident with the runway centre line.

(3) Where it is necessary to denote the proximity of a runway holding position, enhanced taxiway centreline marking shall be provided and shall be installed at each taxiway or runway intersection.

(4) The taxiway centre line marking shall, on a straight section of a taxiway, be located along the taxiway centre line.

(5) The markings, on a taxiway curve, shall continue from the staright portion of the taxiway at a constant distance from the outside edge of the curve.

(6) The taxiway centre line shall, at an intersection of a taxiway with a runway where the taxiway serves as an exit from the runway, be curved into the runway centre line marking.

(7) 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 30m where the code number is 1 or 2.

(8) Where a taxiway centre line marking is provided on a runway, the marking shall be located on the centreline of the designated taxiway.

(9) An enhanced taxiway centre line, where provided, shall extend from the runway holding position to a distance of up to 47m in the direction of travel away from the runway and shall be marked as set out in Figure S1-12 in Schdule 1.

(10) Where 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 47m of the first runway holding position marking, the enhanced taxiway centre line marking shall be interrupted 0.9m prior to and after the intersected runway holding position marking.

(11) An enhanced taxiway centre line marking, where provided, shall continue beyond the intersected runway holding position marking for at least three dashed line segments or 47m from start to finish, whichever is greater.

(12) Where an enhanced taxiway centreline marking, where provided, continues through a taxiway intersection that is located within 47m of the runway holding position, the enhanced taxiway centre line marking shall be interrupted 1.5 m prior to and after the point where the intersected taxiway centreline crosses the enhanced taxiway centre line.

(13) The enhanced taxiway centreline marking shall continue beyond the taxiway intersection for at least three dashed line segments or 47m from start to finish, whichever is greater.

(14) Where two taxiway centre lines converge at or before the runway holding position marking, the inner dashed line shall not be less than 3 m in length.

(15) The enhanced taxiway centreline markings shall, where there are two opposing runway holding position markings and the distance between the marking is less than 94m, extend over this entire distance.

(16) The enhanced taxiway ceentre line markings shall not extend beyond either runway holding position marking.

Taxi side stripe marking

111. A taxi side stripe marking shall —

(*a*) be used at an aerodrome to distinguish non-load bearing surfaces and unserviceable areas from load bearing surfaces;

(*b*) 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; and

(*c*) consist of a pair of solid lines, each 15cm wide and spaced 15cm apart and the same colour as the taxiway centreline marking.

Runway turn pad marking

112. (1) Where a runway turn pad is provided, a runway turn pad shall be provided for continous guidance, to enable an aeroplane to complete a 180 degree turn and align with the runway centreline.

(2) The runway turn pad marking shall be curved from the runway centre line into the turn pad and the radius of the curve shall be compatible with the manoeuvring capabilty and normal taxiing speeds of the aeroplane for which the runway turn pad is intended.

(3) The intersection angle of the runway turn pad marking with the runway centreline shall not be greater than 30 degrees.

(4) The 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.

(5) The straight portion of the runway turn pad marking shall be parallel to the outer edge of the runway turn pad.

(6) The design of the curve allowing the aeroplane to negotiate a 180 degree turn shall be based on a nose wheel steering angle not exceeding 45 degrees.

Runway holding position marking

113. (1) A runway holding position marking shall be displayed along a runway holding position.

(2) A runway holding position marking shall be displayed at a runway holding position as set out in Figure S1-11 of Schedule 1.

(3) A runway holding position marking shall, where increased conspicuity of the runway holding position is required, be as set out in Figure S1-11 in Schedule 1.

(4) A pattern B runway holding position marking, that is located on an area where it would exceed 60m 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 45m maximum between successive marks.

(5) The terms referred to in subregulation (4) shall not be less than 1.8m high and shall be placed not more than 0.5m beyond the holding marking.

(6) The runway holding position marking dispalyed at a runway intersection shall be perpendicular to the centreline of the runway forming part of the standard taxi route.

(7) The pattern of the marking shall be as set out in Figure S1-13 of Schedule 1.

Intermediate holding position marking

114. (1) An intermediate holding position marking shall —

(*a*) be displayed along an intermediate holding position; and

(*b*) consist of a single broken line.

(2) Where an intermediate holding position marking is displayed at an intersection of two paved taxiways, it shall be —

(*a*) located across the taxiway at sufficient distance from the near edge of the intersecting taxiway to ensure safe clearance between taxiing aircraft; and

(*b*) coincident with a stop bar or intermediate holding position lights, where provided.

VOR aerodrome checkpoint marking

115. (1) An operator shall ensure that when a VOR aerodrome checkpoint is established, it shall be indicated by a VOR aerodrome checkpoint marking and sign.

(2) A VOR aerodrome checkpoint marking shall —

(*a*) be centred on the spot at which an aircraft is to be parked to receive the correct VOR signal and shall consist of a circle 6m in diameter and have a line width of 15 cm;

(*b*) be located as near as possible to the checkpoint and the inscriptions visible from the cockpit of an aircraft properly positioned on the VOR aerodrome checkpoint marking; and

(*c*) consist of an inscription in black on a yellow background.

Aircraft stand marking

116. (1) An operator shall provide aircraft stand markings and markings identification signs for designated parking positions on a paved apron in accordance with these Regulations.

(2) An aircraft stand identification marking shall be supplemented with an aircraft stand identification sign where feasible.

(3) An aircraft stand identification sign shall —

(*a*) be located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand; and

(*b*) consist of an inscription in black on a yellow background.

Apron safety lines

117. An operator shall provide apron safety lines on a paved apron as lines required by the parking configuration and ground facilities and in accordance with these Regulations.

Road-holding position marking

118. (1) An operator shall provide road-holding position markings and signs at all road entrances to a runway.

(2) The road-holding position markings provided under subregulation (1) shall be located across the road at all the holding positions and in accordance with these Regulations.

(3) A road holding position sign shall —

(*a*) be provided at all road entrances to a runway; and

(*b*) consist of an inscription in white on a red background.

(4) The inscription referred to in subregulation (3) shall be in the national language, be in conformity with local traffic regulation and include a requirement to –

(*a*) stop; and

(*b*) obtain ATC clearance and location designator, where appropriate.

(5) A road-holding position sign intended for night use shall be retroreflective or illuminated.

Mandatory instruction markings

119. (1) An operator shall provide —

(*a*) a mandatory instruction marking and a sign to identify a location beyond which a taxiing aircraft or vehicle shall not proceed, unless authorised by the aerodrome control tower; and

(*b*) signs to convey mandatory instructions and information on a specific location or destination on a movement area, or to provide surface movement guidance and control.

(2) A mandatory instruction marking or sign shall be provided on the surface of the pavement where, it is impractical to install a mandatory instruction marking and a sign in accordance with subregulation (1).

(3) The location and characteristics of the mandatory instruction marking or sign shall be as set out in Schedule 6.

(4) A mandatory instruction sign shall —

(*a*) include runway designation signs, runway precision approach category I, II, or III runway holding position signs, road holding position sign and NO ENTRY sign; and

(*b*) consist of an inscription in white on a red background.

(5) A pattern —

(*a*) "A" runway holding position marking shall be supplemented at a taxiway and runway intersection or a runway and runway intersection with a runway designation sign; and

(*b*) "B" runway holding position marking shall be supplemented with a category I, II, or III holding position sign.

(6) A NO ENTRY sign shall be —

(*a*) provided when entry into an area is prohibited; and

(*b*) located at the beginning of the area to which entrance is prohibited on each side of the taxiway as viewed by the pilot.

(7) The inscription on a NO ENTRY sign shall be in as set out in Figure S1-34 of Schedule 1.

(8) A runway designation sign at an intersection of a taxiway and runway or at an intersection of two runways, shall be located on each side of the runway holding position marking facing the direction of approach to the runway.

(9) 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.

(10) A category I, II, or III holding position sign shall be located at each side of the runway holding position marking facing the direction of the approach to the critical area.

(11) The inscription on a category I, II, III or joint II/III holding position sign shall consist of the runway designator followed by CAT I, CAT II, CAT III or CAT II/III, as appropriate.

(12) A runway holding position sign shall be located on each side of the runway holding position established in accordance with regulation 113, facing the approach to the obstacle limitation surface or instrument landing system or microwave landing system critical or sensitive area, as appropriate.

(13) The inscription on a runway holding position sign at a runway holding position established in accordance with these Regulations shall consist of a taxiway designation and a number.

Information marking

120. (1) An operator shall install information marking, where an information sign is required but is physically impossible to install.

(2) An information marking shall consist of an inscription in —

(*a*) yellow upon a black background, when it replaces or supplements a location sign; and

(*b*) black upon a yellow background, when it replaces or supplements a direction or destination sign.

(3) Where there is insufficient contrast between the marking background and the pavement surface, the marking shall include a —

(*a*) black border where the inscription is black; and

(*b*) yellow border where the inscription is yellow.

(4) An information sign shall —

(*a*) be provided where there is an operational need to identify by a sign, a specific location, or routing, direction or destination information; and

(*b*) include direction sign, location sign, destination sign, runway exit sign, runway vacated sign and intersection take-off sign.

(5) An information marking shall be dispalyed on the surface of the pavement wherean an information sign would normally be installed and it is impractical to install, as determined by the Authority.

(6) An information sign other than a location sign shall —

(*a*) not be collocated with a mandatory instruction sign; and

(*b*) consist of an inscription in black on a yellow background.

(7) A runway exit sign shall —

(*a*) be provided where there is an operational need to identify a runway exit; and

(*b*) consist of the designator of the exit taxiway and an arrow indicating the direction to follow.

(8) A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.

(9) A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

(10) The inscription on a direction sign shall comprise an alpha or alphanumerical or numerical message identifying the taxiway plus an arrow or arrows appropriately oriented as set out in Figure S1-35 of Schedule 1.

(11) A location sign shall be provided in conjunction with a direction sign, except that it may be omitted where an aeronautical syudy indicates that it is not needed.

(12) An information sign, where practicable, shall, except where specified, be located on the left-hand side of the taxiway in accordance with these Regulations.

(13) An information sign shall, at a taxiway intersection, be located prior to the intersection and in line with the taxiway intersection marking.

(14) Where there is no taxiway intersection markings referred to under subregulation (12), the sign 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 40m where the code number is 1 or 2.

(15) A runway exit sign shall be located —

(*a*) on the same side of the runway as the exit is located and positioned as set out in Table S1-35 of Schedule 1; and

(*b*) prior to the runway exit point in line with a position at least 60m prior to the point of tangency where the code number is 3 or 4, and at least 30m where the code number is 1 or 2.

(16) A runway vacated sign shall be located on one side of the taxiway.

(17) The inscription on a runway vacated sign shall depict the pattern A runway holding position marking as set out in Figure S1-35 of Schedule 1.

(18) The distance between the runway vacated sign and the centreline of a runway shall not be less than the greater of the following —

(*a*) the distance between the centre line of the runway and the instrument landing system or a microwave landing system critical or sensitive area; or

(*b*) the distance between the centre line of the runway and the lower edge of the inner transitional surface.

(19) The taxiway location sign shall, where provided in conjunction with a runway vacated sign, 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.

(21) 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 set out in Figure S1-35 of Schedule 1.

(22) The distance between the intersection take-off sign and the centre line of the runway shall not be less than 60 m where the code number is 3 or 4, and not less than 45m where the code number is 1 or 2.

(23) A taxiway location sign installed in conjuction with a runway designation sign shall be positioned outboard of the runway designation sign.

(24) A location sign shall consist of an inscription in yellow on a black background and where it is a stand alone sign, the location sign shall have a yellow border.

(25) 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.

(26) 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 set out in Figure S1-35 of Schedule 1.

(27) Where a location sign and direction sign are used in combination —

(*a*) all direction signs related to the 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 where the junction consists of one intersecting taxiway, the location sign may alternatively be placed on the left-hand side;

(*b*) 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;

(*c*) an appropriate direction sign shall be placed next to the location sign where the direction of the location taxiways changes significantly beyond the intersection; and

(*d*) adjacent direction signs shall be delineated by a vertical black line as set out in Figure S1-35 of Schedule 1.

(28) A taxiway shall be identified by a designator comprising a letter, letters or a combination of a letter or letters followed by a number.

Lights which may endanger safety of aircraft

121. (1) A person shall not exhibit a light in the vicinity of an aerodrome which, by its glare, endangers the safety of aircraft arriving or departing from the aerodrome.

(2) A non-aeronautical ground light near an aerodrome which might endanger the safety of aircraft shall be extinguished, screened or modified to eliminate the source of danger.

(3) The Authority may, where a light appears to be capable of endangering the safety of aircraft referred to in subregulation (1), direct the owner of the place where the light is exhibited or the person having charge of the light to extinguish and to prevent in the future, the exhibition of the light within the period specified.

Laser emission which may endanger safety of aircraft

122. (1) A person shall not use laser emissions which are likely to endanger the safety of aircraft.

(2) There shall be established around aerodromes, the following protected zones to protect the safety of aircraft against hazardous effects of laser emitters —

(*a*) a laser-beam free flight zone;

(*b*) a laser-beam critical flights zone; and

(*c*) a laser-beam sensitive flight zone.

(3) The flight zones referred to under subregulation (2) shall be established in accordance with requirements determined by the Authority.

(4) The provisions of subregulations (2) and (3) shall not apply to aerodromes in categories 0, 1, 2, 3 and registered unless deemed necessary by the Authority.

Lights which may cause confusion

123. A non-aeronautical ground light which, by reason of its intensity, configuration or colour, may prevent, or cause confusion in, the clear interpretation of aeronautical ground lights, shall be extinguished, screened or modified so as to eliminate such a possibility, and particular attention shall be directed to a non-aeronautical ground light visible from the air within the instrument runway —

(*a*) code number 4, within the areas before the threshold and beyond the end of the runway extending at least 4 500m in length from the threshold and runway end and 750m either side of the extended runway centreline in width;

(*b*) code number 2 or 3, within the areas before the threshold and beyond the end of the runway extending at least 3 000m in length from the threshold and runway end and 750m either side of the extended runway centreline in width; and

(*c*) code number 1, and non-instrument runway, within the approach area.

Elevated approach lights

124. (1) An elevated approach light and its supporting structure shall be frangible except, in the portion of the approach lighting system beyond 300 m from the threshold where —

(*a*) the height of a supporting structure exceeds 12m, the frangibility requirement shall apply to the top 12m only; and

(*b*) a supporting structure is surrounded by a non-frangible object, only the part of the structure that extends above the surrounding object shall be frangible.

(2) An approach light fixture or supporting structure that is not sufficiently conspicuous shall be marked.

Elevated lights

125. An elevated runway, stop-way and taxiway light shall be frangible and its height shall be low to preserve clearance for propellers and for the engine pods of jet aircraft.

Surface lights

126. (1) A light fixture inset in the surface of a runway, stopway, taxiway and aprons shall be designed and fitted so as to withstand being run over by the wheels of an aircraft without damage either to the aircraft or to the light fixture.

(2) The temperature produced by conduction or radiation at the interface between an installed inset light and an aircraft tyre shall not exceed 160 degrees celsius during a 10 minute period of exposure.

Light intensity and control

127. (1) 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.

(2) A high intensity lighting system, where provided, shall incorporate a suitable intensity control, to allow for adjustment of the light intensity to meet the prevailing conditions.

(3 A separate intensity control or other methods shall be provided to ensure that the following systems, when installed, can be operated at compatible intensities —

(*a*) approach lighting system;

(*b*) runway edge light;

(*c*) runway threshold lights;

(*d*) runway end lights;

(*e*) runway centreline lights;

(*f*) runway touchdown zone lights; and

(*g*) taxiway centreline lights.

Emergency lighting

128. (1) An aerodrome with runway lighting and without a secondary power supply shall, have emergency lights available for installation on at least the primary runway in the event of failure of the normal lighting system.

(2) An emergency light shall, when installed on a runway, conform as a minimum to the configuration required for a non-instrument runway.

(3) The colour of the emergency light shall conform to the colour requirements for runway lighting, except where 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.

Aerodrome beacons

129. (1) An aerodrome beacon or an identification beacon shall, where operationally necessary, 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.

Aeronautical beacons

130. (1) An aerodrome beacon shall be provided at an aerodrome intended for use at night if one or more of the following conditions exists —

(*a*) aircraft navigate predominantly by visual means;

(*b*) reduced visibilities are frequent; or

(*c*) it is difficult to locate the aerodrome from the air due to surrounding lights or terrain.

(2) The aerodrome beacon shall be located on or adjacent to the aerodrome in an area of low ambient background lighting.

(3) 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.

(4) An aerodrome beacon shall show either coloured flashes alternating with white flashes, or white flashes only.

(5) The frequency of total flashes in subregulation (4) shall be from 20 to 30 per minute.

(6) A combined water and land aerodrome shall, where coloured flashes are used, have the colour characteristics of whichever section of the aerodrome is designed as the principal facility.

(7) The light from the beacon shall be visible at all angles of azimuth.

(8) The vertical light distribution shall extend upwards from elevation of not more than 1 degree 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 not be less than 2000 cd.

Identification beacon

131. (1) An identification beacon shall be —

(*a*) provided at an aerodrome which is intended for use at night and cannot be easily identified from the air by other means; and

(*b*) located on the aerodrome in an area of low ambient background light.

(2) 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.

(3) An identification beacon at a land aerodrome shall be visible at all angles of azimuth.

(4) The vertical light distribution shall extend upwards from elevation of not more than one degree 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 not be less than 2000 cd.

(5) An identification beacon shall show flashing-green at a land aerodrome and flashing-yellow at a water aerodrome.

(6) The identification characters shall be transmitted in the International Morse Code.

(7) The speed of transmission shall be between six and eight words per minute, the corresponding range of duration of the International Morse Code dots being from 0.15 to 0.2 seconds per dot.

Simple approach lighting system

132. (1) A simple approach lighting system shall consist of a row of approach lights on the extended centre line of the runway, extending, whenever possible, over a distance of not less than 420m from the threshold, with a row of lights forming a crossbar 18m or 30m in length at a distance of 300m from the threshold.

(2) The lights —

(*a*) 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 centreline lights; and

(*b*) of the crossbar shall be spaced so as to produce a linear effect, except that, when a crossbar of 30m is used, gaps may be left on each side of the centre line.

(3) The gaps referred to in subregulation (2) (*b*) shall be kept to a minimum to meet local requirements and each shall not exceed 6m.

(4) The lights forming the centre line shall be placed at longitudinal intervals of 60m, except, where it is desired to improve guidance, an interval of 30m may be used.

(5) The inner most light shall be located either 60m or 30m from the threshold, depending on the longitudinal interval selected for the centre line lights.

(6) Where it is not physically possible to provide a centre line extending for a distance referred to under subregulation (1), it shall extend to 300m so as to include the crossbar.

(7) Where the provisions of subregulation (6) are not possible to effect, the centre line lights shall be extended as far as practicable, and each centre line light shall consist of a barrette at least 3m in length.

(8) Subject to the approach system having a crossbar at 300m from the threshold, an additional crossbar may be provided at 150m from the threshold.

(9) The approach lighting system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that no —

(*a*) object other than an instrument landing system or microwave landing system azimuth antenna shall protrude through the plane of the approach lights within a distance of 60m from the centre line of the system; and

(*b*) light other than a light located within the central part of a crossbar or a centreline barrette shall be screened from an approaching aircraft.

(10) An instrument landing system or microwave landing system azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

(11) The lights of a simple approach lighting system shall be fixed lights and the colour of the lights shall be ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting if present.

(12) A centre line light shall consist of either —

(*a*) a single source; or

(*b*) a barrette at least 3m in length.

(13) Where provided for a non-instrument runway, the lights shall be visible at all angles in azimuth necessary to a pilot on base leg and final approach.

(14) The intensity of the lights in subregulation (13) shall be adequate for all conditions of visibility and ambient light for which the system has been provided.

(15) 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.

(16) The lights in subregulation (15) 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

133. (1) 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 500m from the runway threshold with a row of lights forming a crossbar 30m in length at a distance of 300m from the runway threshold.

(2) The lights forming a crossbar in subregulation (1) shall be —

(*a*) as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centreline lights; and

(*b*) spaced so as to produce a linear effect, except that gaps may be left on each side of the centreline.

(3) The gaps referred to in subregulation (2) (*b*) shall be kept to a minimum to meet local requirements and each shall not exceed 6m.

(4) The lights forming the centre line shall be placed at longitudinal intervals of 30m with the inner most light located 30m from the threshold.

(5) The precision approach lighting system shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that no —

(*a*) object other than an instrument landing system or microwave landing system azimuth antenna shall protrude through the plane of the approach lights within a distance of 60m from the centre of the systems; and

(*b*) light other than a light located within the central part of a crossbar or a centreline barrette shall be screened from an approaching aircraft.

(6) An instrument landing system or microwave landing system azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

(7) The centre line and crossbar lights of a precision approach category I lighting system shall be fixed lights showing variable white.

(8) The centreline light position shall consist of either a —

(*a*) single light source in the innermost 300m of the centre line, two light sources in the central 300m of the centre line and three light sources in the outer 300m of the centreline to provide distance information; or

(*b*) barrette.

(9) Where the serviceability level of the approach lights specified as a maintenance objective can be demonstrated, each centreline light position may consist of either a —

(*a*) single light source; or

(*b*) barrette.

(10) The barrettes shall be at least 4m in length and when they are composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5m.

(11) Where the centre line consists of barrettes as described in subregulation (10), each barrette shall be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(12) A capacitor discharge light 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.

(13) The design of the electrical circuit shall be such that the lights can be operated independently of the other lights of the approach lighting system.

(14) Where the centre line consists of lights as described in above additional crossbars of lights to the crossbar provided at 300m from the threshold shall be provided at 150m, 450m, 600 m and 750 m from the threshold.

(15) 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 centreline lights.

(16) The lights shall be spaced so as to produce a linear effect, except that gaps may be left on each side of the centreline and the gaps shall be kept to a minimum to meet local requirements and each shall not exeed 6m.

Precision approach category II and III lighting system

134. (1) The approch lighting system shall consist of a row lights on the extended centre line of the runway, extending, wherever possible, over a distance of 900 m from the runway threshold.

(2) The system referred to in subregulation (1) shall, in addition, have two side rows of lights, extending 270m from the threshold, and two crossbars, one at 150 m and one at 300m from the threshold, as set out in Figure S1-19 in Schedule 1.

(3) The system referred to in subregulation (1) may have two side rows of lights, extending 240m from the threshold, and two crossbars, one at 150m and one at 300m from the threshold where the serviceability level of the approach lights specified as maintenance objectives in regulation 146 (7) can be demonstrated.

(4) The lights forming —

(*a*) the centre line shall be placed at longitudinal intervals of 30m with the innermost lights located 30m from the threshold; and

(*b*) 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 30m from the threshold.

(5) The 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 60m from the treshold where the serviceability level of the approach lights specified as maintenance objectives at regulation 146 (7) can be demonstrated.

(6) The lateral spacing or gauge between the innermost lights of the side rows shall not be less than 18 m nor more than 22.5m, and preferably 18m, but shall in any event be equal to that of the touchdown zone lights.

(7) The crossbar provided at —

(*a*) 150m from the threshold shall fill the gaps between the centreline and side row lights; and

(*b*) 300m from the threshold shall extend on both sides of the centreline lights to a distance of 15m from the centreline.

(8) Where the centre line beyond 300m from the threshold consists of lights as provided for in subregulation (7), additional crossbars of lights shall be provided at 450m, 600m, and 750m from the threshold.

(9) Where the additional crossbars provided for in these Regulations are incorporated in the system, the outer ends of these crossbar shall lie on two straight lines that either are parallel to the centreline or converge to meet the runway centre line 300m from the threshold.

(10) The system referred to in subregulation (1) shall lie as nearly as practicable in the horizontal plane passing through the threshold, provided that —

(*a*) no object other than an instrument landing system or microwave landing system azimuth antenna shall protrude through the plane of the approach lights within a distance of 60m from the centreline of the system; and

(*b*) 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.

(11) An instrument landing system or microwave landing system azimuth antenna protruding through the plane of the lights shall be treated as an obstacle and marked and lighted accordingly.

(12) The centre line of a precision approach category II and III lighting system for the first 300m from the threshold shall consist of barrettes showing variable white, except where the threshold is displaced 300m or more, the centreline may consist of single light sources showing variable white.

(13) Where the serviceability level of the approach lights specified as maintenance objectives in these Regulations can be demonstrated, the centreline of a precision approach category II and III lighting system for the first 300m from the threshold may consist of either —

(*a*) barrettes, where the centreline beyond 300m consists of barrettes; or

(*b*) alternate single light source and barrettes, where the centre line beyond 300m from the threshold consists of single light sources, with the innermost single light source located 30m and the innermost barrette located 60m from the threshold; or

(*c*) single light sources where the threshold is displaced 300m or more and all light sources shall show variable white.

(14) The barrettes shall be at least 4m in length and when composed of lights approximating to point sources, the lights shall be uniformly spaced at intervals of not more than 1.5m.

(15) Where the centreline goes beyond 300m from the threshold consists of barrettes, each barrette beyond 300m shall be supplemented by a capacitor discharge light, except where such lighting is considered unnecessary taking into account the characteristics of the system and the nature of the meteorological conditions.

(16) The capacitor light referred to in subregulation (16) 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 and the design of the electrical circuit shall be such that the capacitor lights can be operated independently of the other lights of the approach lighting system.

(17) The side row shall consist of barrettes showing red and the length of a side row barrette and the spacing of its lights shall be equal to those of the touchdown zone light barrettes.

(18) The lights forming the crossbars shall be fixed lights showing variable white and the lights shall be uniformly spaced at intervals of not more than 2.7m.

(19) The intensity of the red lights shall be compatible with the intensity of the white lights.

Visual approach slope indicator system

135. 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 non-visual aids, where one or more of the following conditions exists —

(*a*) the runway is used by turbojet or other aeroplanes with similar approach guidance requirements;

(*b*) the pilot of any type of aeroplane may have difficulty in judging the approach due to —

(i) 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

(ii) misleading information such as is produced by deceptive surrounding terrain or runway slopes;

(*c*) 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;

(*d*) physical conditions at either end of the runway present a serious hazard in the event of an aeroplane undershooting or overrunning the runway; and

(*e*) terrain or prevalent meteorological conditions are such that the aeroplane may be subjected to unusual turbulence during approach.

Approach slope and elevation setting of light beams

136. (1) The approach slope shall be appropriate for use by the aeroplane using the approach.

(2) The runway on which a T-VASIS is provided, is equipped with an instrument landing system or microwave landing system, the siting and elevations of the light unit shall be such that the visual approach slope conforms as closely as possible with the glide path of the instrument landing system or the minimum glide path of the microwave landing system.

(3) The elevation of the beams of the wing bar light units on both sides of the runway shall be the same.

(4 The elevation of the top of the beam of the fly-up light unit nearest to each wing bar, and that of the bottom of the beam of the fly-down light unit nearest to each wing bar, shall be equal and shall correspond to the approach slope.

(5) The cut-off angle of the top of the beams of successive fly-up light units shall decrease by 5 minutes of arc in angle of elevation at each successive unit away from the wing bar.

(6) The cut-in angle of the bottom of the beam of the fly-down light units shall increase by 7 minutes of arc at each successive unit away from the wing bar as set out in Figure S1-23 of Schedule 1.

(7) The elevation setting of the top of the red light beams of the wing bar and fly-up light units shall be such that, during an approach, the pilot of an aeroplane to whom the wing bar and three fly-up light units are visible would clear all objects in the approach area by a safe margin if any such light did not appear red.

(8) The azimuth spread of the light beam shall be suitably restricted where an object located outside the obstacle protection surface of the 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.

(9) The extent of the restriction shall be such that the object remains outside the confines of the light beam.

PAPI and APAPI

137. (1) The PAPI system shall —

(*a*) consist of a wing of 4 sharp transition multi-lamp or paired single lamp units equally spaced and the system shall be located on the left side of the runway unless it is physically impracticable to do so;

(*b*) consist of a wing of 2 sharp transition multi-lamp or single lamp units and the system shall be located on the left side of the runway unless it is physically impracticable to do so; and

(*c*) be suitable for both day and night operations.

(2) The wing of a PAPI shall be constructed and arranged in such a manner that a pilot making an approach will when —

(*a*) on or close to the approach slope, see the two units nearest the runway as red and the two units furthest from the runway as white;

(b) above the approach slope, see both the units as white; and

(c) below the approach slope, see both the units as red.

(3) The light units shall be —

(*a*) located as in the basic configuration set out in the S1-24 of Schedule 1, subject to the installation tolerance given therein; and

(*b*) mounted as low as possible and shall be frangible.

(4) The units forming a wing bar shall be mounted so as to appear to the pilot of an approaching aircraft to be substantially in a horizontal line.

(5) 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`.

(6) The red light shall, at full intensity have a Y coordinate not exceeding 0.320.

(7) The 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.

(8) The lighting unit shall be —

(*a*) 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 degree 30` and at least 4 degrees 30` above the horizontal; and

(*b*) designed in such a manner so that deposits of condensation and dirt on optically transmitting or reflecting surfaces shall interfere to the least possible extent with light signals and shall not affect the contrast between the red and white signals and the elevation of the transition sector.

Approach slope and elevation setting of the light units

138. (1) A runway equipped with an instrument landing system or microwave landing system, the siting and the angle of elevation of the light unit shall be such that the visual approach slope conforms as closely as possible with the glide path of the instrument landing system or the minimum glide path of the microwave landing system, as appropriate.

(2) The angle of elevation settings of the light units in —

(*a*) 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; and

(*b*) an APAPI wing bar shall be such that, during an approach, the pilot of an aeroplane observing the lowest on slope, will clear all objects in the approach area by a safe margin.

(3) The azimuth spread of the light beam shall be suitably resticted 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 advesely affect the safety of operations.

(4) The extent of the restrictions in subregulation (3) shall be such that the object remains outside the confines of the light beam.

(5) 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, AVASIS, T-VASIS, PAPI and APAPI

139. (1) An obstacle protection surface shall be established when it is intended to provide for a visual approach slope indicator syatem, the characteristics of the obstacle protection surface such as origin, divergence, length and slope, shall correspond to those specified in the relevant column as set out in Table S1-9 and in Figure S1-26 of Schedule 1.

(2) A new object or extensions of existing objects shall not be permitted above an obstacle protection surfaceexcept when, in the opinion of the Authority, the new object or extension would be shielded by an existing immovable object.

(3) An existing object 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.

(4) 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 —

(*a*) suitably raise the approach slope of the system;

(*b*) reduce the azimuth spread of the system so that the object is outside the confines of the beam;

(*c*) displace the axis of the system and its associated obstacle protection surface by no more than 5 degrees;

(*d*) suitably displace the threshold; and

(*e*) where subregulation (*d*) is found to be impracticable, suitably displace the system upwind of the threshold to provide an increase in threshold crossing height equal to the height of the object penetration.

Circling guidance lights

140. (1) Circling guidance lights shall be provided when existing guidance lights approach and runway lighting systems do not satisfactorily permit identification of the runway or approach area to a circling aircraft in the conditions for which it is intended the runway be used for circling approaches.

(2) The location and number of circling guidance lights shall be adequate to enable a pilot, as appropriate, to —

(*a*) 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

(*b*) keep in sight the runway threshold 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) The circling guidance lights shall consist of lights indicating the —

(*a*) extended centre line of the runway or parts of any approach lighting system;

(*b*) position of the runway threshold; or

(*c*) location of the runway; or a combination of such lights as is appropriate to the runway under consideration.

(4) The 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.

(5) The flashing lights refered to in subregulation (4) shall be white, and the steady lights either white or gaseous discharge lights.

(6) 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.

Runway lead-in lighting systems

141. (1) A runway lead-in lighting system shall —

(*a*) be provided where lighting is desired to provide visual guidance along a specific approach path, for reasons such as avoiding hazardous terrain or for purposes of noise abatement;

(*b*) 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; and

(*c*) 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.

(2) The interval between adjacent groups shall not exceed approximately 1600m.

(3) A group of lights of a runway lead-in lighting system shall consist of at least three flashing lights in a linear or cluster configuration.

(4) The system may be augmented by steady burning lights where such lights would assist in identifying the system.

(5) The flashing lights shall be white, and the steady burning lights gaseous discharge lights and where practicable the flashing lights in each group shall flash in sequence towards the runway.

Runway threshold identification lights

142. (1) The runway threshold identification lights shall be installed —

(*a*) at the threshold of a non-precision approach runway when additional threshold conspicuity is necessary or where it is not practicable to provide other approach lighting aids; and

(*b*) where a runway threshold is permanently displaced from the runway extremity or temporarily displaced from the normal position and additional threshold conspicuity is necessary.

(2) The runway threshold identification lights shall be —

(*a*) located symmetrically about the runway centre line, in line with the threshold and approximately 10m outside each line of runway edge lights; and

(*b*) flashing white lights with a flash frequency between 60 and 120 per minute.

(3) The lights shall be visible only in the direction of approach to the runway.

Runway edge lights

143. (1) The runway edge lights shall be —

(*a*) provided for a runway intended for use at night or for a precision approach runway intended for use by day or night;

(*b*) provided on a runway intended for take-off with an operating minimum below an RVR of the order of 800 m by day;

(*c*) placed along the full length of the runway and shall be in two parallel rows equidistant from the centreline;

(*d*) 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; and

(*e*) uniformly spaced in rows at intervals of not more than 60m for an instrument runway, and at intervals of not more than 100m for a non-instrument runway.

(2) Where the width of the area which could be declared as runway exceeds 60m, the distance between the rows of lights shall be determined considering the nature of the operations, the light distribution characteristics of the runway edge lights, and other visual aids serving the runway.

(3) The runway edge lights shall —

(*a*) on opposite sides of the runway axis be on lines at right angles to that axis;

(*b*) at intersections of runways, be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot;

(*c*) 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 600m 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; and

(*d*) show at all angles in azimuth necessary to provide guidance to a pilot landing or taking off in either direction and when the runway edge lights are intended to provide circling guidance, they shall be visible at all angles in azimuth.

Runway threshold and wing bar lights

144. (1) The runway threshold lights shall be provided for a runway threshold and equipped with runway edge lights except on a non-instrument or non-precision wing bar lights approach runway where the threshold is displaced, and wing bar lights are provided.

(2) The threshold lights shall, when the threshold is at the extremity of a runway, be placed in a row at right angles to the runway axis —

(*a*) as near to the extremity of the runway as possible and, in any case, not more than 3 m outside the extremity; and

(*b*) at the displaced threshold.

(3) The threshold lighting shall consist of —

(*a*) on a non-instrument or non-precision approach runway, at least six lights;

(*b*) 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 3m between the rows of runway edge lights; and

(*c*) 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.

(4) The lights referred to in subregulation (3) (*a*) and (*b*) shall either be —

(*a*) equally spaced between the rows of runway edge lights; or

(*b*) 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.

(5) The wing bar lights shall be —

(*a*) provided on a precision approach runway when additional conspicuity is considered desirable;

(*b*) 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; and

(*c*) symmetrically disposed about the runway centre line at the threshold in two groups.

(6) A wing bar shall be formed by at least five lights extending at least 10m 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.

(7) A runway threshold and wing bar lights shall be fixed unidirectional lights showing green in the direction of approach to the runway.

(8) 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.

Runway end lights

145. (1) The runway end lights shall be —

(*a*) provided for a runway equipped with runway edge lights;

(*b*) 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; and

(*c*) consist of at least six lights and the lights shall either be —

(i) equally spaced between the rows of runway edge lights, or

(ii) symmetrically disposed about the runway centre line in two groups with 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.

(2) The spacing between runway end lights for a precision approach runway category III, shall not exceed 6m, except between the two innermost lights if a gap is used.

(3) A runway end light shall be fixed unidirectional lights showing red in the direction of the runway and the intensity.

(4) The beam spread of the lights shall be adequate for the conditions of visibility and ambient light for which the runway is intended.

Runway centre line lights

146. (1) A runway centre line light shall be —

(*a*) provided on a precision line approach category II;

(*b*) 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;

(*c*) provided on a runway intended to be used for take-off with an operating minimum of an RVR of the order of 400m;

(*d*) provided on a runway intended to be used for take-off with an operating minimum of an RVR of the order of 400m 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;

(*e*) 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 60cm, where it is not practicable to locate them along the centre line; and

(*f*) located from the threshold to the end at longitudinal spacing of approximately 15m.

(2) A centre line guidance for take-off from the beginning of a runway to a displaced threshold shall be provided by —

(*a*) 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

(*b*) runway centre line lights; or

(*c*) barrettes of at least 3m length and spaced at uniform intervals of 30m, as shown in Figure S1-28 in Schedule 1, 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 —

(i) where necessary, provision shall be made to extinguish those centre line lights specified in subregulation (*b*) or reset the intensity of the approach lighting system or barrettes when the runway is being used for landing,

(ii) in no case shall only the single source runway centre line lights show from the beginning of the runway to a displaced threshold when the runway is being used for landing.

(3) A runway centre line light shall be fixed lights showing variable white from the threshold to the point 900m from the runway end, alternate red and variable white from 900m to 300m from the runway end and red from 300m to the runway end, except that for runways less than 1 800m in length, the alternate red and variable white lights shall extend from the mid-point of the runway usable for landing to 300m from the runway end.

Runway touchdown zone lights

147. (1) The touchdown zone lights shall —

(*a*) be provided in the touchdown zone of a precision approach runway category II or III; and

(*b*) extend from the threshold for a longitudinal distance 900m , except that, on runways less than 1 800m in length, the system shall be shortend so that it does not extend beyond the midpoint of the runway.

(2) A pair of barrettes symmetrically located about the runway centre line shall form a pattern, as set out in Figure S1-19 of Schedule 1.

(3) 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.

(4) A barrette shall —

(*a*) be composed of at least three lights with a spacing between the lights of not more than 1.5m; and

(*b*) not be less than 3m nor more than 4.5m in length.

(5) The longitudinal spacing between pairs of barrettes shall either be 30m or 60m.

(6) The touchdown zone lights shall be —

(*a*) fixed unidirectional lights showing variable white; and

(*b*) in accordance with the specifications set out in Figure S5-5 of Schedule 5.

Simple touch down zone lights

148. (1) An aerodrome shall be provided with simple touchdown zone lights, except where touchdown zone lights are provided, at an aerodrome where the approach angle is greater than 3.5 degrees or the landing distance available combined with other factors increases the risk of an overrun.

(2) The simple touchdown zone lights referred in subregulation (1) shall be —

(*a*) a pair of lights located on each side of the runway centre line 0.3m beyond the upwind edge of the final touchdown zone marking; and

(*b*) 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.

(3) 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.

(4) The spacing between the lights of the same pair shall not be more than 1.5m or half the width of the touchdown zone marking, whichever is greater.

(5) Where provided on a runway without touchdown zone markings, simple touchdown zone lights shall be installed in such a position that provides the equivalent touchdown zone information.

Rapid exit taxiway indicator lights

149. (1) A taxiway runway intended for use in runway visual range condition less than value of indicator lights 350m and where the traffic density is heavy shall be provided with rapid exit taxiway indicator lights.

(2) The 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.

(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 and in each set, the light shall be located 2m apart and light nearest to the runway centre line shall be displaced 2m from the runway centre line.

(4) Where more than one rapid exit taxiway exits on a runway, the set of rapid exit taxiway indicator light for each exit shall not overlap when displayed.

(5) A rapid exit taxiway indicator light shall be fixed unidirectional yellow lights, aligned to be visible to the pilot of a landing aeroplane in the directional of approach to the runway.

Stop way lights

150. A stop-way light shall be —

(*a*) provided for a stop-way intended for use at night;

(*b*) placed along the full length of the stop-way and shall be in two parallel rows that are equidistant from the centre line and coincident with the rows of the runway edge lights; and

(*c*) provided across the end of a stop-way on a line at right angles to the stop-way axis as near to the end of the stop-way as possible and, in any case, not more than 3m outside the end.

Taxiway centre line lights

151. (1) A taxiway centre line light shall be provided —

(*a*) on an exit taxiway and apron intended for use in runway visual range conditions less than a value of 350m in such a manner as to provide continuous guidance between the runway centreline and aircraft stand, except that the lights shall not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance;

(*b*) on a taxiway intended for use at night in runway visual range conditions of 350m or greater, and particularly on complex taxiway intersections and exit taxiways, except that the lights shall not be provided where traffic density is light and taxiway edge lights and centreline marking provide adequate guidance;

(*c*) 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 a manner as to provide continuous guidance between the runway centreline and aircraft stands;

(*d*) 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, except that the lights shall not be provided where the traffic density is light and taxiway edge lights and centreline marking provide adequate guidance;

(*e*) 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; and

(f) on a taxiway other than an exit taxiway and on a runway forming part of a standard taxi route shallbe fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway.

(2) A taxiway centreline light on an exit taxiway shall be fixed lights.

(3) An alternate taxiway centreline light shall show green and yellow from their beginning near the runway centre line to the perimeter of the instrument landing system or microwave landing system critical or sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway and thereafter all lights shall show green.

(4) The first light in the exit centreline shall always show green and the light nearest to the perimeter shall always show yellow.

(5) 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 instrument landing system or microwave landing system critical or 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 —

(*a*) their end point near the runway centre line; or

(*b*) in the case of the taxiway centre line lights crossing the runway, to the opposite perimeter of the instrument landing system or microwave landing system critical or sensitive area or the lower edge of the inner transitional surface, whichever is farthest from the runway.

(6) Where a pilot requires higher intensity, from an operational point of view, 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 determined by the Authority.

(7) 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 centreline lights shall be in accordance with the specifications determined by the Authority.

(8) A taxiway centre line lights shall 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.

Taxiway centre line lights on taxiways

152. (1) A taxiway center line light on a straight section of a taxiway line lights on shall be spaced at longitudinal intervals of not more than 30m, except that —

(*a*) larger intervals not exceeding 60m may be used where, because of the prevailing meteorological conditions, adequate guidance is provided by such spacing; and

(*b*) intervals less than 30m shall be provided on short straight sections and on a taxiway intended for use in RVR conditions of less than a value of 350m, the longitudinal spacing shall not exceed 15m.

(2) A taxiway centreline light on a taxiway curve shall continue from the straight portion of the taxiway at a constant distance from the outside edge of the taxiways curves.

(3) The lights referred in subregulation (2) shall be spaced at intervals such that a clear indication of the curve is provided.

(4) A taxiway intended for use in RVR conditions of less than a value of 350m, the lights on a curve shall not exceed a spacing of 15m and on a curve of less than 400m radius, the lights shall be spaced at intervals of not greater than 7.5m, the spacing shall extend for 60m before and after the curve.

Taxiway centre line lights on other exit taxiways

153. (1) A taxiway centre line light on an exit taxiway 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, and the first light shall be at least 60 cm from any row of runway centreline lights.

(2) The lights shall be spaced at longitudinal intervals of not more than 7.5m.

Taxiway centreline lights on runways

154. A taxiway centre line light 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.

Taxiway edge lights

155. (1) A taxiway edge light shall be —

(*a*) provided at the edges of a holding bay, apron, among others 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 others means;

(*b*) 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 centre line lights; and

(*c*) fixed lights showing blue.

(2) A taxiway edge light 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.

(3) The lights on a curve shall be spaced at intervals less than 60m so that a clear indication of the curve is provided.

(4) A taxiway edge light on a holding bay, or apron shall be spaced at uniform longitudinal interval of not more than 30m.

(5) The lights shall be located as near as practicable to the edges of the taxiway, runway turn pad, holding bay, apron or runway or outside the edges at a distance of not more than 3m.

(6) The lights shall show up to at least 75 degrees above the horizontal and at all angles in azimuth necessary to provide guidance to a pilot taxiing in either direction.

(7) The lights shall, at an intersection, exit or curve 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 degree to 6 degrees vertical, and 0.2 cd at any vertical angles between 6 degrees and 75 degrees.

Runway turn pad lights

156. (1) A runway turn pad light shall be —

(*a*) provided for continuous pad lights guidance on a runway turn pad intended for use in runway visual range conditions less than a value of 350m, to enable an aeroplane to complete a 180 degree turn and align with the runway centre line; and

(*b*) 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; and

(*c*) unidirectional fixed lights showing green with beam dimensions such that the light is visible only from aeroplanes on or approaching the runway turn pad.

(2) A runway turn pad light on a straight section of the runway turn pad marking shall be spaced at longitudinal intervals of not more than 15m.

(3) A runway turn pad light on a curved section of the runway turn pad marking shall not exceed a spacing of 7.5m.

Stop bars

157. (1) A stop bar is intended to be controlled either manually or automatically by air traffic services.

(2) A stop bar shall be provided at every runway-holding position serving a runway where it is intended that the runway will be used in runway visual range conditions of values between 350m and 550m, except where —

(*a*) appropriate aids and procedures are available to assist in preventing inadvertent incursions of traffic onto the runway; or

(*b*) operational procedures exist to limit, in runway visual range conditions less than a value of 550m, the number of —

(i) aircraft on the manoeuvring area to one at a time, and

(ii) vehicles on the manoeuvring area to the essential minimum.

(3) Where there is more than one stop bar associated with a taxiway and runway intersection, only one stop bar shall be illuminated at any given time.

(4) A stop bar shall —

(*a*) be provided at an intermediate holding position when it is desired to supplement markings with lights and to provide traffic control by visual means;

(*b*) be located across the taxiway at the point where it is desired that traffic stop and where the additional lights specified by the Authority are provided, these lights shall be located not less than 3m from the taxiway edge; and

(*c*) consist of lights spaced at uniform intervals of no more than 3m across the taxiway, showing red in the intended direction of approach to the intersection or runway-holding position.

(5) 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, 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) A stop bar installed at a runway-holding position shall be unidirectional and shall show red in the direction of approach to the runway.

(7) Where the additional lights are provided, the 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.

(8) 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 determined by the Authority.

(9) The lighting circuit shall be designed so that —

(*a*) stop bars located across entrance taxiways are selectively switchable;

(*b*) stop bars located across taxiways intended to be used only as exit taxiways are switchable selectively or in groups;

(*c*) when a stop bar is illuminated, any taxiway centreline lights installed beyond the stop bar shall be extinguished for a distance of at least 90m; and

(*d*) 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.

Intermediate holding position lights

158. (1) An intermediate holding position light shall be provided at an intermediate holding position intended for use in runway visual range conditions less than a value of 350 m, except where a stop bar has been installed.

(2) An intermediate holding position light shall —

(*a*) be provided at an intermediate holding position where there is no need for stop-and-go signals as provided by a stop bar;

(*b*) be located along the intermediate holding position marking at a distance of 0.3m prior to the marking;

(*c*) 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; and

(*d*) disposed symmetrically about and at right angle to the taxiway centre line, with individual lights spaced 1.5m apart.

Runway guard lights

159. (1) A runway incursion may take place in all visibility or weather conditions and the use of runway guard lights at runway holding positions can form part of an effective runway incursion prevention measures.

(2) A runway guard light shall be provided at each taxiway and runway intersection, as set out in Figure S1-33 of Schedule 1, except at exit only taxiways associated with a runway intended for use in —

(*a*) runway visual range conditions less than a value of 550m where a stop bar is not installed; and runway visual range conditions of values between 550m and 1 200m where the traffic density is heavy; and

(*b*) as part of runway incursion prevention measures, runway guard lights, Configuration A or B, shall be provided at each taxiway and runway intersection where runway incursion hot spots have been identified, and used under all weather conditions during day and night.

(3) A runway guard light Configuration B shall —

(*a*) not be collocated with a stop bar;

(*b*) not be located across the taxiway on the holding side of the runway-holding position marking at a distance from the runway centreline not less than that specified for a take-off runway;

(*c*) consist of yellow lights spaced at intervals of 3m across the taxiway; and

(*d*) where there are adjacent lights, be alternately illuminated and alternative lights shall be illuminated in unison.

(4) A runway guard light Configuration A shall —

(*a*) be located at each side of the taxiway on the holding side of the runway holding position marking at a distance from the runway centre line not less than that specified for a takeoff runway; and

(*b*) consist of two pairs of yellow lights.

(5) 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 shall be located above each lamp of to prevent sunlight from entering the lens without interfering with the function of the fixture shall be located above each lamp.

(6) A light beam shall be unidirectional and shall show yellow in the direction of approach to the runway holding position.

(7) The intensity in yellow light and beam spreads of lights of Configuration A shall be in accordance with the specifications determined by the Authority.

(8) Where runway guard lights are intended for use during the day, the intensity in yellow light and beam spreads of lights of Configuration A and B shall be in accordance with the specifications determined by the Authority.

(9) 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 and B shall be in accordance with the specifications determined by the Authority.

(10) The lights in each unit of Configuration A shall be illuminated alternately.

(11) The runway guard 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.

Apron floodlighting

160. (1) An apron and a designated isolated aircraft parking position intended to be used at night shall be provided with floodlights.

(2) The floodlights referred to in subregulation (1) 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.

(3) The arrangments and aiming of floodlights shall be such that an aircraft stand receives light from two or more directions to minimize shadows.

(4) 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.

(5) The average illuminance shall be at least the following aircraft stand —

(*a*) horizontal illuminance 20 lux with a uniformity ratio (average to minimum) of not more than 4 to 1; and

(*b*) vertical illuminance 20 lux at a height of 2m above the apron in relevant directions.

(6) The other areas of illuminance shall be horizontal illuminance -50 per cent of the average illuminance on the aircraft stands with a uniformity ratio of not more than 4 to 1.

Visual docking guidance system

161. (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.

(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.

(4) The azimuth guidance unit and the stopping position indicator shall be of a design such that —

(*a*) a clear indication of malfunction of either or both is available to the pilot; and

(*b*) they can be turned off.

(5) The azimuth guidance unit and the stopping position indicator shall be located in position that allows continuity of guidance between the aircraft stand markings, the aircraft stand manoeuvring 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, without selective operation.

(8) Where 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

162. (1) The azimuth guidance unit shall —

(*a*) 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 manoeuvre and aligned for use at least by the pilot occupying the left seat;

(*b*) be aligned for use by the pilots occupying both the left and right seats;

(*c*) provide unambiguous left or right guidance which enables the pilot to acquire and maintain the lead-in line without over controlling.

(2) When azimuth guidance is indicated by colour change, green shall be used to identify the centre line and red for deviations from the centre line.

Stopping position indicator

163. (1) The stopping position indicator shall —

(*a*) 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;

(*b*) be usable at least by the pilot occupying the left seat;
(*c*) be usable by the pilots occupying both the left and right seats;
(*d*) 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 deaccelerate the aircraft to a full stop at the intended stopping position; and
(*e*) provide closing rate information over a distance of at least 10m.

(2) 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 or viewing angle.

Advanced Visual Docking Guidance System

164. (1) The A-VDGS shall be —
(*a*) suitable for use by all types of aircraft for which an aircraft stand is intended;
(*b*) used only in conditions in which its operational performance is specified;
(*c*) located in a manner ensuring that unobstructed and unambiguous guidance is provided to the person responsible for, and persons assisting, the docking of the aircraft throughout the docking manoeuvre;
(*d*) provide, at minimum, the following guidance information at the appropriate stage of the docking manoeuvre —
(i) an emergency stop indication,
(ii) the aircraft type and model for which the guidance is provided,
(iii) the aircraft type and model for which the guidance is provided,
(iv) an indication of the lateral displacement of the aircraft relative to the stand centre line,
(v) the direction of azimuth correction needed to correct a displacement from the stand centre line,
(vi) an indication of the distance to the stop position,
(vii) an indication when the aircraft has reached the correct stopping position, and
(viii) a warning indication if the aircraft goes beyond the appropriate stop position; and
(*e*) be capable of providing docking guidance information for all aircraft taxi speeds encountered during the docking manoeuvre.

(2) 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.

(3) A method of indicating that an A-VDGS is not in operational use or is unserviceable shall be provided.

(4) Any symbols and graphics used to depict guidance information shall be —
(*a*) intuitively representative of the type of information provided on the lateral displacement of the aircraft relative to the stand centreline;
(*b*) provided at least 25m prior to the stop position; and
(*c*) provided from at least 15m prior to the stop position for the continuous closure distance and closure rate.

(5) Where docking, a docking manoeuvre shall be provided throughout, on the A-VDGS to indicate the need to bring an aircraft to an immediate halt.

(6) Where there is a need to bring an aircraft to an immediate halt and a failure of the A-VDGS, no other information shall be displayed.

(7) The docking procedure to initiate an immediate halt shall be made available to personnel responsible for the operational safety of the stand.

Aircraft stand manoeuvring guidance lights

165. (1) The aircraft stand manoeuvring guidance lights shall be collocated with the aircraft stand markings.

(2) The aircraft stand manoeuvring 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.

(3) The lights indicating a stop position shall be fixed unidirectional lights showing red.

Road-holding position light

166. (1) A road-holding position light shall —

(*a*) 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;

(*b*) be located adjacent to the holding position marking 1.5m (±0.5m) from one edge of the road as appropriate to the local traffic regulations; and

(*c*) comprise a —

(i) controllable red (stop) and green (go) traffic light; or

(ii) flashing-red light.

(2) 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.

(3) 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.

(4) The flash frequency of the flashing-red light referred to under subregulation 1 (*c*) (ii) shall be between 30 and 60 flashes per minute.

No-entry bar

167. (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.

(2) The intensity in red light and beam spreads of no-entry bar lights shall be in accordance with the specifications of the Authority.

(3) The taxiway centre line lights installed beyond the no-entry bar, looking in the direction of the runway, shall not be visible.

Runway status lights

168. (1) A runway status light is a type of autonomous runway incursion warning system with two components namely, runway entrance lights and take-off hold lights.

(2) The components referred to in subregulation (1) may be installed separately although the two components are designed to be complementary to each other.

(3) Where provided, runway entrance lights shall be offset 0.6m from the taxiway centreline on the opposite side to the taxiway centreline lights and begin 0.6m before the runway-holding position extending to the edge of the runway.

(4) An additional single light shall be placed on the runway 0.6 m from the runway centreline and aligned with the last two taxiway runway entrance lights.

(5) Where two or more runway-holding positions are provided, the runway-holding position to be used is the one closest to the runway.

(6) A runway entrance entrance light shall —

(*a*) consist of at least five light units and shall be spaced at a minimum of 3.8m and a maximum of 15.2m longitudinally, depending upon the taxiway length involved, except for a single light installed near the runway centreline;

(*b*) consist of a single line of fixed in pavement lights showing red in the direction of aircraft approaching the runway; and

(*c*) illuminate as an array at each taxiway and runway intersection.

(7) Where provided, take-off holding lights 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.

(8) Where provided, taking-off holding lights shall consist of two rows of fixed in pavement lights showing red facing the aircraft taking off.

(9) The take-off holding light shall illuminate as an array on the runway less than two seconds after the system determines a warning is needed.

(10) The intensity and beam spread of take-off holding light and runway entrance light shall be in accordance with the specifications set out in Schedule 5 and Schedule 1.

Signs

169. (1) A sign 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 regulation 224 (1).

(2) A sign shall be frangible.

(3) A sign located near a runway or taxiway shall be placed low to preserve clearance for propellers and the engine pods of jet aircraft.

(4) The installed height of the sign shall not exceed the dimension set out in Schedule 7 and shall be rectangular with the longer side horizontal.

(5) The inscriptions on a sign shall be in accordance with the provisions of regulation 224 (1).

(6) A sign shall be illuminated as set out in Schedule 7 when intended for use —

(*a*) in runway visual range conditions less than a value of 800m; or

(*b*) at night in association with instrument runways; or

(*c*) at night in association with non-instrument runway where the code number is 3 or 4.

(7) A sign shall be retro reflective or illuminated as set out in Schedule 7 when intended for use at night in association with non-instrument runways where the code number is 1 or 2.

(8) A variable message sign shall —

(*a*) show a blank face when not in use; and

(*b*) in case of failure, not provide information that could lead to unsafe action from a pilot or a vehicle driver.

(9) The colour of a sign shall be as set out in Schedule 4.

Mandatory instruction sign

170. (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) The sign referred to in subregulation (1) shall be red if in the movement area.

(3) A mandatory instruction sign 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.

(4) The signs referred to in subregulation (2) shall be in accordance with pattern A or Pattern B.

(5) A pattern "A" runway-holding position marking shall be supplemented at a taxiway and runway intersection or a runway and runway intersection with a runway designation sign.

(6) A pattern "B" runway-holding position marking shall be supplemented with a category I, II or III holding position sign.

(7) A pattern "A" runway-holding position marking at a runway-holding position established in accordance with regulation 73 (3) shall be supplemented with a runway-holding position sign.

(8) A mandatory instruction sign shall consist of an inscription in white on a red background.

(9) 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.

(10) The inscription on a category I, II, III, joint II and III or joint I, II and III holding position sign shall consist of the runway designator followed by CAT I, CAT II, CAT III, CAT II and III or CAT I,II and III, as appropriate.

(11) The inscription on a runway-holding position sign at a runway-holding position established in accordance with regulation 73 (3) shall consist of the taxiway designation and a number.

Information signs

171. (1) An information sign shall be provided where there is an operational need to identify by a sign, a specific location, or routing information.

(2) The information sign 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 centreline lights and there is a need to indicate to a pilot leaving a runway the perimeter of the instrument landing system or microwave landing system critical or sensitive area or the lower edge of the inner transitional surface, whichever is farther from the runway centreline.

(5) A taxiway shall be identified by a designator that is used only once on an aerodrome comprising a single letter, two duplicate letters or a combination of a letter or letters or a combination of a letter or letters followed by a number.

(6) When designating taxiways, the use of letters I, O or X and the use of words such as inner and outer shall be avoided to avoid confusion with numerals 1, 0 and closed marking.

(7) An intersection take-off sign shall be provided when there is an operational need to indicate the remaining take-off run available for intersection take-offs.

(8) A destination sign shall be provided to indicate the direction to a specific destination on the aerodrome.

(9 A combined location and direction sign shall be provided when it is intended to indicate routing information prior to a taxiway intersection.

(10) An apron stand shall not conflict with taxiway designators.

(11) A direction sign shall be provided when there is an operational need to identify the designation and direction of taxiways at an intersection.

VOR aerodrome checkpoint sign

172. (1) A VOR aerodrome checkpoint sign shall —

(*a*) be located as near as possible to the checkpoint and so that the inscriptions are visible from the cockpit of an aircraft properly positioned on the VOR aerodrome checkpoint marking; and

(*b*) consist of an inscription in black on a yellow background.

(2) The inscriptions on a VOR checkpoint sign should be in accordance with one of the alternatives in the VOR aerodrome checkpoint sign Figure set out in figure S1-37 of Schedule 1.

Aerodrome identification sign

173. (1) An aerodrome identification sign shall —

(*a*) be provided at an aerodrome where there is insufficient alternative means of visual identification and shall be placed on the aerodrome so as to be legible in so far as is practicable, at all angles above the horizontal;

(*b*) be placed on the aerodrome so as to be legible, in so far as is practicable, at all angles above the horizontal; and

(*c*) consist of the name of the aerodrome.

(2) The colour selected for the aerodrome identification sign shall give adequate conspicuity when viewed against its background.

(3) The characters of the aerodrome identification shall have a height of not less than 3m.

Aircraft stand identification sign

174. (1) An aircraft stand identification marking shall be —

(*a*) supplemented with an aircraft stand identification sign where feasible; and

(*b*) located so as to be clearly visible from the cockpit of an aircraft prior to entering the aircraft stand.

(2) An aircraft stand identification sign should consist of an inscription in black on a yellow background.

Road-holding position sign

175. (1) A road-holding position sign shall —

(*a*) be provided at all road entrances to a runway, apron and taxiway;

(*b*) be located 1.5m from one edge of the road (left or right as provided in the Road Traffic Act) to the holding position; and (Cap. 69:03)

(*c*) consist of an inscription in white on a red background.

(2) The inscription on a road-holding position sign shall be in the national language, be in conformity with the Road Traffic Act and include the following —

(*a*) a requirement to stop; and

(*b*) where appropriate —

(i) a requirement to obtain ATC clearance, and

(ii) a location designator.

(3) A road-holding position sign intended for night use shall be retro reflective or illuminated.

Unpaved runways edge markers

176. (1) A marker 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.

(2) Where runway lights are provided, the markers shall be incorporated in the light fixtures.

(3) Where there are no lights, markers of flat rectangular or conical shape shall be placed so as to delimit the runway clearly.

(4) The flat rectangular markers referred in subregulation (3) shall have a minimum size of 1m by 3m and shall be placed with their long dimension parallel to the runway centreline.

(5) The conical markers referred in subregulation (3) shall have a height not exceeding 50cm.

Stop way edge markers

177. (1) A stop way edge marker shall, be provided when the extent of a stop way is not clearly indicated by its appearance compared with that of the surrounding ground.

(2) The stop way edge markers shall be sufficiently different from any runway edge markers used to ensure that the two types of markers cannot be confused.

(3) A marker consisting of small vertical boards camouflaged on the reverse side, as viewed from the runway, is operationally acceptable.

Taxiway edge markers

178. (1) A taxiway edge marker shall —

(*a*) where provided, be provided on a taxiway where the code number is 1 or 2 and taxiway centre line or edge lights or taxiway centre line markers are not provided;

(*b*) be installed at least at the same locations as would the taxiway edge lights had they been used; and

(*c*) be retro reflective blue.

(2) The marked surface as viewed by the pilot shall be a rectangle and shall have a minimum viewing area of 150cm^2.

(3) A taxiway edge marker shall be frangible.

(4) The height of the marker referred to in subregulation (3) shall be low to preserve clearance for propellers and for the engine pods of jet aircraft.

Taxiway centre line markers

179. (1) A taxiway centreline marker shall be —

(*a*) provided on a taxiway if there is a need to improve the guidance provided by the taxiway centreline marking, where provided;

(*b*) retro reflective green; and

(*c*) 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.

(2) The marked surface as viewed by the pilot shall be a rectangle and shall have a minimum viewing area of 20cm^2.

Unpaved taxiway edge markers

180. (1) A marker shall be provided where the extent of an unpaved taxiway is not clearly indicated by its appearance compared with that of the surrounding ground.

(2) Where taxiway lights are provided, the markers shall be incorporated in the light fixtures.

(3) Where there are no lights, markers of conical shape shall be placed so as to delimit the taxiway clearly.

Boundary markers

181. (1) A boundary marker shall —

(*a*) be provided at an aerodrome where the landing area has no runway;

(*b*) be spaced along the boundary of the landing area at intervals of not more than 200m, if the type set out in Figure S1-38 of Schedule 1 is used, or approximately 90m, if the conical type is used with a marker at any corner; and

(*c*) where provided, be in the form of a cone not less than 50cm high and not less than 75cm in diameter at the base.

(2) A boundary marker shall be coloured to contrast with the background against which they will be seen.

(3) A single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white, shall be used, except where such colours merge with the background.

PART X — *Visual aids for Denoting Obstacle*

Provision of visual aids for denoting obstacles

182. An operator shall ensure that visual aids for denoting obstacles are duly provided and properly maintained to ensure the safe operation of aircraft at and around the aerodrome.

Marking and lighting of objects within the lateral boundaries of the obstacle limitation surfaces

183. (1) A vehicle and other mobile objects, excluding an aircraft, on the movement area of an aerodrome shall be obstacles and shall be marked, and, if the vehicle and aerodrome are used at night or in conditions of low visibility, they shall be lit, except that aircraft servicing equipment and vehicles used only on aprons may be exempt.

(2) An elevated aeronautical ground light within the movement area shall be marked to be conspicuous by day and obstacle lights shall not be installed on elevated ground lights or signs in the movement area.

(3) All obstacles within the distance set out in Table S1-3, column 11 or 12 of Schedule 1, from the centreline 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, lit.

(4) A fixed obstacle that extends above a take-off climb surface within 3 000m of the inner edge of the take-off climb surface shall be marked and, if the runway is used at night, lit, except that —

(*a*) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(*b*) the marking may be omitted when the obstacle is lit by medium-intensity obstacle lights, type A, by day and its height above the level of the surrounding ground does not exceed 150m; and

(*c*) the marking may be omitted when the obstacle is lit by high intensity obstacle lights by day.

(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, lit if such marking and lighting is considered necessary to ensure its avoidance, except that the marking may be omitted when the object is lighted by —

(*a*) medium-intensity obstacle lights, type A, by day and its height above the level of the surrounding ground does not exceed 33m; or

(*b*) high-intensity obstacle lights by day.

(6) A fixed obstacle that extends above an approach surface within 3 000 m of the inner edge or above a transitional surface shall be marked and, if the runway is used at night, lit, except that —

(*a*) such marking and lighting may be omitted when the obstacle is shielded by another fixed obstacle;

(*b*) 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 exceed 33 m; and

(*c*) the marking may be omitted when the obstacle is lighted by high-intensity obstacle lights by day.

(7) A fixed obstacle that extends above a horizontal surface shall be marked and, if the aerodrome is used at night, lighted except that —

(*a*) such marking and lighting may be omitted when —

(i) the obstacle is shielded by another obstacle, or

(ii) for a circuit extensively obstructed by immovable objects or terrain, procedures have been established to ensure safe vertical clearance below prescribed flight paths, or

(*b*) an aeronautical study shows the obstacle not to be of operational significance;

(*c*) 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 exceed 150m; and

(*d*) the marking may be omitted when the obstacle is lighted by high intensity obstacle lights by day.

(8) A fixed object that extends above an obstacle protection surface shall be marked and, if the runway is used at night, lighted.

(9) Any other object inside the obstacle limitation surfaces shall be marked or lit if an aeronautical study indicates that the object could constitute a hazard to aircraft, and this includes objects adjacent to visual routes.

(10) All overhead wires or cables shall be marked, and their supporting towers marked and lit if an aeronautical study indicated that the wires or cables could constitute a hazard to aircraft.

Marking and lighting of objects outside the lateral boundaries of the obstacle limitation surfaces

184. (1) An obstacle in an area beyond the limit of the obstacle limitation surface, which extends to a height of 33 m or more above ground elevation within 16 kilometres shall be considered as an obstacle and shall be marked and lit, except that the marking may be omitted when the obstacle is lighted by high intensity obstacle lights by day.

(2) Any other object outside the obstacle limitation surfaces shall be marked or lit if an aeronautical study indicates that the object could constitute a hazard to aircraft including objects adjacent to visual routes such as waterways and highways.

(3) All overhead wires or cables 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.

Marking and/or lighting of objects

185. (1) The presence of objects which must be lit, in accordance with these Regulations shall be indicated by low, medium, or high intensity lights, or a combination of such lights.

(2) A —

(*a*) low intensity obstacle light, types A, B, C and D;

(*b*) medium intensity obstacle light, types A, B and C; and

(*c*) high intensity obstacle light, type A and B,

shall be in accordance with the specifications set out in Tables S1-12 to S1-14 in Schedule 1.

(3) Pursuant to subregulations (1) and (2) —

(*a*) 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

(*b*) 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; and

(*c*) if the shielded light does not contribute to the definition of the object to be lighted, it may be omitted.

Marking and lighting of mobile objects

186. (1) All mobile objects to be marked shall be coloured or display lighting.

(2) Where a mobile object is marked by colour, a single conspicuous colour shall be used, preferably red or yellowish green for emergency vehicles and yellow for service vehicles.

(3) A flag used to mark mobile objects shall —

(*a*) be displayed around, on top of, or around the highest edge of the object; and

(*b*) not increase the hazard presented by the object they mark.

(4) Pursuant to subregulations (1) and (2) —

(*a*) flags used to mark mobile objects shall not be less than 0.9m on each side and shall consist of a chequered pattern, each square having sides of not less than 0.3*m*;

(*b*) the colours of the pattern shall contrast each with the other and with the background against which they will be seen; and

(*c*) orange and white or alternatively red and white shall be used, except where such colours merge with the background and an extended beam spread may be necessary under specific configuration and justified by an aeronautical study.

(5) A low intensity obstacle light, type C shall be displayed on vehicles —

(*a*) and other mobile objects excluding aircraft; and

(*b*) associated with emergency or security shall be flashing-blue and those displayed on other vehicles shall be flashing-yellow.

(6) A low intensity obstacle light, type D shall be displayed on follow-me vehicles.

(7) A low-intensity obstacle light on objects with limited mobility such as aerobridges, shall be fixed-red, and as a minimum be in accordance with the specifications for low-intensity obstacle lights, type A, set out in Table S8-1 of Schedule 8.

(8) The intensity of the lights referred to in subregulation (6) shall be sufficient to ensure conspicuity considering the intensity of the adjacent lights and the general levels of illumination against which they would be viewed.

Intensity and colour of obstacle lights

187. The intensity and colour of obstacle lights shall be as set out in Schedule 7.

Marking of fixed objects

188. (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 conspicuous by their shape, size or colour need not be otherwise marked.

(2) Pursuant to subregulation (1) —

(*a*) 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;

(*b*) 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;

(*c*) the colours of the pattern shall contrast each with the other and with the background against which they will be seen; and

(*d*) orange and white or alternatively red and white shall be used, except where such colours merge with the background as set out in Figure S1-39 of Schedule 1.

(3) An object shall be coloured to show alternating contrasting bands if it —

(*a*) 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

(*b*) is of skeletal type with either a vertical or a horizontal dimension greater than 1.5m.

(4) Subject to subregulation (3) —

(*a*) 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;

(*b*) the colours of the bands shall contrast with the background against which they will be seen;

(*c*) orange and white shall be used, except where such colours are not conspicuous when viewed against the background; and

(*d*) the bands on the extremities of the object shall be of the darker colour as set out in Figures S1-39 and S1-40 of Schedule 1.

(5) The 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 shall be as set out in Table S1-15 of Schedule 1.

(6) An object shall be coloured in a single conspicuous colour if its projection on any vertical plane has both dimensions less than 1.5m and orange or red shall be used, except where such colours merge with the background, in which case it may be necessary to use a different colour from orange or red to obtain sufficient contrast.

(7) A flag used to mark fixed objects shall —

(*a*) be displayed around, on top of, or around the highest edge of, the object and when flags are used to mark extensive objects or groups of closely spaced objects, they shall be displayed at least every 15m and such flags shall not increase the hazard presented by the object they mark;

(*b*) not be less than 0.6m on each side; and

(*c*) be orange in colour 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.

(8) A marker displayed on or adjacent to objects shall be in a conspicuous position to retain the general definition of the object and shall be recognizable in clear weather from a distance of at least 1 000m for an object to be viewed from the air and 300m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object.

(9) Pursuant to subregulation (10) the shape of markers shall be distinctive 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 mark is not increased.

(10) A marker shall be of one colour, and when installed, white and red, or white and orange markers shall be displayed alternately and the colour selected shall contrast with the background against which it will be seen.

Lighting of fixed medium objects

189. (1) Where an object is to be lit, one or more low, fixed objects medium or high intensity obstacle lights shall be located as close as practicable to the top of the object.

(2) A chimney or other structure of like function, the top light shall be placed below the top to minimize contamination by smoke as set out in Figure S1-40 of Schedule 1.

(3) A tower or antenna structure indicated by high intensity obstacle lights by day with an appurtenance, such as a rod or an antenna, greater than 12m 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.

(4) An extensive object or of a group of closely spaced objects to be lit that are —

(*a*) penetrating a horizontal obstacle limitation surface or located outside an obstacle limitation surface, 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 or above the ground, and so as to indicate the general definition and the extent of the objects; and

(*b*) penetrating a sloping obstacle limitation surface, 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, and so as to indicate the general definition and the extent of the objects, where two or more edges are of the same height, the edge nearest the landing area shall be marked.

(5) Where an obstacle limitation surface is sloping and the highest point above the obstacle limitation surface is not the highest point of the object, additional obstacle lights shall be placed on the highest point of the object.

(6) Where lights are applied to display the general definition of an extensive object or a group of closely spaced objects, and —

(*a*) low intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 45m; and

(*b*) medium intensity lights are used, they shall be spaced at longitudinal intervals not exceeding 900m.

(7) A high intensity obstacle light, type A and a medium intensity obstacle light, types A and B, located on an object shall flash simultaneously.

(8) The installation setting angles for high intensity obstacle lights, type A, shall be in accordance with Table S1-15 in Schedule 1, except that where high intensity obstacle lights are intended for day use as well as night use, care shall be taken to ensure that the lights do not create disconcerting dazzle.

(9 A sign, location, and operation of high intensity obstacle lights shall be in accordance with Part X of these Regulations and as determined by the Authority.

(10) Where, in the opinion of the Authority or the operator, the use of high intensity obstacle lights, type A, or medium intensity obstacle lights, type A, at night may dazzle pilots within approximately 10 000m radius of an aerodrome or cause significant environmental concerns, a dual obstacle lighting system shall be provided, in which case, this system shall be composed of high intensity obstacle lights, type A, or medium intensity obstacle lights, type A, as appropriate, for daytime and twilight use and medium intensity obstacle lights, type B or C, for night-time use.

Lighting of objects with height less than 45m above level ground

190. (1) A low intensity obstacle light, type A or B, shall be used where the object is a less extensive one and its height above the surrounding ground is less than 45m.

(2) 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.

(3) A low intensity obstacle light, type B, shall be used either alone or in combination with a medium intensity obstacle light, type B, in accordance with subregulation (4).

(4) A medium intensity obstacle light, type A, B or C, shall be used where the object is an extensive one, such as a group of buildings, and medium intensity obstacle light, type A and C, shall be used alone, and a medium intensity obstacle light, type B, shall be used either alone or in combination with low intensity obstacle light, type B.

(5) The lighting of an object shall be as set in Table S8-1-8 in Schedule 8.

Lighting of objects with a height 45m or more to a height less than 150m above ground level

191. (1) Where an object is indicated by medium intensity obstacle lights, type A, and the top of the object is more than 105m above the level of the surrounding ground or the elevation of tops of nearby buildings, where the object to be marked is surrounded by buildings, additional lights shall be provided at intermediate levels.

(2) Pursuant to subregulation (2), the additional 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.

(3) Where an object is indicated by medium intensity obstacle lights, type B, and the top of the object is more than 45m above the level of the surrounding ground or the elevation of tops of nearby buildings, where the object to be marked is surrounded by buildings, additional lights shall be provided at intermediate levels.

(4) Pursuant to subregulation (3), the additional 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.

(5) Where an object is indicated by medium intensity obstacle lights, type C, and the top of the object is more than 45m above the level of the surrounding ground or the elevation of tops of nearby buildings, where the object to be marked is surrounded by buildings, additional lights shall be provided at intermediate levels.

(6) The additional lights referred to in subregulation (6) 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.

(7) Where high intensity obstacle lights, type A, are used, the lights shall be spaced at uniform intervals not exceeding 105m between the ground level and the top light, 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.

(8) The lighting of an object shall be as set in Table S8-1-8 in Schedule 8.

Lighting of objects with a height 150m or more above ground level

192. (1) A high intensity obstacle light, type A, shall be used to indicate the presence of an object if its height above the level of the surrounding ground exceeds 150m and an aeronautical study indicates such lights to be essential for the recognition of the object by day.

(2) Where high intensity obstacle lights, type A, are used, the lights shall be spaced at uniform intervals not exceeding 105m between the ground level and the top light, 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.

(3) Where, in the opinion of the Authority, the use of high intensity obstacle lights, type A, at night may dazzle pilots within approximately 10 000m radius of the aerodrome or cause significant environmental concerns, medium intensity obstacle lights, type C, shall be used alone, and medium intensity obstacle lights, type B, shall be used either alone or in combination with low intensity obstacle lights, type B.

(4) Where an object is indicated by medium intensity obstacle lights, type A, additional lights shall be provided at intermediate levels and the additional 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.

(6) Where an object is indicated by medium intensity obstacle lights, type B, additional lights shall be provided at intermediate levels.

(7) The additional lights referred to in subregulation (6) 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.

(8) Where an object is indicated by medium intensity obstacle lights, type C, additional lights shall be provided at intermediate levels and the additional 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.

(9) The lighting of an object shall be as set in Table S8-1-8 in Schedule 8.

Marking of wind turbines

193. (1) A wind turbine shall be marked or lit if the Authority determines that the wind turbine is an obstacle.

(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 of wind turbines

194. (1) A medium intensity obstacle light shall be used at night, in bad weather and in a wind farm and shall be installed —

(*a*) to identify the perimeter of the wind farm;

(*b*) in accordance with the maximum spacing between the lights along the perimeter, unless a dedicated assessment shows that a greater spacing can be used; and

(*c*) to ensure that where flashing lights are used, they flash simultaneously.

(2) Where the light referred to in subregulation (1) is used in a wind farm, the light shall be regarded as an obstacle and any wind turbines of significantly higher elevation are also identified wherever they are located.

(3) 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.

Marking of overhead wires, cables and supporting towers

195. (1) The wires, and cables to be marked shall be equipped with markers and the supporting tower shall be coloured.

(2) The supporting towers of overhead wires, and cables that require marking shall be marked in accordance with Part X of these Regulations, except that the marking of the wires, and cables may be omitted when the wires and cables are lit by high intensity obstacle lights by day.

(3) A marker displayed on or adjacent to objects shall be 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 1 000m for an object to be viewed from the air and 300m for an object to be viewed from the ground in all directions in which an aircraft is likely to approach the object.

(4) Subject to subregulation (3), the shape of markers shall be distinctive 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 mark is not increased.

(5) A marker displayed on an overhead wire, and cable shall be spherical and have a diameter of not less than 60cm.

(6) 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 —

(*a*) 30m where the marker diameter is 60cm progressively increasing with the diameter of the marker;

(*b*) 35m where the marker diameter is 80cm and further progressively increasing; and

(*c*) 40m where the marker diameter is of at least 130cm.

and 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 —

(*a*) white and red; or

(*b*) white and orange; and

(*c*) displayed alternately,

and the colour selected shall contrast with the background against which it will be seen.

(7) Where the Authority has determined that an overhead wire or cable needs to be marked but it is not practicable to install markers on the wire, or cable, then high intensity obstacle lights, type B, shall be provided on their supporting towers.

Lighting of overhead wires, cables, and supporting towers

196. (1) A high intensity obstacle light, type B, shall be used to indicate the presence of a tower supporting overhead wires or cables, where —

(*a*) an aeronautical study indicates such lights to be essential for the recognition of the presence of wires or cables; or

(*b*) it has not been found practicable to install markers on the wires or cables.

(2) Where high intensity obstacle lights, type B, are used, they shall be located at three levels —

(*a*) at the top of the tower;

(*b*) at the lowest level of the catenary of the wires or cables; and

(*c*) at approximately midway between the levels at (*a*) and (*b*),

and in some cases, this may require locating the lights off the tower.

(3) A high intensity obstacle light, type B, indicating the presence of a tower supporting overhead wires or cables, shall flash sequentially, first the middle light, second the top light and last, the bottom light, and the intervals between flashes of the lights shall approximate the following ratios —

Flash interval between	*Ratio of cycle time*
middle and top light	1/13
top and bottom light	2/13
bottom and middle light	10/13

and where high intensity obstacle lights are intended for day use as well as for night use, care shall be taken to ensure that these lights do not create disconcerting dazzle.

(4) A dual obstacle lighting system shall be provided where within approximately 10 000m radius of an aerodrome, pilots may be dazzled or cause significant environmental concerns.

(5) The dual obstacle lighting system required by subregulation (4) shall be composed of high intensity obstacle lights, type B, for daytime and twilight use and medium intensity obstacle lights, type B, for night time use and where medium intensity lights are used they shall be installed at the same level as the high intensity obstacle lights, type B.

(6) The installation setting angles for high intensity obstacle lights, type B, shall be in accordance with Table S9-2 in Schedule 9.

(7) Where, in the opinion of the Authority, the use of high intensity obstacle lights, type B, shall, be used to indicate the presence of tower supporting wires and cables including other obstacles.

PART XI — *Visual Aids for Denoting Restricted Use Areas*

Marking of restricted use areas

197. An operator shall —

(*a*) ensure that restricted areas are marked restricted use in a manner that is visible to aircraft operating on the ground and in the air areas; and

(*b*) adhere to visual aids requirements prescribed in these Regulations so as to ensure that aircraft operations can be conducted safely on the aerodrome.

Marking and lighting of closed runways and taxiways, or parts thereof

198. (1) A closed marking shall be displayed on a —

(*a*) runway or taxiway, or portion thereof, which is permanently closed to the use of all aircraft; and

(*b*) temporarily closed runway or taxiway or portion thereof, except that such marking may be omitted when the closing is less than 3 days long and adequate warning by air traffic services is provided.

(2) A closed marking on a runway, shall be placed at each end of the runway, or portion thereof, declared closed, and additional markings shall placed at the maximum interval between markings so as not to exceed 300m and on a taxiway, a closed marking shall be placed at least at each end of the taxiway or portion thereof closed.

(3) The closed marking shall be —

(*a*) of the form and proportions as set out in Figure S1-41, illustration a, in Schedule 1, when displayed on a runway;

(*b*) of the form and proportions as set out in Figure S1-41 illustration b, in Schedule 1, when displayed on a taxiway;

(*c*) white when displayed on a runway; and

(*d*) yellow when displayed on a taxiway.

(4) Where 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.

(5) Where a runway or taxiway or portion thereof is permanently closed, all normal runway and taxiway markings shall be obliterated.

(6) Where a runway or taxiway or portion thereof is closed, lighting shall not be operated, except as required for maintenance purposes.

(7) Where a 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, in addition to closed markings.

Marking of non-load bearing surfaces

199. A boundary shall be provided between the load bearing surface marked by a taxi side stripe marking and shoulders for taxiways, holding bays and aprons and other non-load-bearings surfaces, which cannot readily be distinguished from load bearing surfaces and which, if used by aircraft, might result in damage to the aircraft.

Marking of pre-threshold areas

200. (1) Where a 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.

(2) A chevron marking shall —

(*a*) point in the direction of the runway and be placed as set out in Figure S1-42 of Schedule 1;

(*b*) be of conspicuous colour and contrast with the colour used for the runway markings; it shall preferably be yellow; and

(*c*) have an overall width of at least 0.9m.

Marking and lighting of unserviceable areas

201. (1) An unserviceability marker shall be displayed —

(*a*) 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; and

(*b*) at the entrances to a permanently or temporarily closed runway or taxiway, or part thereof and on a movement area used at night, unserviceability lights shall be used.

(2) An unserviceability marker and lights shall be placed at intervals sufficiently close so as to delineate the unserviceable area.

(3) An unserviceability marker shall consist of —

(*a*) conspicuous upstanding devices such as flags, cones or marker boards; and

(*b*) a red fixed light and the light shall have intensity sufficient to ensure conspicuity considering the 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 and in no case shall the intensity be less than 10 cd of red light.

(4) 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.

(5) 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.

(6) An unserviceability 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.

PART XII — *Aerodrome Operational Services, Equipment, Installations and Facilities*

Immigration, customs and excise aerodromes

202. The Authority may, in consultation with the authorities responsible for immigration, customs and excise, notify, of any aerodrome which is introduced as, or ceases to be a place for landing or departure of aircraft for purposes of the laws relating to immigration, customs and excise.

Supply of aviation fuel to aircraft

203. (1) An operator of an aviation fuel installation at an aerodrome shall not cause or permit any aviation fuel to be delivered or extracted from that installation to an aircraft unless —

(*a*) when the aviation fuel is delivered to the installation, the operator of the aviation fuel installation is satisfied that —

(i) the installation is capable of storing and dispensing the fuel so as not to render it unfit for use in an aircraft,

(ii) the installation is marked in an appropriate manner to the grade of the fuel stored or where different grades are stored in different parts, that each part is so marked, and

(iii) in the case of delivery into the installation or part of the installation from a vehicle or vessel, the fuel has been sampled and is of the grade appropriate to that installation or part of the installation as the case may be and is fit for use in an aircraft; and

(*b*) where aviation fuel is dispensed from the installation, the operator of the aviation fuel installation is satisfied after sampling, that the fuel is fit for use in an aircraft.

(2) A person shall not cause or permit aviation fuel to be dispensed for use in an aircraft where that person knows or has reason to believe that the aviation fuel is not fit for use in an aircraft.

(3) An operator of an aviation fuel installation shall —

(*a*) not supply fuel to an aircraft except at a place and in a manner approved by the operator, on an aerodrome;

(*b*) keep a written record in respect of each installation managed by that operator;

(*c*) preserve the written record for a period of 12 months or such longer period as the Authority may determine; and

(*d*) within a reasonable time, after being requested to do so by an authorised person, produce the record to that authorised person.

(4) An operator may subject to the approval granted under subregulation (3), ensure compliance with any conditions as the operator may impose, in order to safeguard persons or property on the ground.

(5) The record in subregulation (3) (*b*), shall include —

(*a*) particulars of the grade and quantity of aviation fuel delivered and the date of delivery;

(*b*) particulars of all samples taken of the aviation fuel and of the results of the tests of those samples; and

(*c*) particulars of the maintenance and cleaning of the installation.

(6) The Authority or an authorised person may, where it appears to the Authority or to that authorized person that aviation fuel is intended or likely to be delivered in contravention of this regulation, direct the operator of an aviation fuel installation to not permit aviation fuel to be dispensed from that installation until the direction is revoked by the Authority or that authorised person.

(7) For the purpose of this regulation —

"aviation fuel" means fuel intended for use in an aircraft; and

"aviation fuel installation" means any apparatus or container, including a vehicle designed, manufactured or adapted for the storage of aviation fuel or for the delivery of fuel to an aircraft.

Aerodrome emergency planning

204. (1) An operator shall establish an aerodrome emergency plan at the aerodrome, which shall be commensurate with the aircraft operations and other activities conducted at the aerodrome.

(2) An aerodrome emergency plan shall —

(*a*) set forth the procedures for coordinating the response of different aerodrome agencies and services and of agencies in the surrounding community that could be of assistance in responding to an emergency;

(*b*) provide for the coordination of the actions to be taken in the event of an emergency occurring at the aerodrome or in its vicinity; and

(*c*) include —

(i) the types of emergencies planned for,

(ii) agencies to be involved in the plan,

(iii) the responsibility and role of each agency, the emergency operation centre and the command post for each type of emergency,

(iv) names and contacts of offices or people to be contacted in the case of a particular emergency, and

(v) a grid map of the aerodrome and its immediate vicinity.

(3) An aerodrome emergency shall include —

(*a*) aircraft emergencies;

(*b*) sabotage including bomb threats;

(*c*) unlawfully seizure of aircraft;

(*d*) dangerous goods occurrences;

(*e*) building fires;

(*f*) natural disasters; and

(*g*) public health emergencies.

(4) Subject to subregulation (3) (*e*), public health emergencies shall include —

(*a*) increased risk of travellers or cargo spreading a serious communicable disease internationally through air transport; and

(*b*) severe outbreak of a communicable disease potentially affecting a large proportion of aerodrome staff.

(5) An emergency plan shall provide for the response and participation of all agencies whose assistance is required in the event of an emergency, including —

(a) at an aerodrome —

(i) air traffic control unit,

(ii) rescue and firefighting services,

(iii) aerodrome administration,

(iv) medical and ambulance services,

(v) aircraft operators,

(vi) security services, and

(vii) airport police unit; and

(*b*) outside the aerodromes —

(i) fire departments,

(ii) Police services,

(iii) health authorities including medical, ambulance services, hospitals and public health service,

(iv) the military forces, and

(v) harbour patrol or coast guard.

(6) The public health services shall include planning to minimise adverse effects to the community from health-related events and deal with population health issues rather than provision of health services to individuals.

(7) An emergency plan shall provide for cooperation and coordination with the rescue coordination centre as necessary.

(8) The operator shall, in developing an aerodrome emergency plan, the take into consideration the human factor principles to ensure optimum response by all existing agencies participating in the emergency operations.

(9) This regulation applies to aerodromes in categories 2, 3, 4, 5, 6,7,8,9 and 10.

(10) This regulation may apply to aerodromes in categories H and 3 where deemed necessary by the Authority.

(11) This regulation shall not apply to aerodromes in category 1 and registered aerodromes.

Emergency planning committee

205. (1) An operator shall form an emergency planning committee to discuss, determine and implement emergency planning arrangements commensurate with the size and type of aircraft that use the aerodrome.

(2) This regulation applies to aerodromes in categories 2, 3, 4, 5, 6,7,8,9 and 10.

(3) This regulation may apply to an aerodrome in category H where deemed necessary by the Authority.

(4) This regulation shall not apply to aerodromes in category 1, and registered aerodromes.

Emergency operations centre and command post

206. (1) An operator shall ensure that —

(*a*) a fixed emergency operations centre and a mobile command post are available for use during an emergency;

(*b*) a person is assigned to assume control of the emergency operations centre and, where appropriate, assigned another person the mobile command post; and

(*c*) adequate communication systems linking the command post and the emergency operations' centre with each other and with the participating agencies are provided in accordance with the plan and are consistent with the particular requirements of the aerodrome.

(2) 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.

(3) 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.

(4) This regulation applies to aerodromes in categories 2, 3, 4, 5, 6,7,8,9 and 10.

(5) This regulation may apply to an aerodrome in category H where deemed necessary by the Authority.

Aerodrome emergency exercise

207. (1) The aerodrome emergency plan shall contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness and shall include all participating agencies and associated equipment.

(2) The aerodrome emergency plan required by subregulation (1) shall be tested by conducting —

(*a*) 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;

(*b*) 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; or

(*c*) contingency plan exercises in accordance with the Civil Aviation (Security) Regulations. Cap. 71:01 Sub. Leg.

(3) The purpose of a full-scale exercise shall be to ensure the adequacy of the plan to cope with different types of emergencies.

(4) The purpose of a partial exercise shall be to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system.

(5) The purpose of modular tests shall be to enable concentrated effort on specific components of established emergency plans.

(6) This regulation applies to aerodromes in categories 2, 3, 4, 5, 6,7,8,9 and 10.

(7) This regulation may apply to an aerodrome in category H where deemed necessary by the Authority.

Emergencies in difficult environment

208. (1) The aerodrome emergency 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 or swampy areas and where a significant portion of approach or departure operations takes place over water or swampy areas.

(2) An aerodrome located close to a water body, a swampy area, or difficult terrain, the aerodrome emergency plan shall include the establishment, testing and assessment at regular intervals of a pre-determined response for the specialist rescue services.

(3) An assessment of the approach and departure areas within 1 000m of the runway threshold shall be carried out to determine the options available for intervention.

(4) This regulation applies to aerodromes in categories, 3, 4, 5, 6, 7, 8, 9 and 10.

(5) This regulation may apply to an aerodrome in category H where deemed necessary by the Authority.

(6) This regulation shall not apply to aerodromes in categories 1, 2 and registered aerodromes.

Establishment of aerodrome rescue and fire fighting services

209. (1) An operator shall put in place rescue and fire fighting of aerodrome equipment and services commensurate with the category of the aerodrome.

(2) A public or private organisation, suitably located and equipped, may be designated to provide the rescue and fire fighting service and where designated the fire station housing the organisations shall where possible be located on the aerodrome, although an off-aerodrome location is not precluded provided the response time can be met.

(3) Where an aerodrome is located close to a water body, a swampy area or difficult terrain and where a significant portion of approach or departure operations takes place over such an area, specialist rescue services and fire fighting equipment appropriate to the hazard and risk shall be made available.

(4) Subject to subregulation (3), an operator shall 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.

(5) These regulations shall apply to aerodromes in categories 3, 4, 5, 6, 7, 8, 9 and 10.

(6) The Authority may specify alternative means of compliance with this regulation for aerodromes in category H.

Determination of aerodrome rescue and firefighting category

210. (1) The aerodrome rescue and fire fighting services category of an aerodrome shall be determined using Table S1-18 of Schedule 1 to and shall be based on the longest aircraft that normally uses the fire fighting category aerodrome, and its fuselage width.

(2) Where, after selecting the aerodrome category appropriate to the longest aeroplane's overall length, that aeroplane's fuselage width is found to be greater than the maximum width in Table S1-18 column 3 of Schedule 1, for that category, then the category for that aeroplane shall be one category higher.

Level of protection for rescue and firefighting services

211. (1) An operator shall provide an appropriate level of protection commensurate with the rescue and fire fighting category as set out in Table 1-18 of Schedule 1.

(2) The level of protection provided at an aerodrome for rescue and fire fighting shall be appropriate to the aerodrome category 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.

(3) Where there is an anticipated period 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.

(4) The principal and complementary agents shall be provided at an aerodrome.

(5) The principal extinguishing agent shall be a —

(*a*) foam meeting the minimum performance level A; or

(*b*) foam meeting the minimum performance level B; or

(*c*) foam meeting the minimum performance level C; or

(*d*) combination of these agents;

except that the principal extinguishing agent for aerodromes in categories 1 to 3 shall preferably meet the minimum performance level B or C foam.

(6) The complementary extinguishing agent shall be a dry chemical powder suitable for extinguishing hydrocarbon fires, and care must be taken to ensure compatibility when selecting dry chemical powder for use with foam; and alternate complementary agents having equivalent firefighting capability may be utilised.

(7) 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 as set out in Table S1-19 of Schedule 1.

(8) A kilogram of a complementary agent shall be taken as equivalent to a litre of water for production of a foam meeting performance level A, for the purpose of agent substitution.

(9) The amounts of water specified for foam production shall be predicated on an application rate of 8.2 L/min/m2 for a foam meeting performance level A, 5.5 L/min/m2 for a foam meeting performance level B and 3.75 L/min/m2 for a foam meeting performance level C; and where any other complementary agent is used, the substitution ratios shall be checked.

(10) An aerodrome with a fire fighting category 1 and a registered aerodrome, shall require up to a 100 per cent of water.

(11) Subject to subregulation (10) the water maybe replaced by a complementary agent.

(12) An 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.

(13) 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.

(14) The amount of foam concentrate provided on a vehicle shall be sufficient to produce at least two loads of foam solution.

(15) The operator shall install fire hydrants, maintain serviceability requirements and ensure constant supply of water at an aerodrome with cargo and passenger terminals.

(16) A supplementary water supply shall be provided, for the expeditious replenishment of rescue and fire fighting vehicles at the scene of an aircraft accident.

(17) The total amount of water to be provided for foam production where a combination of different performance level foams are provided at an aerodrome 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 fire fighting equipment.

(18) The complementary agents shall comply with the appropriate specifications of the International Organization for Standardization (ISO 7202 (Powder)).

(19) The discharge rate of the foam solution and of complementary agents shall be no less than the values set out in Table S1-19 in Schedule 1.

(20) The discharge rate of complementary agents shall be no less than the values set out in Table S1-19 in Schedule 1.

(21) A dry chemical powder shall only be substituted with an agent that has equivalent or better firefighting capabilities for all types of fires where a complementary agent is expected to be used.

(22) This regulation applies to aerodromes in categories 4, 5, 6, 7, 8, 9 and 10.

(23) This regulation may apply to aerodromes in categories 3 and H where deemed necessary by the Authority.

Provision of reserve supplies of water and foam for fire fighting vehicles

212. (1) A reserve supply of foam concentrate, equivalent to 200 per cent of the quantities set out in Table S1-19 in Schedule 1, shall be maintained on the aerodrome for vehicle replenishment purposes and foam concentrate carried on fire vehicles in excess of the quantities set out in Table S1-19 in Schedule 1, shall be considered to contribute to the reserve.

(2) A reserve supply of complementary agent, equivalent to 100 per cent of the quantity set out in Table S1-19 of Schedule 1, shall be maintained on the aerodrome for vehicle replenishment purposes and propellant gas shall be included to utilize this reserve complementary agent.

(3) A category 1 and 2 aerodrome that has replaced up to 100 per cent of the water with a complementary agent shall hold a reserve supply of a complementary agent of 200 per cent.

(4) Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply required by subregulations (1), (2) and (3) shall be increased as determined by a risk assessment.

(5) This regulation applies to aerodromes in categories 4, 5, 6, 7, 8, 9 and 10.

(6) This regulation may apply to aerodromes in categories 2, 3 and H where deemed necessary by the Authority.

Rescue equipment

213. (1) An operator shall ensure that rescue equipment commensurate with the level of aircraft operations are provided on the rescue and fire fighting vehicles.

(2) This regulation applies to aerodromes in categories 4, 5, 6, 7, 8, 9 and 10.

(3) This regulation may apply to aerodromes in categories 2, 3 and H where deemed necessary by the Authority.

Response time for rescue and fire fighting services

214. (1) The operational objective of the rescue and fire fighting service shall be to achieve a response time not exceeding three minutes to any —

(*a*) point of each operational runway in optimum visibility and surface conditions; and

(*b*) other part of the movement area in optimum visibility and surface conditions.

(2) For the purpose of these Regulations —

(*a*) "response time" means the time between the initial call to the rescue and fire fighting service, and the time when the first responding vehicle is in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table S1-19 in Schedule 1; and

(*b*) "optimum visibility" and "surface conditions" means daytime, good visibility, no precipitation with normal response route free of surface contamination such as water.

(3) An operator shall provide guidance, equipment and procedures for rescue and fire fighting services to meet the operational objectives in less than optimum conditions of visibility, especially during low visibility operations.

(4) A vehicle, other than the first responding vehicle, required to deliver the amounts of extinguishing agents set out in Table S1-19 in Schedule 1, shall ensure continuous agent application, and shall arrive no more than four minutes from the initial call.

(5) 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.

(6) This regulation applies to aerodromes in categories 4, 5, 6, 7, 8, 9 and 10.

(7) This regulation may apply to aerodromes in categories 2, 3 and H where deemed necessary by the Authority.

(8) This regulation shall not apply to aerodromes in categories 0, 1 and registered aerodromes.

Establishment of emergency access roads

215. (1) An emergency access road shall be provided on an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times.

(2) The provision of ready access to approach areas up to 1 000m from the threshold, or at least within the aerodrome boundary shall be given particular attention and where a fence is provided, the need for convenient access to outside areas shall be taken into account.

(3) An aerodrome service road may serve as an emergency access road when they are suitably located and constructed.

(4) An emergency access road shall be capable of supporting the heaviest vehicles which will use them, and be usable in all weather conditions.

(5) A road within 90m of a runway shall be surfaced to prevent surface erosion and the transfer of debris to the runway and sufficient vertical clearance shall be provided from overhead obstructions for the largest vehicles.

(6) Where the surface of the road is indistinguishable from the surrounding area, edge markers shall be placed at intervals of about 10m.

(7) This regulation applies to aerodromes in categories 4, 5, 6, 7, 8, 9, and 10.

Rescue and fire fighting service stations

216. (1) A rescue and fire fighting vehicle shall be housed in a fire station.

(2) A satellite fire station shall be provided where the response time cannot be achieved from a single fire station.

(3) The fire station referred to in subregulation (1) 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.

(4) This regulation applies to aerodromes categories 4, 5, 6, 7, 8, 9, 10 and to aerodromes in categories 2 and 3 where deemed necessary by the Authority.

Provision of communication and alerting systems for rescue and firefighting service

217. (1) An operator shall provide a discreet communication system linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and fire fighting vehicles.

(2) A system used for alerting rescue and fire fighting personnel, capable of being operated from a fire station, shall be provided at a fire station, any other fire station on the aerodrome and at the aerodrome control tower.

(3) A system used for monitoring rescue and fire fighting service, capable of relaying information to the watch room attendant at a watch office and a direct contact line to watch office capable of being dialed to pass emergency information shall be provided.

(4) This regulation applies to aerodromes in categories 4, 5, 6,7,8,9 and 10.

(5) This regulation shall apply to aerodromes in categories 2 and 3 where deemed necessary by the Authority.

Minimum number of rescue and fire fighting vehicles

218. The minimum number of rescue and fire fighting vehicles provided at an aerodrome shall be in accordance with Table S1-20 in Schedule 1.

Requirements for rescue and firefighting personnel

219. (1) An operator shall carry out a task resource analysis to determine the minimum number of rescue and fire fighting personnel required at the aerodrome, and shall document in the Aerodrome Manual, the level of staffing.

(2) An operator shall ensure that all rescue and fire fighting personnel —

(*a*) are properly trained to perform their duties in an efficient manner; and

(*b*) participate in live fire drills commensurate with the types of aircraft and type of rescue and fire fighting equipment in use at the aerodrome, including pressure-fed fuel fires.

(3) For the purpose of these Regulations, "pressure-fed fuel fires" means fires associated with fuel discharge under very high pressure from a ruptured fuel tank.

(4) The rescue and fire fighting personnel training programme shall —

(*a*) be as determined by the Authority and shall include training in human performance, human factors including team coordination, initial, advanced, recurrent, Inter Personal Proficiency Tests (IPPT) and on-the-job training; and

(*b*) cover all the areas required for personnel performing duties at the aerodrome.

(5) A trained and competent personnel shall be designated, during flight operations, to be readily available to ride the rescue and fire fighting vehicles and to operate the equipment at maximum capacity.

(6) The rescue and fire fighting 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, taking into account, the need for the personnel to use hand lines, ladders and other rescue and fire fighting equipment normally associated with aircraft rescue and fire fighting operations.

(7) The responding rescue and fire fighting personnel shall be provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner including —

(*a*) helmets;

(*b*) proximity suits;

(*c*) boots; and

(*d*) gloves.

(8) This regulation shall apply to aerodromes in categories 4, 5, 6, 7, 8, 9, 10 and to category 2, 3 and H where deemed necessary by the Authority.

Removal of disabled aircrafts

220. (1) An operator shall have in place a plan for the removal of an aircraft disabled on, or adjacent to, the movement area and shall designate a coordinator to implement the plan when necessary.

(2) The disabled aircraft removal plan shall be based on the characteristics of the aircraft that may be expected to operate at the aerodrome, and include among other things —

(*a*) a list of equipment and personnel on, or in the vicinity of, the aerodrome which would be available for such purpose;

(*b*) arrangement for the rapid receipt of aircraft recovery equipment kits from other aerodromes, where applicable; and

(*c*) the name and contacts of the coordinator designated to implement the plan.

(3) The plan under this regulation shall include particulars of the procedures for removing a disabled aircraft on the movement area or adjacent to it.

(4) This regulation shall not apply to aerodromes in categories B and C unless otherwise specified by the Authority.

Apron management service

221. (1) An appropriate apron management service shall be provided on an apron by an aerodrome air traffic service unit, by the aerodrome operating authority, or by a cooperative combination of these, where warranted by the volume of traffic and operating conditions in order to —

(*a*) regulate movement with the objective of preventing collisions between aircraft, and between aircraft and obstacles;

(*b*) regulate entry of aircraft into, and coordinate exit of aircraft from, the apron with the aerodrome control tower; and

(*c*) ensure safe and expeditious movement of vehicles and appropriate regulation of other activities.

(2) Where 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.

(3) An operator shall ensure that, where an apron management service is established, radio telephony communication facilities are provided.

(4) Where low visibility procedures are in effect, persons and vehicles operating in the apron shall be restricted to the essential minimum.

(5) An emergency vehicle responding to an emergency shall have priority over all other surface movement traffic.

(6) A vehicle operating on an apron shall give way to —

(*a*) an emergency vehicle;

(*b*) an aircraft —

(i) taxiing,

(ii) about to taxi, or

(iii) being pushed or towed; and

(c) other vehicles in accordance with the Road Traffic Act.

(7) An aircraft stand shall be visually monitored to ensure that the recommended clearance distances are provided to an aircraft using the stand.

(8) This regulation does not apply to aerodromes in categories 0, 1, 2, 3 and registered unless otherwise deemed necessary by the Authority.

Ground servicing of aircrafts

222. (1) An operator shall ensure that fire extinguishing equipment, suitable for at least the initial intervention in the event of a fuel fire, is readily available during the ground servicing of an aircraft, and that there is means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill.

(2) An operator shall ensure that, when aircraft refuelling operations take place while passengers are on board, embarking or disembarking, ground equipment are positioned in a manner that allows —

(*a*) the use of exits for expeditious evacuation; and

(*b*) a ready escape route from each of the exits to be used in an emergency.

Aerodrome vehicle operation

223. (1) A person shall not operate a vehicle on —

(*a*) the manoeuvring area at an aerodrome where air traffic service is provided, except where authorised by the aerodrome control tower; and

(*b*) an apron of an aerodrome except where authorised by an operator.

(2) A vehicle operating on the movement area shall have a rotating beacon.

(3) A driver of a vehicle on the movement area shall comply with all mandatory instructions conveyed by —

(*a*) markings and signs, where the vehicle is on the manoeuvring area, except where the driver is authorised by the —

(i) aerodrome control tower, and

(ii) appropriate designated authority on an apron only; and

(*b*) lights and instructions issued by the aerodrome control tower where the vehicle is on the manoeuvring area or by the appropriate designated authority, where the vehicle is on an apron.

(4) A driver of a vehicle on the movement area shall be trained for the tasks to be performed.

(5) A driver of a radio-equipped vehicle shall establish two-way radio communication with the aerodrome control tower before entering the manoeuvring area and with the appropriate designated authority before entering the apron and shall maintain a continuous listening watch on the assigned frequency while on the movement area.

Surface movement guidance and control systems

224. (1) A surface movement guidance and control system shall be provided at an aerodrome.

(2) The design of a surface movement guidance and control system provided at an aerodrome shall take into account the —

(*a*) density of air traffic;

(*b*) visibility conditions under which operations are intended;

(*c*) need for pilot orientation;

(*d*) complexity of the aerodrome layout; and

(*e*) movement of vehicles.

(3) The visual aid components of a surface movement guidance and control system, that is, markings, lights and signs, shall be designed to conform to Parts VIII and IX of these Regulations.

(4) 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.

(5) The surface movement guidance and control 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.

(6) Where a surface movement guidance and control system is provided by selective switching of stop bars and taxiway centreline lights, the following requirements shall be met —

(*a*) taxiway routes which are indicated by illuminated taxiway centreline lights shall be capable of being terminated by an illuminated stop bar;

(*b*) the control circuits shall be so arranged that when a stop bar located ahead of an aircraft is illuminated, the appropriate section of taxiway centreline lights beyond it is suppressed; and

(*c*) the taxiway centreline lights are activated ahead of an aircraft when the stop bar is suppressed.

(7) A 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 350m.

(8) A surface movement radar for the manoeuvring area shall be provided at an aerodrome other than that in subregulation (7) when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.

(9) This regulation shall apply to aerodromes in categories 4, 5, 6, 7, 8, 9 and 10.

Siting of equipment and installations on operational areas

225. (1) An installation or equipment shall, unless its function requires it to be there for air navigation or for aircraft safety purposes be —

(*a*) on a runway strip, a runway end safety area, a taxiway strip or within the distances specified in Table S1-3, column 11 in Schedule 1, if it would endanger an aircraft; or

(*b*) on a clearway if it would endanger an aircraft in the air.

(2) Any equipment or installation required for air navigation or for aircraft safety purposes shall be frangible, mounted as low as possible and located on a –

(*a*) portion of a runway strip within 240m from the end of the strip and penetrates the inner approach surface, the inner transitional surface or the balked landing surface;

(*b*) runway end safety area, a taxiway strip or within the distances set out in Table S1-3 of Schedule 1; or

(*c*) clearway and which would endanger an aircraft in the air.

(3) Any installation or equipment 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.

(4) An installation or equipement shall not be located within 240m from the end of the strip unless its function requires it to be there for air navigation or for aircraft safety purposes and within —

(*a*) 60m of the extended centreline where the code number is 3 or 4; or

(*b*) 45m of the extended centreline where the code number is 1 or 2, of a precision approach runway category I, II or III.

(5) 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 —

(*a*) is situated on a portion of the strip within 77.5m of the runway centreline where the code number is 4 and the code letter is F; or

(*b*) is situated within 240 m from the end of the strip and within —

(i) 60 m of the extended runway centreline where the code number is 3 or 4, or

(ii) 45 m of the extended runway centreline where the code number is 1 or 2; and

(*c*) penetrates the inner approach surface, the inner transitional surface or the balked landing surface;

shall be frangible and mounted as low as possible.

(6) Any equipment or installation required for air navigation or for aircraft safety purposes which is an obstacle of operational significance shall be frangible and mounted as low as possible.

Location, construction and installation of equipment on operational areas

226. (1) A person shall not construct or install equipment or any installation on a runway strip, a runway end safety area, a taxiway strip, a clearway or within any distances determined by the Authority, where the construction or the equipment may endanger the safety of an aircraft, except for purposes of air navigation or for aircraft safety.

(2) Where any equipment or installation required for air navigation or for aircraft safety purposes is to be located on a portion of a runway strip or on a runway end safety area, a taxiway strip or within any distances determined by the Authority, the equipment or installation shall be frangible and mounted as low as possible in accordance with Part VI of these Regulations.

Fencing of aerodromes and installations

227. (1) An operator of an aerodrome shall provide a fence or a suitable barrier on the aerodrome —

(*a*) to prevent the entrance into the movement area, of any animals likely to be a hazard to aircraft; and

(*b*) to deter the inadvertent or premeditated access of an unauthorised person onto a non-public area of the aerodrome.

(2) An operator shall provide suitable means of protection for an aerodrome to deter the inadvertent or premeditated access of unauthorised persons into ground installations and facilities essential for the safe operation of aircraft.

(3) The fence or barrier required under subregulation (1) shall be located so as to separate the movement area and other facilities or zones on the aerodrome which are vital to the safe operation of aircraft from areas open to public use.

(4) Where greater security is needed, 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 and provision for a perimeter road along the aerodrome fencing for the use of both maintenance personnel and security patrols may be made.

(5) This regulation applies to aerodromes in categories 3,4,5,6,7,8,9 and 10.

Security lighting of aerodrome fence

228. Where it is deemed desirable 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 and the security lighting shall be located so that the ground area on both sides of the fence or barrier, particularly at access points, is illuminated.

Maintenance of safety inspection programme

229. (1) An operator shall establish and maintain a safety inspection program for the aerodrome.

(2) The safety inspection programme shall provide —

(*a*) procedures to ensure that competent aerodrome personnel execute the programme effectively; and

(*b*) a reporting system to ensure prompt correction of unsafe aerodrome conditions noted during any inspection.

Establishment of fire prevention unit and maintenance of fire prevention programme

230. (1) An operator shall establish a fire prevention unit and program with preventive measures against possible fires on the aerodrome and identify a person to maintain the fire prevention program for the aerodrome, the aerodrome buildings and training stakeholders on Basic Fire safety.

(2) The prevention measures include installation of fire detection and protection systems within the aerodrome buildings.

(3) Where an aerodrome does not have designated fire services, the operator shall arrange with the relevant local government authority or any other concerned authority to maintain a fire prevention programme for the aerodrome and to advise the operator of any dangerous conditions for rectification.

(4) An operator shall ensure that unsafe practices that may result in fire are not performed on the aerodrome or within its vicinity.

(5) Notwithstanding subregulation (3) where unsafe practices are performed during maintenance on the aerodrome, an operator shall alert the rescue and fire fighting service concerned, to be on standby for the duration of the practices.

(6) The provision of subregulation (1) shall not apply to aerodromes in categories 1, 2, H and a registered aerodrome.

Access of ground vehicles to aerodrome movement area

231. (1) An operator shall —

(*a*) limit the access of any ground vehicles used for aerodrome and aircraft operations, to the aerodrome manoeuvring area;

(*b*) provide adequate procedures for the safe and orderly access to the aerodrome and operation in the manoeuvring area of ground vehicles, where an air traffic service unit is in operation at the aerodrome, in order to ensure that each ground vehicle operating in the aerodrome manoeuvring area is controlled by —

(i) two-way radio communication between the vehicle and the air traffic service unit, and

(ii) an accompanying radio communication or an escort vehicle with adequate measures including signals or guards to control the vehicle, where the vehicle does not have a radio;

(*c*) provide adequate measures to ensure that ground vehicles operating in the aerodrome movement area are controlled by signs, pre-arranged signals or standards prescribed by the Authority, where an air traffic service unit is not in operation at the aerodrome; and

(*d*) ensure that any person who operates a ground vehicle on the aerodrome movement area is familiar with and complies with the rules and procedures for the operation of ground vehicles as determined by the Authority.

(2) An operator shall ensure that a person who has access to the aerodrome movement area wears a coloured reflective gear which shall be conspicuously displayed while on the movement area.

(3) For purposes of this regulation, "gear" includes a vest, band, overcoat, helmet, shoes and socks.

Autonomous runway incursion warning system

232. (1) An ARIWS installed at an aerodrome, shall —

(*a*) 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; and

(*b*) function and be controlled independently of any other visual system on the aerodrome.

(2) The visual aid components of an ARIWS shall be designed to conform to the relevant specifications as determined by the Authority.

(3) The failure of part or all of the ARIWS shall not interfere with normal aerodrome operations and as such provision shall be made to allow the Air Traffic Control Unit to partially or entirely shut down the system.

(4) An ARIWS may —

(*a*) be installed in conjunction with enhanced taxiway centreline markings, stop bars or runway guard lights; and

(*b*) share common sensory components of an Surface Movement Guidance and Control Systems or an Advanced Surface Movement Guidance and Control Systems, however, it operates independently of either system.

(5) The ARIWS shall be installed to be operational under all weather conditions, including low visibility.

(6) 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 Aeronautical Information Publication with the description of the aerodrome surface movement guidance and control system and markings as specified by the Authority.

Operation of aircraft exceeding certified characteristics of an aerodrome

233. (1) An operator shall not accommodate an aircraft that exceeds the certified characteristics of aerodromes unless approved by the Authority.

(2) An aerodrome operator intending to accommodate an aircraft exceeding the certified characteristics of the aerodrome shall carry out a compatibility study in collaboration with stakeholders including but not limited to an aircraft operator, Air Navigation Service providers and ground handling agencies.

(3) The operator shall assess the compatibility between the operation of the aeroplane and aerodrome infrastructure and shall develop and implement appropriate measures in order to maintain an acceptable level of safety during operations.

(4) Any information concerning alternative measures, operational procedures and operating restrictions implemented at an aerodrome arising from subregulations (2) and (3) above shall be published in the Aeronautical Information Publication.

PART XIII — *Aerodrome Maintenance*

Application of this Part

234. (1) This part shall apply only to aerodromes in categories 4, 5, 6, 7, 8, 9, 10 and to categories 2, 3 and H where deemed necessary by the Authority.

Maintenance programme

235. (1) An operator shall establish at the aerodrome, a maintenance programme, including preventive maintenance to maintain a facility in a condition that does not impair the safety, regularity and efficiency of air navigation.

(2) For purposes of this regulation —

(*a*) "facility" includes a pavement, visual aid, fencing, drainage system and building; and

(*b*) "preventive maintenance" means programmed maintenance work done to prevent failure or degradation of a facility.

(3) The design and application of the maintenance programme shall observe Human Factors principles.

Maintenance of movement and adjacent areas

236. (1) An operator shall at all times ensure that —

(*a*) the surfaces of all movement areas including pavements (runways, taxiways, and aprons) and adjacent areas are 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 Objects Debris (FOD) that might cause damage to aircraft or impair the operation of aircraft systems;

(*b*) the surface of the runway is maintained in a condition that precludes formation of harmful irregularities such as water pools and rough surfaces;

(*c*) a paved runway is be maintained in a condition so as to provide surface friction characteristics at or above the minimum friction level specified by the Authority;

(*d*) the runway surface friction characteristics for maintenance purposes is periodically measured with a continuous friction measuring device using self-wetting features and documented and that the frequency of these measurements are sufficient to determine the trend of the surface friction characteristics of the runway; and

(*e*) corrective maintenance action is 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 by the Authority.

(2) Where there is reason to believe that the drainage characteristics of a runway or portions of the runway, are poor due to slopes or depressions, then the runway friction characteristics are assessed under natural or simulated conditions that are representative of local rain and corrective maintenance action is taken.

(3) Where a taxiway is used by turbine engine aircraft, the surface of the taxiway shoulders is maintained to be free of any loose stones or other objects that may be ingested by the aircraft engines.

Removal of contaminants

237. (1) Any standing water, mud, dust, sand, oil, rubber deposits and other contaminants shall be removed from the surface of runways in use as rapidly and completely as possible to minimise accumulation.

(2) Any chemical which may have harmful effect on aircraft or pavements, or chemicals which may have toxic effects on the aerodrome environment, shall not be used.

Runway pavement overlays

238. (1) An operator shall ensure that the overlaying of runway pavements is done in accordance with these Regulations.

(2) The longitudinal slope of the temporary ramp, measured with reference to the existing runway surface or previous overlay course, shall be —

(*a*) 0.5 to 1.0 per cent for overlays up to and including 5cm in thickness; and

(*b*) not more than 0.5 per cent for overlays more than 5cm in thickness.

(3) Any overlaying shall proceed from one end of the runway toward the other end so that based on runway utilisation most aircraft operations will experience a down ramp.

(4) The entire width of the runway shall be overlaid during each work session.

(5) A runway centreline marking shall, before a runway being overlaid is returned to a temporary operational status, be provided and in addition, the location of any temporary threshold shall be identified by a 3.6m wide transverse stripe.

(6) The frequency of measurements under this regulation shall be sufficient to determine the trend of the surface friction characteristics of the runway.

(7) An operator shall ensure that, the overlay is constructed and maintained above the minimum friction level specified by the Authority.

Preventive maintenance of visual aids

239. (1) An operator shall not operate an aerodrome unless a system of preventive maintenance of visual aids is employed at the aerodrome.

(2) The system of preventive maintenance of visual aids to be employed shall ensure lighting and marking system reliability.

(3) A light shall be deemed to be unserviceable when the main beam average intensity is less than 50 per cent of the value set out in Schedule 5 to these Regulations.

(4) A light unit where the designed main beam average intensity is above the value as set out in Schedule 5 to these Regulations, the 50 per cent value shall be related to that design value.

(5) The system of preventive maintenance employed for a precision approach runway category II or III shall include at least the following checks —

(*a*) visual inspection and in-field measurement of the intensity, beam spread and orientation of lights included in the approach and runway lighting systems;

(*b*) control and measurement of the electrical characteristics of each circuitry included in the approach and runway lighting systems; and

(*c*) control of the correct functioning of light intensity settings used by air traffic control.

(6) The in-field measurements 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 set out in Schedule 5.

(7) The 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 analyse the characteristics of the individual lights.

(8) The frequency of measurement of lights for a precision approach runways categories II or III shall be based on traffic density, the local pollution level, the reliability of installed lighting equipment and the continuous assessment of the result of the in-field measurements but, in any case, shall not be less than twice a year for in-pavement lights and not less than once a year for other lights.

(9) 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 case, at least —

(*a*) 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 450m,

(ii) runway centreline lights,

(iii) runway threshold lights, and

(iv) runway edge lights;

(*b*) 90 per cent of the lights are serviceable in the touchdown zone lights;

(*c*) 85 per cent of the lights are serviceable in the approach lighting system beyond 450 m; and

(*d*) 75 per cent of the lights are serviceable in the runway end lights.

(10) The allowable per centage of unserviceable lights, in order to provide continuity of guidance shall not be permitted in such a way as to alter the basic pattern of the lighting system and 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.

(11) In relation to barrettes, crossbars and runway edge lights, lights are considered to be adjacent if located consecutively and —

(*a*) laterally in the same barrette or crossbar; or

(*b*) longitudinally in the same row of edge lights or barrettes.

(12) 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 —

(*a*) no more than two lights will remain unserviceable; and

(*b*) two adjacent lights will not remain unserviceable unless the light spacing is significantly less than that specified.

(13) The system of preventive maintenance employed for a taxiway intended for use in runway visual range conditions less than a value of 350m shall have as its objective that no two adjacent taxiway centreline lights be unserviceable.

(14) 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 case, at least 85 per cent of the lights are serviceable in each of the following —

(*a*) precision approach category I lighting system;

(*b*) runway threshold lights;
(*c*) runway edge lights; and
(*d*) runway end lights.

(15) An unserviceable light shall not, in order to provide continuity of guidance, be permitted adjacent to another unserviceable light unless the light spacing is significantly less than that provided at regulation 143 (1) (*e*) and in barrettes and crossbars, guidance is not lost by having two adjacent unserviceable lights.

(16) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions less than a value of 550m shall have as its objective that, during any period of operations, all runway lights are serviceable and that in any event at least —

(*a*) 95 per cent of the lights are serviceable in the runway centreline lights (where provided) and in the runway edge lights; and
(*b*) 75 per cent of the lights are serviceable in the runway end lights.

(17) The system of preventive maintenance employed for a runway meant for take-off in runway visual range conditions of a value of 550m 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.

(18) The appropriate authority shall, during low visibility procedures, restrict construction or maintenance activities in the proximity of aerodrome electrical systems.

(19) These Regulations shall apply to aerodromes categories 3, 4, 5, 6, 7, 8, 9, and 10 as appropriate and where deemed necessary by the Authority, category H.

Construction or maintenance activity during low visibility operations

240. An operator shall ensure that any construction or maintenance activity is not undertaken in the proximity of aerodrome electrical systems during any time during periods of low visibility operations and low visibility operations.

Works at aerodromes

241. (1) An operator shall establish procedures and precautions for aerodromes to ensure that any works carried out at an aerodrome do not endanger the safety of any aircraft operations.

(2) The procedures and precautions in subregulation (1) shall comply with guidelines as follows —

(*a*) procedures for planning and safely carrying out aerodrome works, including works that may have to be carried out at short notice;
(*b*) process for ensuring that any works safety officers have been trained in aerodrome safety;
(*c*) identifying areas of the aerodrome affected during each stage of the work;
(*d*) arrangements for telling aircraft operators and other aerodrome users of the method-of-working plan and the telephone numbers for contacting those operators and users during and after working hours;
(*e*) arrangements for communicating with air traffic control and aircraft during the carrying out of the works;
(*f*) process for complying with regulatory requirements relating to the period of notice for works;
(*g*) arrangements to address safety hazards resulting from aerodromes works;
(*h*) notification of completion of works to the Authority and other airport users; and
(*i*) promulgation of any changes to the physical characteristics and operations as a result of such works.

Application of this part

242. (1) This Part shall apply to aerodromes in categories 3, 4, 5, 6, 7, 8, 9 and 10.

(2) This part may apply to aerodromes in categories H where deemed necessary by the Authority.

Electrical power supply systems for air navigation services and facilities

243. (1) An operator shall not operate an aerodrome unless adequate primary power supply systems are made available for the safe functioning of air navigation services and facilities.

(2) The design and provision of electrical power systems for aerodrome visual and radio navigation aids shall be such that an equipment failure does not leave the pilot with inadequate visual and non-visual guidance or misleading information.

(3) The design and installation of the electrical systems shall take into consideration factors that can lead to malfunction, such as electromagnetic disturbances, line losses, power quality, among others.

(4) Where secondary power is required for air navigation services and facilities, the operator shall arrange the electric power supply connections so as to ensure that the facilities are automatically connected to the secondary power supply upon failure of the primary power supply.

(5) The provisions of subregulation (3) shall apply for non-instrument runways except that a secondary power supply for visual aids may not be provided where an emergency lighting system is provided and is capable of being deployed within 15 minutes.

(6) An operator shall provide the following aerodrome facilities with secondary power supply capable of supplying power where there is a failure of the primary power supply —

(*a*) the signalling lamp and the minimum lighting necessary to enable air traffic services personnel to carry out their duties;

(*b*) all obstacle lights which, in the opinion of the Authority are essential to ensure the safe operation of aircraft;

(*c*) approach, runway and taxiway lighting;

(*d*) meteorological equipment;

(*e*) essential security lighting, if provided;

(f) essential equipment and facilities for the aerodrome emergency agencies;

(*g*) floodlighting on a designated isolated aircraft packing position if provided; and

(*h*) illumination of apron areas over which passengers may walk.

(7) The maximum switch-over time between failure of the primary source of power and the secondary source of power for the services shall be as set out in Table S1-17 in Schedule 1.

(8) For the purpose of this regulation, "switch-over time" means 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 changeover, when the light is being operated at intensities of 25 per cent or more.

(9) The time interval between failure of the primary source of power and the complete restoration of the services required by subregulation (6) shall be as short as practicable, except that for visual aids associated with non-precision, precision approach or take-off runways the requirements set out in Table S1-17 in Schedule 1 for maximum switch-over times shall apply.

(10) Where a secondary power supply is installed, 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 set out in Table S1-17 in Schedule 1 for maximum switch-over times.

(11) A secondary power supply, capable of meeting the requirements set out in Table S1-17 in Schedule 1 for the appropriate category of precision approach runway shall be provided.

(12) An electric power supply connections to those facilities for which secondary power is required shall be arranged so that the facilities are automatically connected to the secondary power supply on failure of the primary source of power.

(13) A runway meant for take-off in runway visual range conditions less than a value of 800m, a secondary power supply capable of meeting the relevant requirements set out in Table S1-17 in Schedule 1, shall be provided.

(14) An aerodrome where the primary runway is a —

(*a*) non-precision approach runway, a secondary power supply capable of meeting the requirements set out in Table S1-17 in Schedule 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; and

(*b*) non-instrument runway, a secondary power supply capable of meeting requirements of subregulation (9) shall be provided, except that a secondary power supply for visual aids need not be provided when an emergency lighting system is provided and capable of being deployed in 15 minutes.

(15) The requirements for a secondary power supply shall be met by either of the following —

(*a*) 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

(*b*) standby power units, which are engine generators, batteries, from which electric power can be obtained.

Electrical system design and operation

244. (1) A runway meant for use in runway visual range conditions system design less than a value of 550m, the electrical systems for the power supply, lighting and control of the lighting systems included in Table S1-17 in Schedule 1, shall be designed so that an equipment failure will not leave the pilot with inadequate visual guidance or misleading information.

(2) Where the secondary power supply of an aerodrome is provided by the use of duplicate feeders, such supplies shall be physically and electrically separate so as to ensure the required level of availability and independence.

(3) 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.

Monitoring of electrical systems

245. (1) A system of monitoring shall be employed to indicate the electrical systems operational status of the lighting systems.

(2) 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 and this information shall be relayed to the air traffic service unit.

(3) Where a change in the operational status of lights has occurred, an indication may 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.

(4) A runway meant for use in runway visual range conditions less than a value of 550m, the lighting systems set out in Table S1-17 in Schedule 1, shall be monitored automatically to provide an indication when the serviceability level of any element falls below the minimum serviceability level specified by the Authority and this information shall be relayed to the maintenance crew and displayed in a prominent position.

PART XV — *Information to be Reported to Aeronautical Information Services*

Application of this Part

246. This Part shall not apply to registered categories of aerodromes.

Availability of information

247. (1) An operator shall —

(*a*) ensure that information relating to the aerodrome and its facilities, which is significant for the conduct of flights to and from the aerodrome, is available to the users of the aerodrome;

(*b*) be responsible for notifying the Aeronautical Information Services of any errors and omissions in the aeronautical information of operational significance, published in the Aeronautical Information Publication or Aeronautical Information Circular or in the NOTAM, and of any pending changes in the aerodrome or its facilities which are likely to affect this information; and

(*c*) provide information on the following for the guidance of pilots and other operators —

(i) status of licensing or certification of the aerodrome,

(ii) construction or maintenance work on or immediately adjacent to the manoeuvring area,

(iii) unserviceable portions of any part of the manoeuvring area,

(iv) the runway surface conditions when affected by water, damp, wet, water patches or flooded, as appropriate,

(v) parked aircraft or other objects on, or immediately adjacent to the taxiways,

(vi) the presence of other temporary hazards,

(vii) failure or irregular operation of any part of the aerodrome lighting system, or of the aerodrome main and secondary power supplies,

(viii) failure, irregular operation and changes in the operational status of any electronic approach or navigation aid, or aeronautical communication facility,

(ix) failures and changes in the runway visual range observer system, and

(x) any other information of operational significance.

Action required for occurrences of operational significance other than those involving electronic aids and communication facilities

248. (1) An operator shall, where any of the following conditions occur or are anticipated —

(*a*) changes in the availability of the manoeuvring area and changes in the runway declared distance; except that increases in declared distances may only be made with the approval of the Authority;

(*b*) significant changes in aerodrome lighting and other visual aids;

(*c*) presence or removal of temporary obstructions to aircraft operation in the manoeuvring area;

(*d*) presence of airborne hazards to air navigation;

(*e*) interruption, return to service, or major changes to rescue facilities and firefighting services in terms of the new category of the rescue and firefighting service available at the aerodrome; except that permanent changes to the promulgated rescue fire fighting category may only be made with the approval of the Authority;

(*f*) failure of or return to operation of hazard beacons and obstruction lights on or in the vicinity of the aerodrome;

(*g*) erection or removal of obstructions to air navigation, and erection or removal of significant obstacles in take-off, climb or approach areas;

(*h*) air displays, air races, parachute jumping, or any unusual aviation activity; and

(*i*) any other information of operational significance,

take immediate action to amend the information contained in the Aeronautical Information Circular and where necessary, promulgate the change by NOTAM through the Aeronautical Information Services using the Aeronautical Information Services address notified in the Aeronautical Information Circular.

(2) Where any of the conditions in subregulation (1) arises at short notice, an operator shall notify the Aeronautical Information Services for promulgation of a NOTAM.

(3) Where any of the conditions in subregulation (1) is intended, the operator shall make a written request to the Aeronautical Information Services, for the amendment of the Aeronautical Information Publication and Aeronautical Information Circular or for supplementary action.

Action required for occurrences that affect electronic aids and communication facilities

249. (1) An operator or a person in charge of a navigation facility shall —

(*a*) initiate NOTAM action —

(i) for the establishment or withdrawal of electronic aids to air navigation, and

(ii) for changes in the regularity or reliability of the operation of any electronic aid to air navigation or aeronautical communication facility; and

(*b*) request for the NOTAM action, or an amendment or a supplement of Aeronautical Information Publication or Aeronautical Information Circular directly from the Aeronautical Information Services or through channels established by the Authority.

Aeronautical data reporting

250. (1) An operator shall —

(*a*) provide to the Authority for promulgation, data reporting accurate aeronautical data in accordance with regulation 29;

(*b*) ensure that aerodrome related aeronautical data is adequate and accurate and that the integrity of the data is maintained and protected throughout the data process from survey or origin up to the next intended user; and

(*c*) determine and report aerodrome related aeronautical data in accordance with prescribed accuracy and integrity requirements while taking into account the established quality system procedures.

(2) Any accuracy requirements for aeronautical data shall be based upon a 95 per cent confidence level and in that respect, three types of positional data, namely, surveyed points, calculated points and declared points shall be identified.

(3) An aerodrome mapping data shall be made available to the aeronautical information services for aerodromes in categories 3, 4, 5, 6, 7, 8, 9, and 10 where safety or performance-based operations suggest possible benefits.

(4) The selection of the aerodrome mapping data features to be collected, where made available in accordance with regulation 29, shall be made with consideration of the intended applications.

(5) An aerodrome mapping data shall, where made available in accordance with regulation 29, comply with the accuracy and integrity requirements specified by the Authority.

(6) Subject to subregulation (5), the following classification and data integrity levels shall apply —

(*a*) for routine data: avoid corruption throughout the processing of the data;

(*b*) essential data: assure corruption does not occur at any stage of the entire process and may include additional processes as needed to address potential risks in the overall system architecture to further assure data integrity at this level; and

(*c*) for critical data: assure corruption does not occur at any stage of the entire process and include additional integrity assurance procedures to fully mitigate the effects of faults identified by thorough analysis of the overall system architecture as potential data integrity risks.

PART XVI — *General Provisions*

Lighting of enroute obstacles

251. (1) An owner or a person in charge of an enroute obstacle shall ensure that the enroute obstacle is fitted with medium intensity steady red light —

(*a*) positioned as close as possible to the top of the obstacle; and

(*b*) spaced as far as practicable, equally between the top lights and ground level with an interval not exceeding 33 metres, at the intermediate levels.

(2) Where any light which is required by this regulation to be displayed fails, an owner or a person in charge of an enroute obstacle shall repair or replace the light as soon as is reasonably practicable but in any case not later than 24 hours after the failure of the light.

(3) Subject to subregulation (2), an owner or a person in charge of an enroute obstacle shall ensure that the lights required to be fitted by this regulation are displayed.

(4) An owner or a person in charge of an enroute obstacle shall ensure that sufficient light is fitted and arranged at each level of an obstacle where lights are required to be fitted, so as to show, when displayed, in all directions.

(5) The Authority may direct that an enroute obstacle is fitted with additional lights which shall be displayed in such positions and at such times as the Authority may specify.

(6) For the purpose of this regulation —

(*a*) "enroute obstacle" means any building, structure or erection, which is 100m or more, above ground level, except a building, structure or erection, which is in the vicinity of an aerodrome; and

(*b*) "medium intensity steady light" means a light, which complies with the characteristics described for a medium intensity type C light.

Land use in the vicinity of aerodrome

252. Any land use practices and activities in the vicinity of an aerodrome shall conform to the guidelines prescribed by the Authority.

Aeronautical studies

253. The Authority shall, where an aerodrome does not meet the requirements specified in these Regulations, cause an aeronautical study to be undertaken by the operator or proponent, the conditions and procedures that are necessary to ensure a level of safety equivalent to that established by the relevant prescribed standard.

254. Any deviation from these Regulations shall be set out in an endorsement on the aerodrome manual. Deviations from standards

255. The Authority shall — Safety inspections and audits

(*a*) carry out such safety inspections and audits as may be necessary for the purpose of verifying the validity of an application for construction and operation of an aerodrome; and

(*b*) carry out safety inspections and audits of any document and records of an operator, which may be necessary to determine compliance with the appropriate requirements of these Regulations.

256. (1) A person shall not operate, or cause or permit any other person to operate, an aerodrome unless there is an insurance policy in force in relation to that aerodrome. Obligation to insure aerodrome

(2) An insurance policy shall be of no effect for the purposes of this regulation unless —

(*a*) there has been issued by the insurer to the operator a certificate in relation to the insurance policy in such form and containing such particulars as the Authority may specify; and

(*b*) the operator has sent, or caused to be sent, to the Authority a copy of the certificate provided for under paragraph (*a*).

(3) Where the insurance policy, ceases at any time or for any reason to have effect, any licence or certificate issued under these Regulations in respect of the aerodrome to which the insurance policy relates shall be deemed to have been revoked.

(4) A licence or certificate shall not be renewed or amended under these Regulations in relation to the operation of an aerodrome where the insurance policy has expired.

(5) For purposes of this regulation "insurance policy" means a policy which insures the operator of an aerodrome against liability in respect of loss and damage caused to any person or property at that aerodrome and which complies with such conditions as may be specified by the Authority.

(6) This regulation shall not apply to aerodromes in categories 1, 2 and registered unless required by the Authority.

257. The following shall be the minimum specifications for licenced aerodromes — Minimum specifications for licensed aerodromes

(*a*) runway length: the minimum length shall be 1200m;

(*b*) runway width: the minimum width shall be 18m;

(*c*) runway slopes: maximum longitudinal and lateral slopes shall be 1:50 (2 per cent);

(*d*) sight distance: an unobstructed line of the sight must be available from any point 2m above the runway to all other points 2m above the runway within a sight distance of at least half the runway length;

(*e*) strip length: the strip shall extend 30m beyond the end of the runway at either end;

(*f*) strip width: the strip shall extend 30m either side of the runway centreline;

(*g*) slopes on strip: the maximum permissible slopes are: - Longitudinal 2 per cent (1:50), Lateral per cent (1:33), except that the first 3 m out from the runway edge may be as great as 5 per cent (1:20) to facilitate drainage;

(*h*) surface, runway and strip: it should be possible to drive a vehicle at 80kp/hr over the runway and onto the strip at 50kp/hr without undue shock to the vehicle; and

(*i*) take-off and Approach Surface: a clear 5 per cent (1:20) slope must be available, this slope originates from the end of runway or the stop way, in plain view it is 60m wide at the end of the stop way (or width of the strip) and diverges at 10 per cent (1:10) for a distance of 1600m along the extended runway centre line, where overhead lines protrude through a slope of 1 per cent (1:100) and are not shielded by trees, they will be marked to the satisfaction of the Authority.

(2) An overhead line shall not protrude through a 1 per cent slope where night flying is anticipated.

(3) A transitional surface, no obstruction shall protrude through a slope of 20 per cent (1:5) which originates from edge of the strip and the edge of the approach/take-off surface, the upper limit of this slope is 45m above the elevation of the geometric centre of the aerodrome.

(4) An inner horizontal surface, there will be no obstruction which protrudes through a horizontal plane 45m above the elevation at the geometric centre of the aerodrome in the area within 2000m from any point on the runway.

(5) A conical surface, no obstruction shall protrude through a conical surface sloping upwards and outwards from the periphery of the horizontal surface at uniform rate (5 per cent slope) to 80m above the aerodrome elevation at 2700m distance from the runway.

(6) A standard windsock shall, at the least be provided, the height and dimensions of the windsock shall be as set out in Schedule 9.

(7) A runway marker shall include threshold markers and shall be provided as set out in Schedule 9.

(8) An aircraft parking area shall be provided outside the area and sufficient in size to park the maximum number of aircraft to be parked at any one time.

(9) An aerodrome name circle shall be read from west to east and the size of letters to be such that they are easily readable at a height of 2000 feet above the aerodrome level.

(10) Any fire fighting equipment shall include, at least at least 2 x 9kg dry chemical powder fire extinguisher, four buckets of sand and one hand axe.

(11) The fire extinguishers and the hand axe referred in subregulation (10) shall be housed in a suitable shelter near the parking area.

(12 The shelter referred to in subregulation (11) shall at all times, during the aerodrome hours of operation, be available and accessible to persons who may have to make use of the firefighting equipment.

Aerodrome layout plan

258. An airport operator shall submit an aerodrome layout plan indicating the location and dimensions of the following —

(*a*) basic strip with dimensions;

(*b*) runway with dimensions (1200m X 18m minimum);

(*c*) windsock location and height;

(*d*) name circle;

(*e*) obstructions in the strip area;

(*f*) give their position and height;

(*g*) airfield fencing;

(*h*) any obstructions in the approach or take off areas such as trees, hills, buildings;

(*i*) give their position (and height) relative to the nearest runway threshold;
(*j*) parking areas; and
(*k*) access roads.

Heliport operations

259. The design and operation of heliports shall meet the specifications determined by the Authority.

Enforcement

260. (1) The Authority shall take —
(*a*) enforcement action on any aerodrome or regulated entity that fails to comply with the provisions of these Regulations; and
(*b*) necessary action to preserve safety where an undesirable condition has been detected.

(2) The action referred to in subregulation (1) may include in the case of —
(*a*) an aerodrome or regulated entity, imposition of operating restrictions until such a time that the existing undesirable condition has been resolved; or
(*b*) a licensed personnel, require that the individual does not exercise the privileges of the license until such a time that the undesirable condition has been resolved.

(3) The inspectors of the Authority shall, in carrying out the enforcement actions pursuant to the provisions of subregulation (1), invoke the powers with due care and act in good faith in the interest of preserving safety.

PART XVII — *Miscellaneous Provisions*

Contravention of Regulations

261. The Authority may cancel or suspend the certificate of a person who contravenes any provision of these Regulations.

Appeals to the Tribunal

262. A person who is aggrieved with the decision of the Authority under these Regulations may within 21 days appeal to the Appeals Tribunal.

Offences

263. (1) A person who contravenes any provision of these Regulations commits an offence and upon conviction is liable to a fine of not more than P5 000 000 or to imprisonment for a term not more than six months or to both, and in a case of a continuing offence shall be liable to a fine of not more than P2 000 000.

(2) Where it is proved that an act or omission of any person, which would otherwise have been a contravention by that person of a provision of these Regulations, any orders or notices made thereunder was due to any cause not avoidable by the exercise of reasonable care by that person, the act or omission shall be deemed not to be a contravention by that person of that provision.

Revocation

264. The Civil Aviation (Aerodromes) Regulations, 2012 are hereby revoked.

SCHEDULES

SCHEDULE 1

(Reg. 9 (3), 41 (1), 68 (9), 72 (2), 73 (6), (7), (8), 79 (1), 81 (1), 82, 87 (3), (6), 88 (2), 89 (4), 90 (2), (3), (5),100 (3), 104 (1), (6), (7), 105 (1), (3), 106 (5), (6), (11), (12), 107 (2), (3), 113 (2), (3), (7), 119 (7), 120 (10), (14), (16), (20), (25), (26), 134 (2), 136 (6), 137 (3), 139 (1), 146 (2), 159 (2), 168 (10), 172 (2), 181 (1), 183 (3), 185 (2), 188 (2), (4), (5), 189 (2), 198 (3), 200 (2), 210 (1), 211 (1), (7), (18), (19), 212 (1), (2), 214 (2), (4), 218, 225 (1), (2), 243 (7), (9), (10), (11), (12), (14), 244 (1), 245 (4))

Figures and Tables

Figures

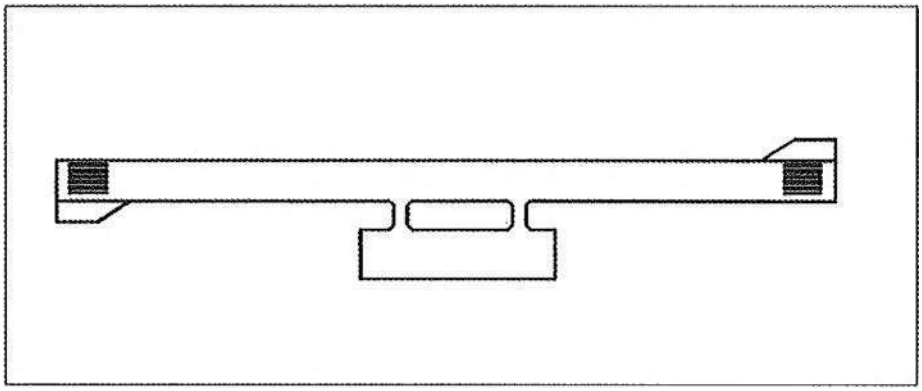


Figure S1-1. Typical turn pad

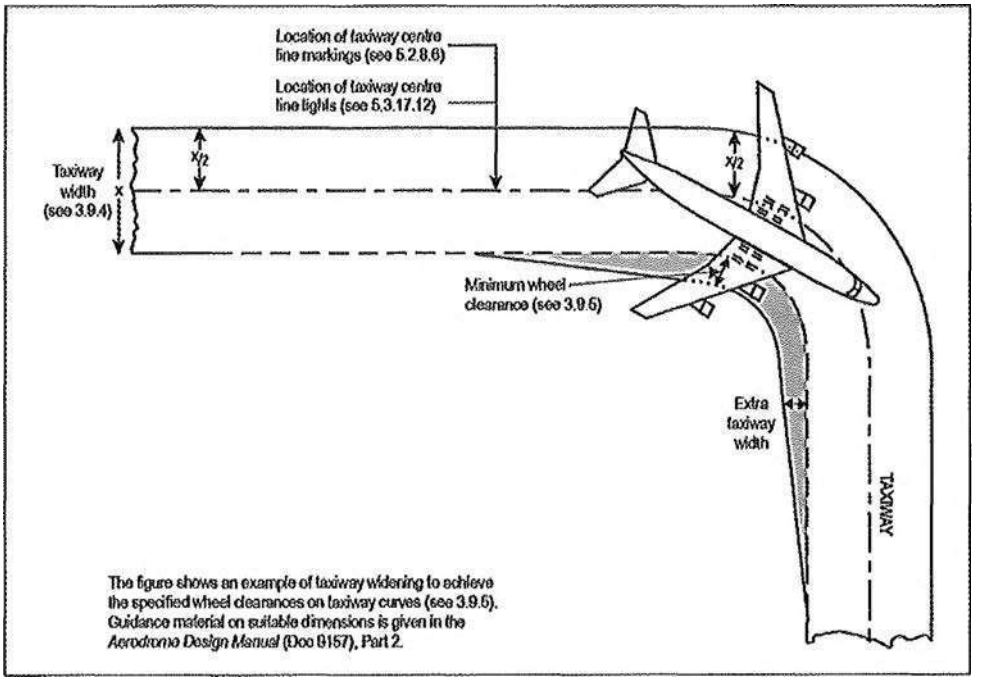


Figure S1-2. Taxiway curve

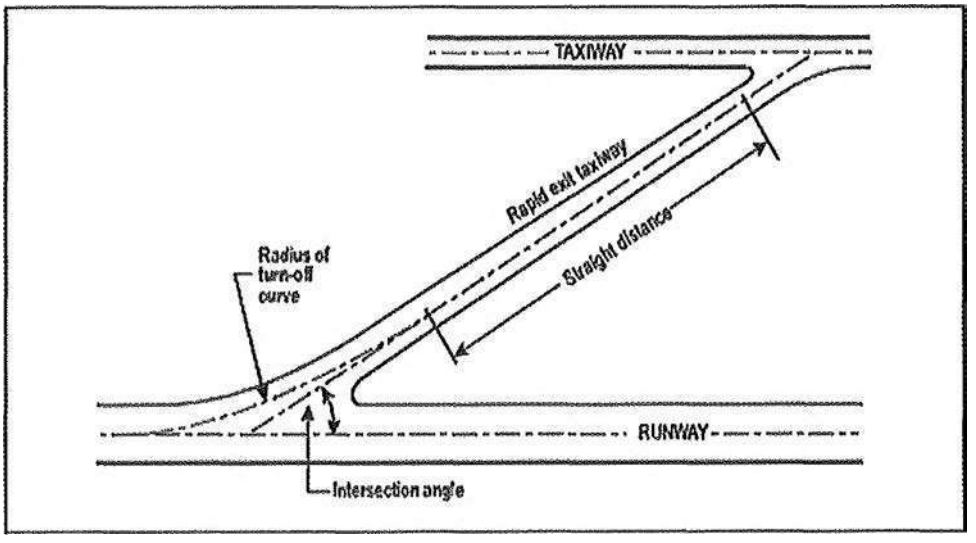


Figure S1-3 Rapid exit taxiway

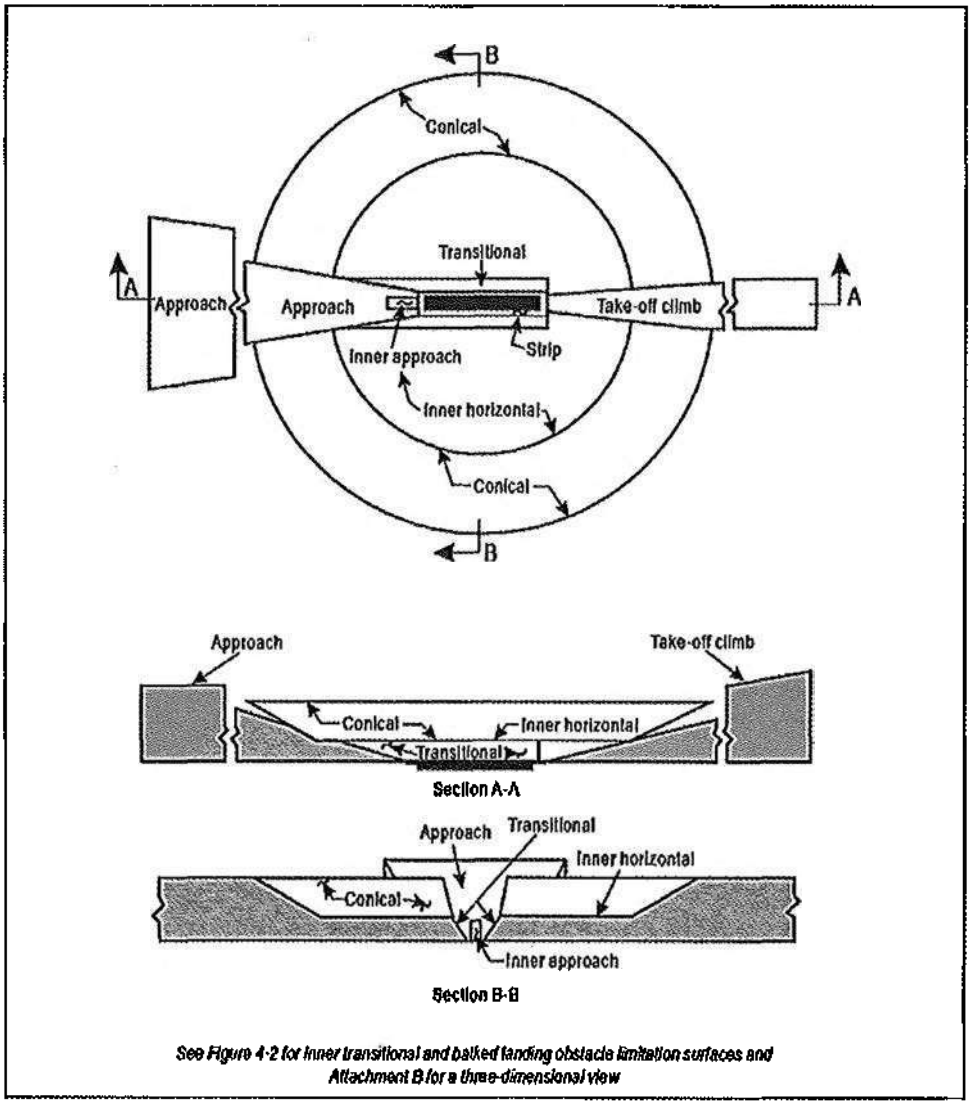


Figure S1-4. Obstacle Limitation Surfac

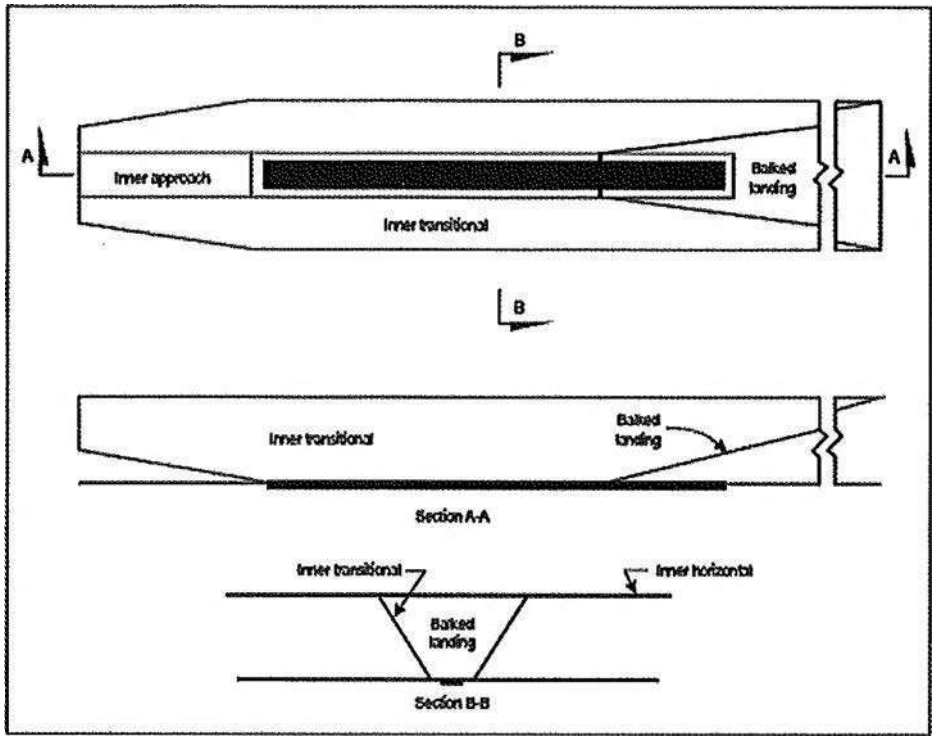


Figure S1-5. Inner approach, inner transitional and balked landing obstacle limitation

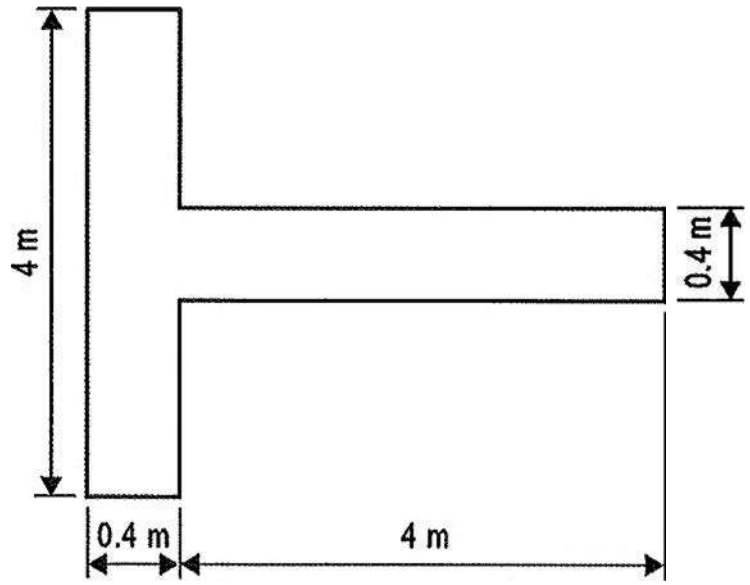


Figure S1-6 Landing direction indicator

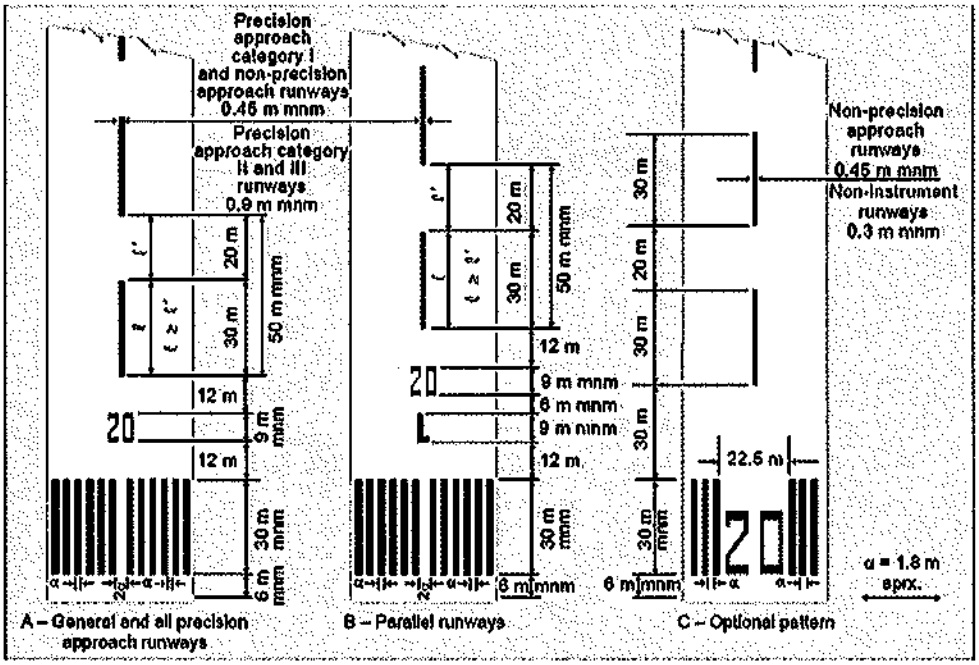


Figure S1-7. Runway designation, centre line and threshold markings

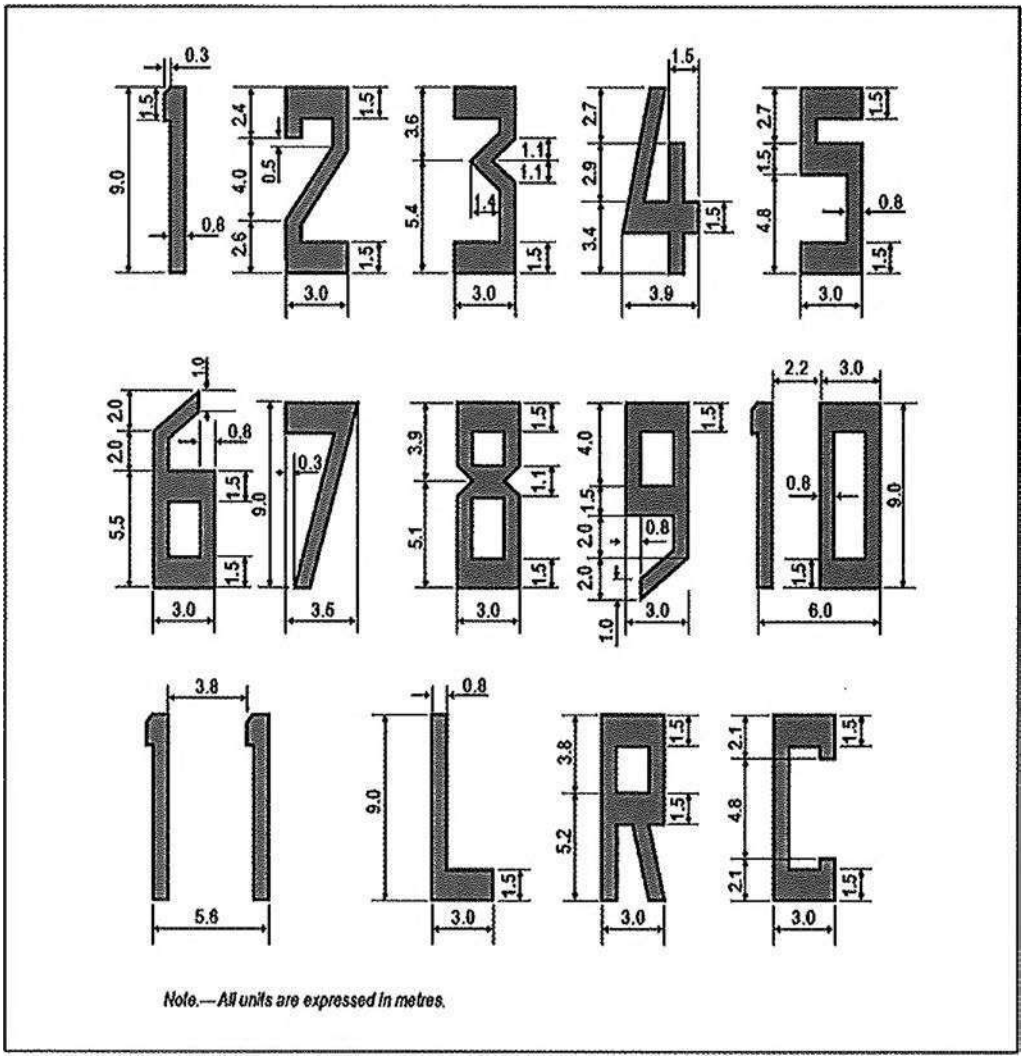


Figure S1-8. Form and proportions of numbers and letters for runway designation

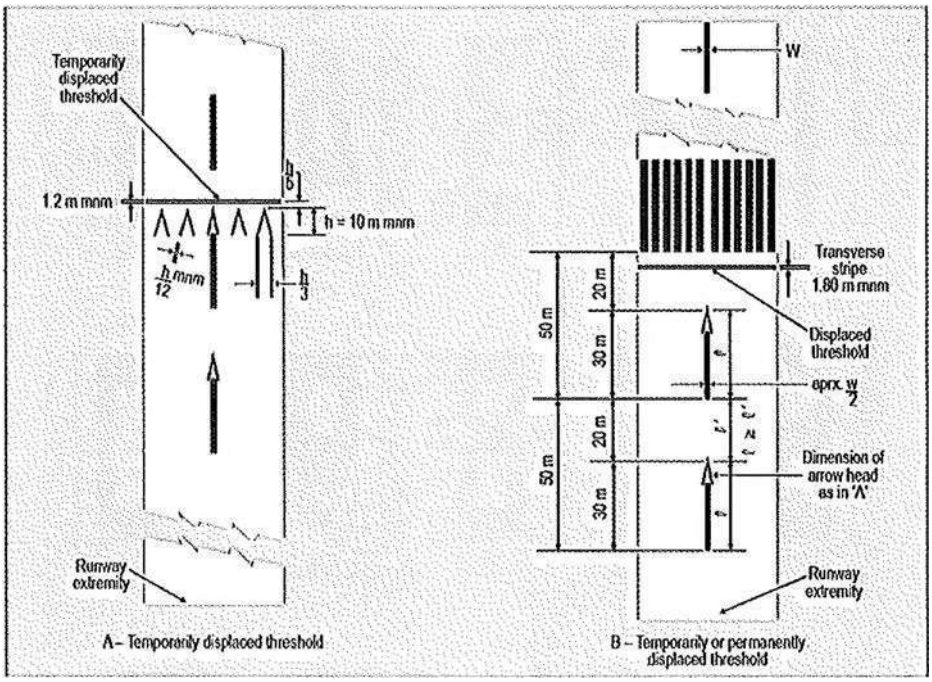


Figure S1-9. Displaced threshold

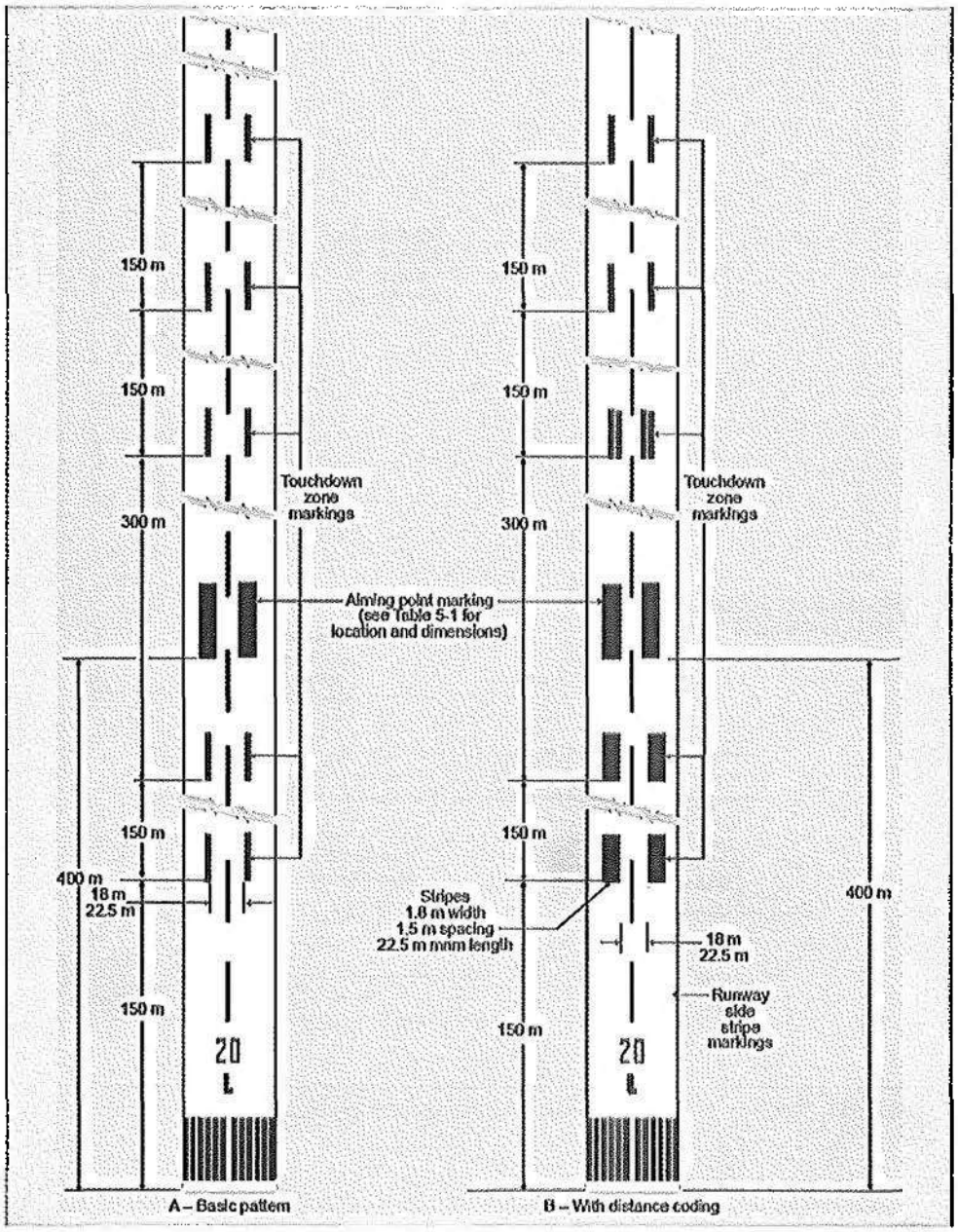


Figure S1-10. Aiming point and touchdown zone markings (illustrated for a runway with a length of 2 400 m or more)

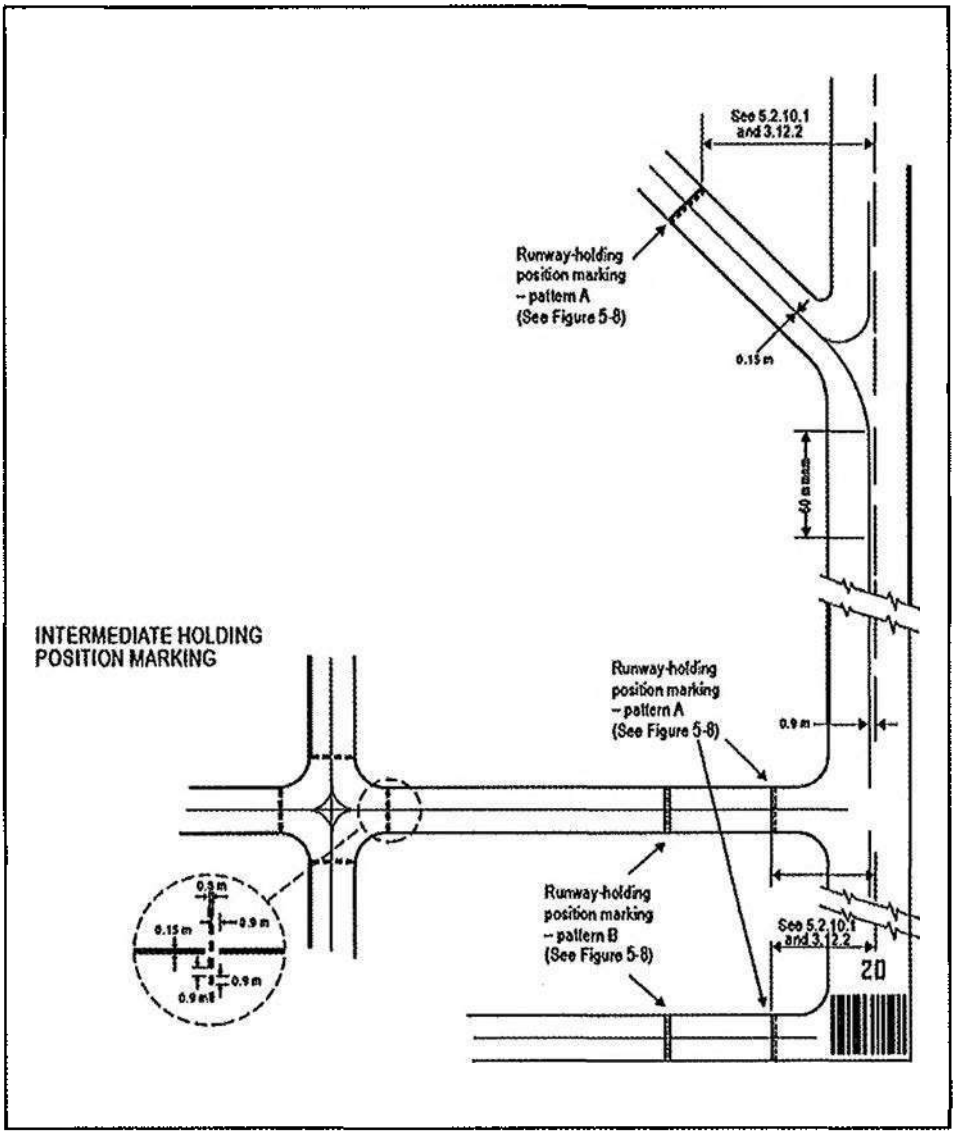


Figure S1-11. Taxiway markings (shown with basic runway markings)

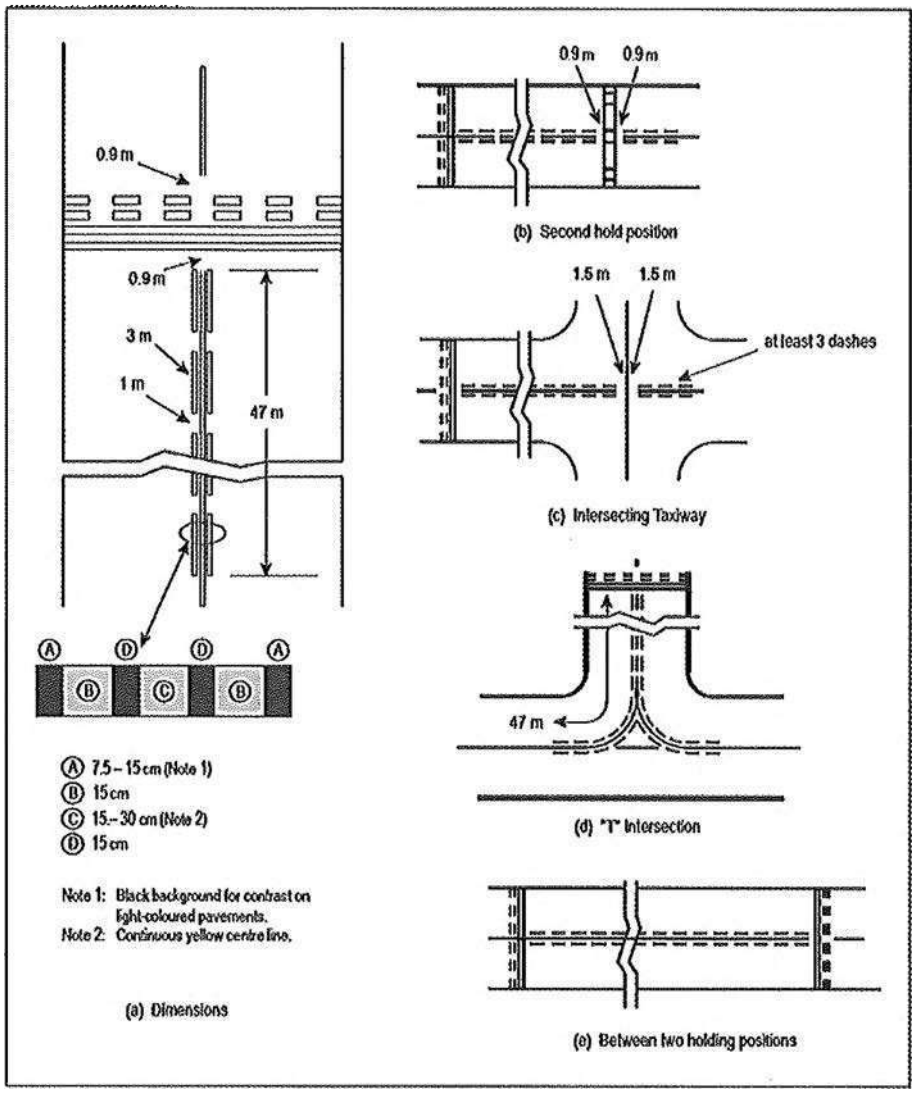


Figure S1-12. Enhanced taxiway centre line marking

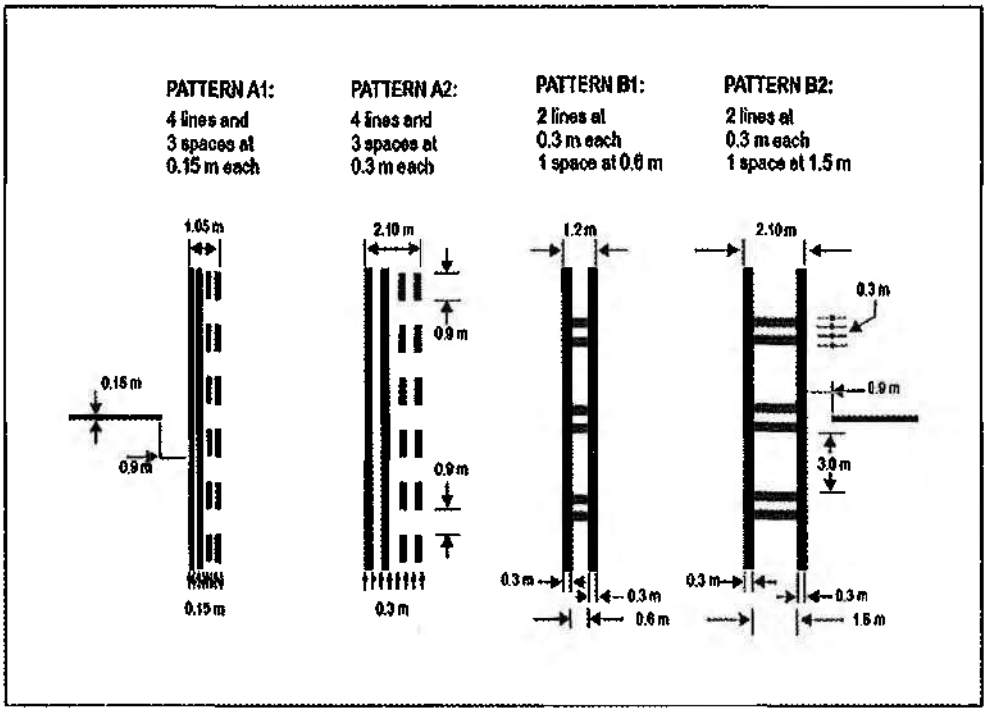


Figure S1-13. Runway-holding position markings

Note. — Patterns A1 and B1 are no longer valid after 2026.

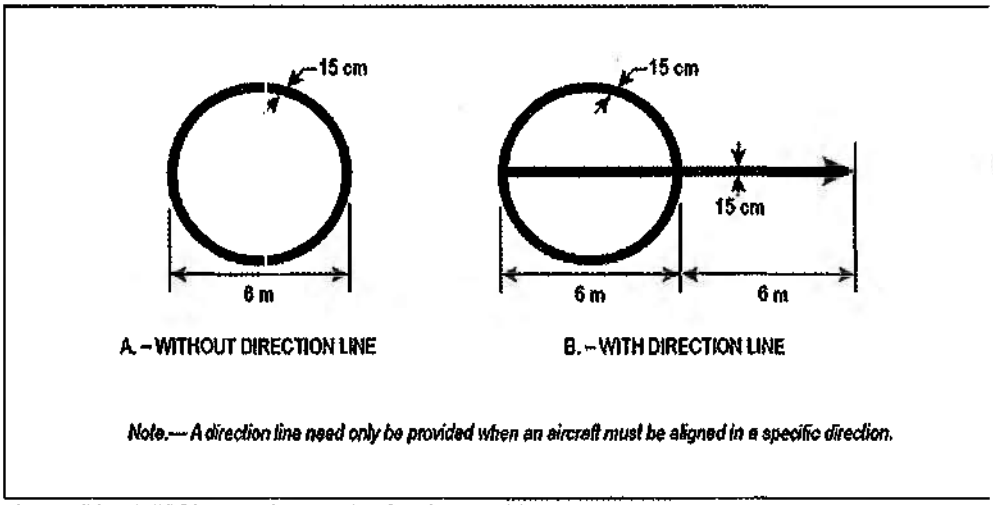
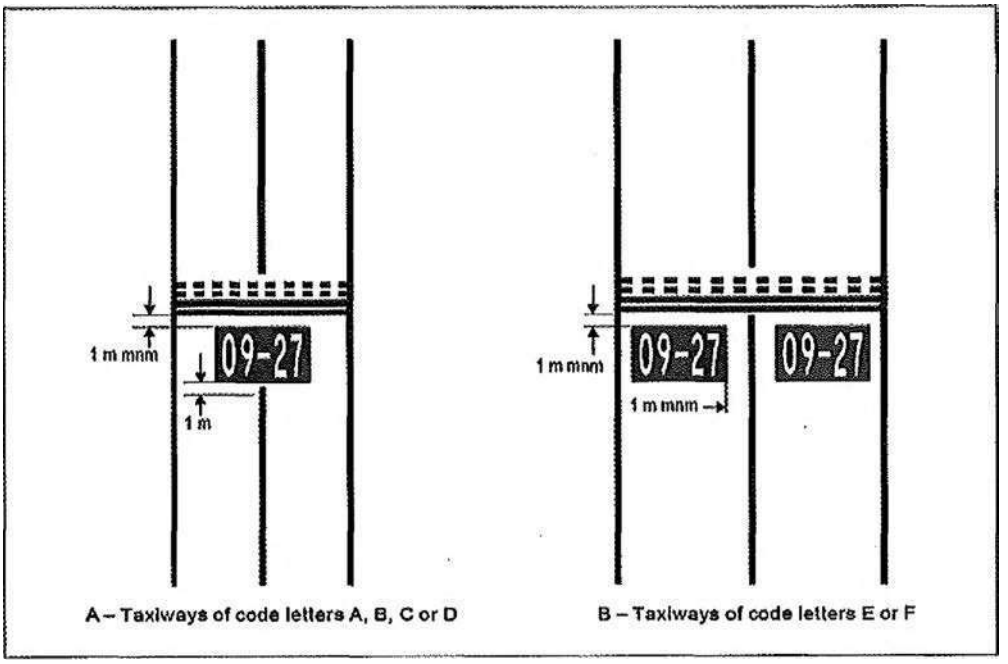


Figure S1-14. VOR aerodrome checkpoint marking



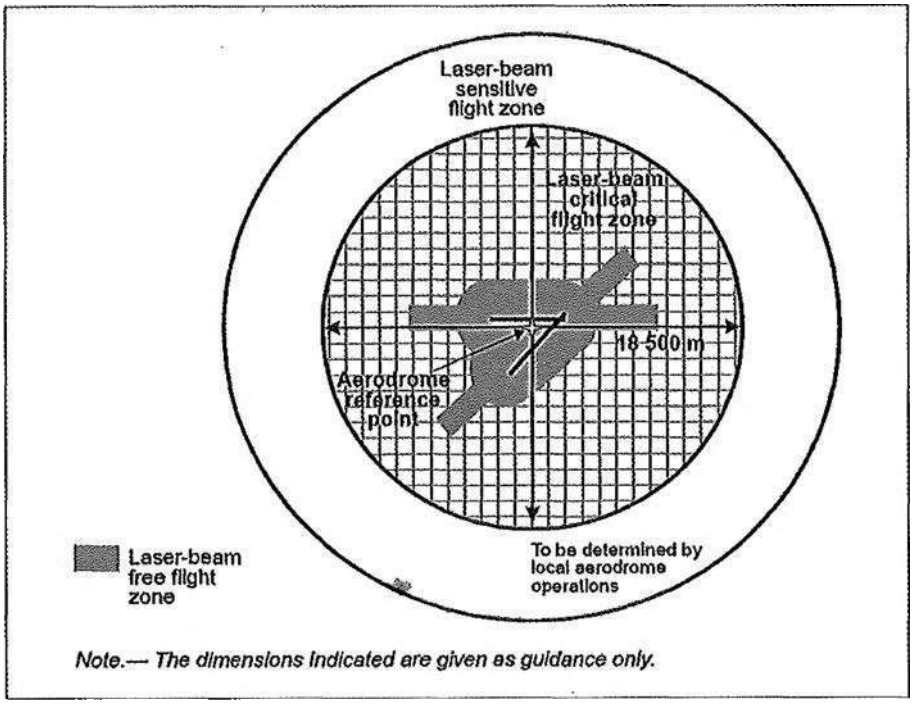


Figure S1-16. Protected flight zones

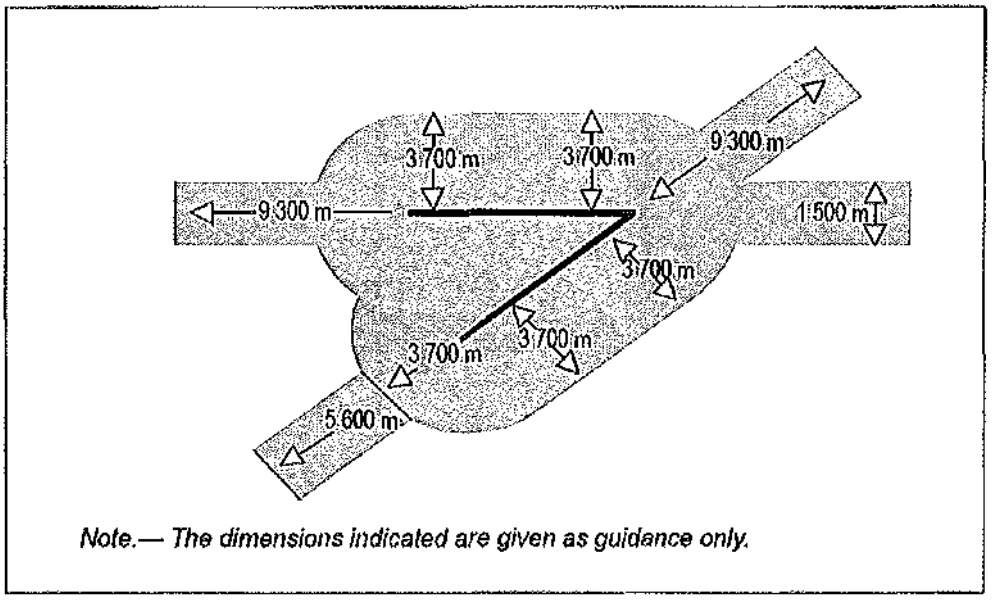


Figure S1-17. Multiple runway laser-beam free flight zone

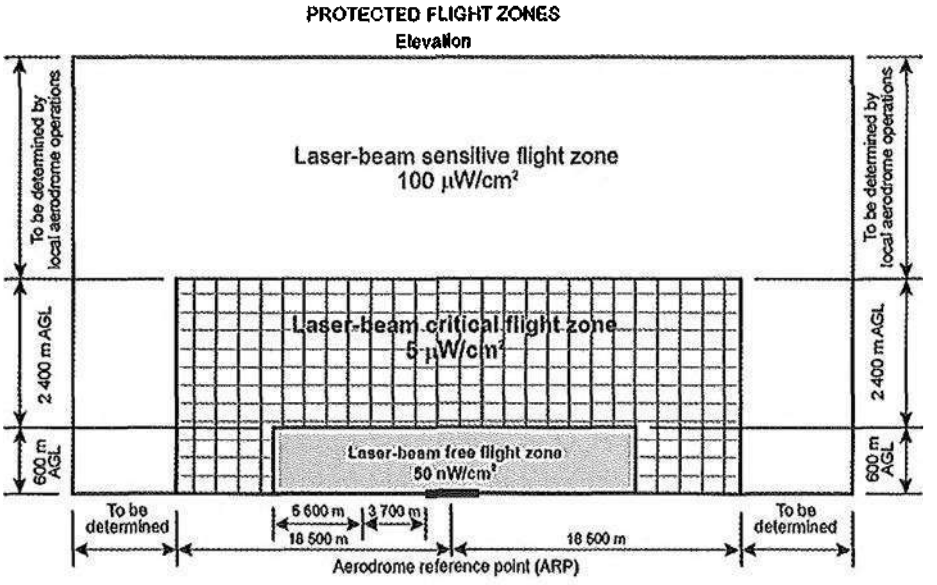


Figure S1-18. Protected flight zones with indication of maximum irradiance levels for visible laser beams

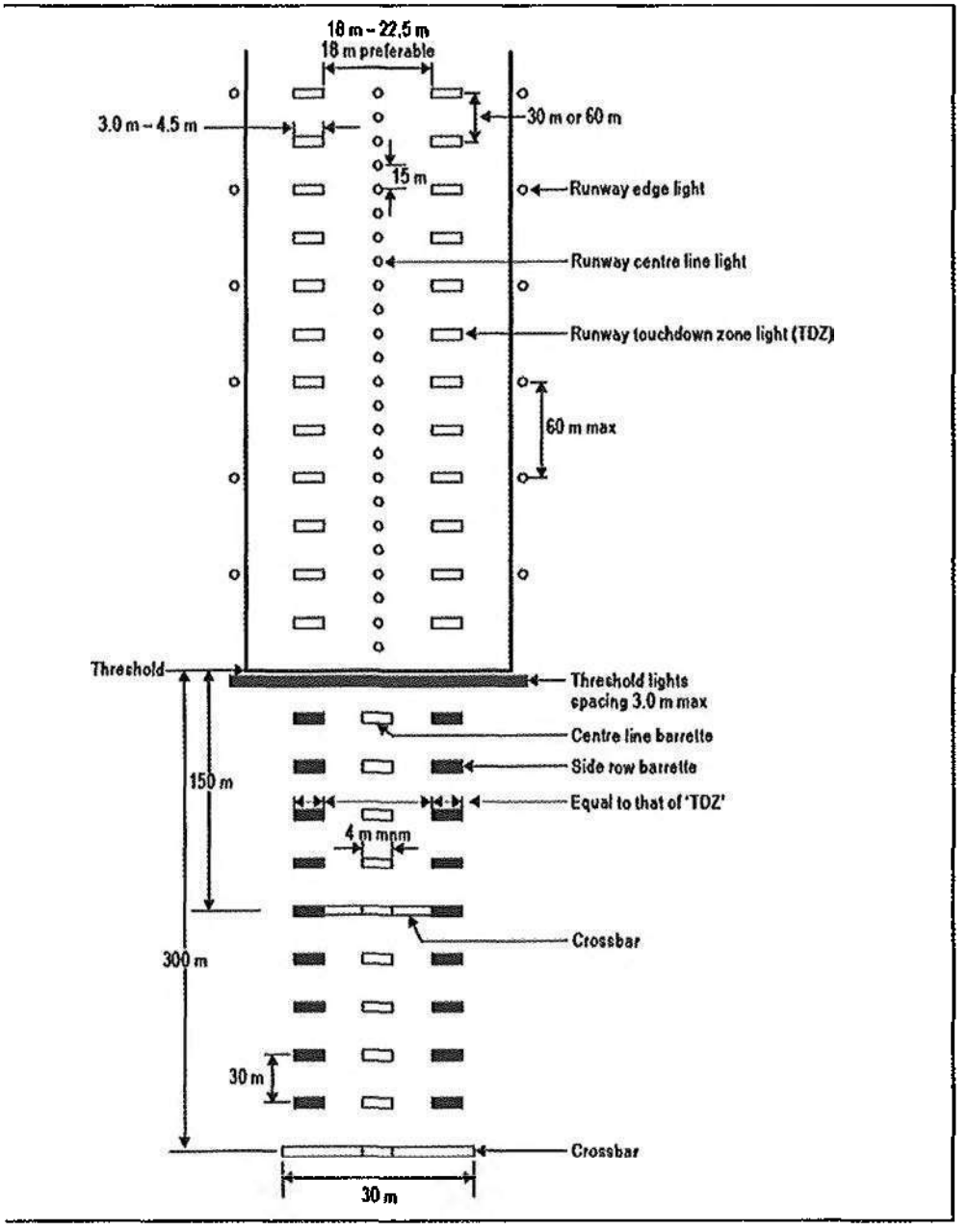


Figure S1-19. Inner 300m approach and runway lighting for precision approach runways, categories II and III

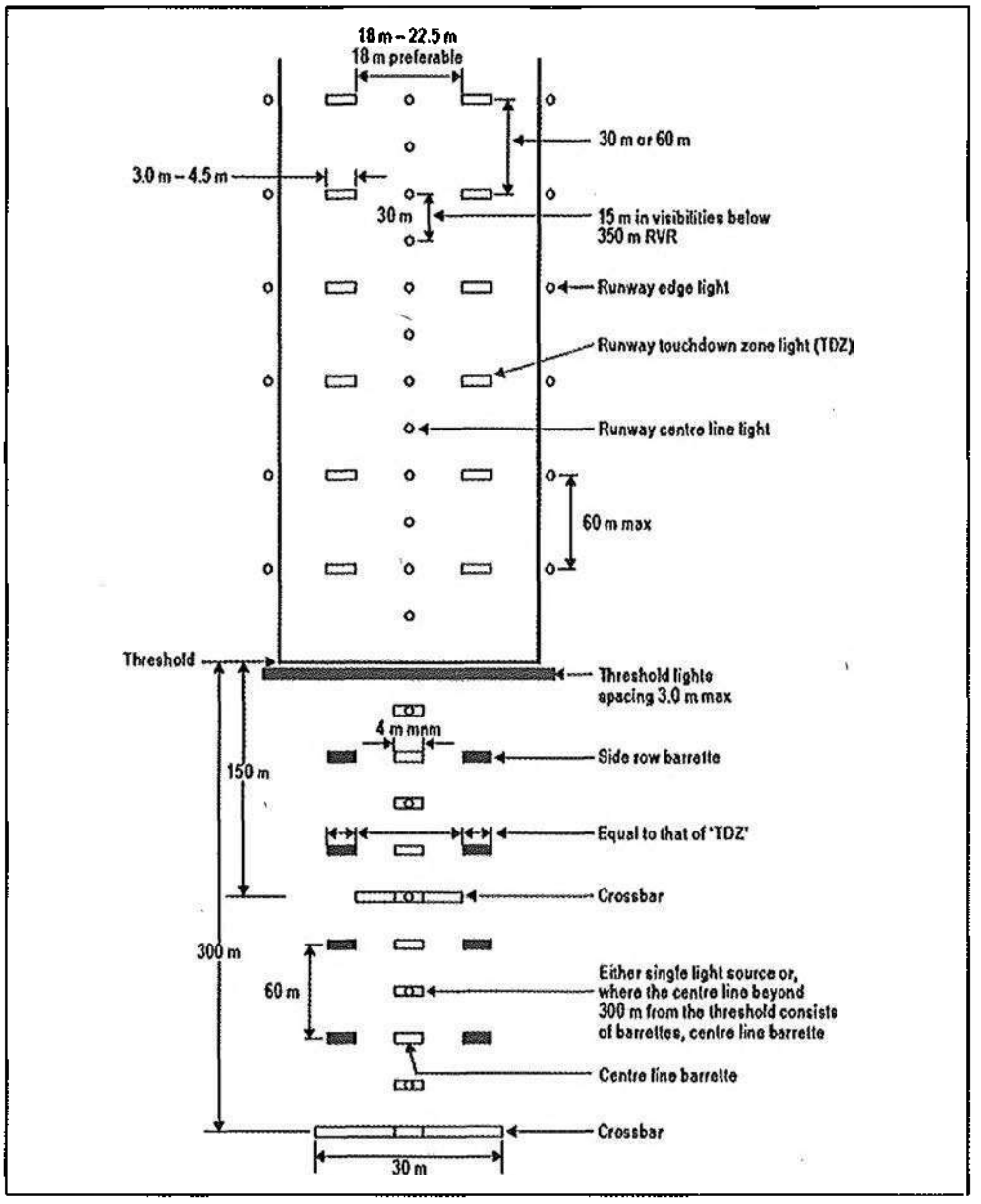


Figure S1-20. Inner 300m approach and runway lighting for precision approach runways, categories II and III, where the serviceability levels of the lights specified as maintenance objectives in part XIII of these regulations