CIVIL AVIATION AUTHORITY OF FIJI

STANDARDS DOCUMENT

Aerodrome Operational Services, Equipment And Installations

APPENDIX 9

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Contents

AERODROME OPERATIONAL SERVICES, EQUIPMENT AND INSTALLATIONS

1.0 INTRODUCTION

1.1 This appendix expands on the requirements pertaining to aerodrome operational services, equipment and installations.

2.0 AERODROME EMERGENCY PLANNING

Introductory Note. — Aerodrome emergency planning is the process of preparing an aerodrome to cope with an emergency occurring at the aerodrome or in its vicinity. The objective of aerodrome emergency planning is to minimize the effects of an emergency, particularly in respect of saving lives and maintaining aircraft operations. The aerodrome emergency plan sets forth the procedures for coordinating the response of different aerodrome agencies (or services) and of those agencies in the surrounding community that could be of assistance in responding to the emergency. Additional guidance material to assist the appropriate authority in establishing aerodrome emergency planning is given in the Airport Services Manual (Doc 9137), Part 7.

2.1 An aerodrome emergency plan shall be established at an aerodrome, commensurate with the aircraft operations and activities conducted at the aerodrome.

2.2 The aerodrome emergency plan shall provide for the coordination of the actions to be taken in an emergency occurring at an aerodrome or in its vicinity.

Note 1. — Examples of emergencies; aircraft emergencies, sabotage including bomb threats, unlawfully seized aircraft, dangerous goods occurrences, building fires, natural disaster and public health emergencies.

Note 2. — Examples of public health emergencies are increased risk of travellers or cargo spreading a serious communicable disease internationally through air transport and severe outbreak of a communicable disease potentially affecting a large proportion of aerodrome staff.

2.3 The plan shall coordinate the response or participation of all existing agencies which, in the opinion of the appropriate authority, could be of assistance in responding to an emergency.

Note 1. — Examples of agencies are:
a. on the aerodrome: air traffic control units, rescue and firefighting services, aerodrome administration, medical and ambulance services, aircraft operators, security services, and police;
b. off the aerodrome: fire departments, police, health authorities (including medical, ambulance, hospital and public health services), military, and harbour patrol or coast guard.

Note 2. — Public health services include planning to minimize adverse effects to the community from health-related events and deal with population health issues rather than provision of health services to individuals.

2.4 The plan should provide for cooperation and coordination with the rescue coordination centre, as necessary.

2.5 The aerodrome emergency plan document should include at least the following:

a) types of emergencies planned for;

b) agencies involved in the plan;

c) responsibility and role of each agency, the emergency operations centre and the command post, for each type of emergency;

d) information on names and telephone numbers of offices or people to be contacted in the case of a particular emergency; and

e) a grid map of the aerodrome and its immediate vicinity.

2.6 The plan shall observe Human Factors principles to ensure optimum response by all existing agencies participating in emergency operations.

Note. — Refer to Human Factors Training Manual (Doc 9683) for guidance on Human Factors principles.

Emergency operations centre and command post

2.7 A fixed emergency operations centre and a mobile command post, commensurate with the aerodrome operations, should be available for use during an emergency.

2.8 The emergency operations centre should be a part of the aerodrome facilities and should be responsible for the overall coordination and general direction of the response to an emergency.

2.9 The command post should be a facility capable of being moved rapidly to the site of an emergency, when required, and should undertake the local coordination of those agencies responding to the emergency.

2.10 A person should be assigned to assume control of the emergency operations centre and, when appropriate, another person the command post.

Communication system

2.11 Adequate communication systems linking the command post, where one is provided, and the emergency operations centre with each other and with the participating agencies shall be provided in accordance with the plan and consistent with the particular requirements of the aerodrome.

Aerodrome emergency exercise

2.12 The plan shall contain procedures for periodic testing of the adequacy of the plan and for reviewing the results in order to improve its effectiveness.

Note. — The plan includes all participating agencies and associated equipment.

2.13 The plan shall be tested by conducting:

a) a full-scale aerodrome emergency exercise at intervals not exceeding two years and partial emergency exercises in the intermediate year to ensure that any deficiencies identified during the full-scale aerodrome emergency exercise have been corrected and that aerodrome personnel are refreshed on aerodrome emergency procedures; or
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; such exercises or actual emergency.
c) where the aerodrome is certified for night use, alternate full-scale exercises shall be held during the hours of darkness.

Note1. The purpose of a full-scale exercise is to ensure the adequacy of the plan to cope with different types of emergencies. The purpose of a partial exercise is to ensure the adequacy of the response to individual participating agencies and components of the plan, such as the communications system. The purpose of modular tests is to enable concentrated effort on specific components of established emergency plans.

Emergencies in difficult environments

2.14 The plan shall include the ready availability of, and coordination with, appropriate specialist rescue services to be able to respond to emergencies where an aerodrome is located close to water and/or swampy areas and where a significant portion of approach or departure operations takes place over these areas.

2.15 At those aerodromes located close to water and/or swampy areas, or difficult terrain, the aerodrome emergency plan should include the establishment, testing and assessment at regular intervals of a predetermined response for the specialist rescue services.

2.16 An assessment of the approach and departure areas within 1000m of the runway threshold should be carried out to determine and implement options for intervention.

Note. — Guidance material on assessing approach and departure areas within 1000m of runway thresholds is contained in Chapter 13 of the Airport Services Manual (Doc 9137), Part 1.

3.0 RESCUE AND FIREFIGHTING

Introductory Note. — The principal objective of a rescue and firefighting service is to save lives in the event of an aircraft accident or incident occurring at, or in the immediate vicinity of, an aerodrome. The rescue and firefighting service is provided to create and maintain survivable conditions, to provide egress routes for occupants and to initiate the rescue of those occupants unable to make their escape without direct aid. The rescue may require the use of equipment and personnel other than those assessed primarily for rescue and firefighting purposes.

The most important factors bearing on effective rescue in a survivable aircraft accident are: the training received, the effectiveness of the equipment and the speed with which personnel and equipment designated for rescue and firefighting purposes can be put into use.

Requirements to combat building and fuel farm fires, or to deal with foaming of runways, are not taken into account.

Application

3.1 Rescue and firefighting equipment and services shall be provided at an aerodrome.

Note. — Public or private organizations, suitably located and equipped, may be designated to provide the rescue and firefighting service. It is intended that the fire station housing these organizations be normally located on the aerodrome, although an off-aerodrome location is not precluded provided the response time can be met.

3.2 Where an aerodrome is located close to water/swampy areas, or difficult terrain, and where a significant portion of approach or departure operations takes place over these areas, specialist rescue services and firefighting equipment appropriate to the hazard and risk shall be available.

Note 1. — Although special firefighting equipment need not be provided for water areas; this does not prevent the provision of such equipment if it would be of practical use, such as when the areas concerned include reefs or islands.

Note 2. — The objective is to plan and deploy the necessary life-saving flotation equipment as expeditiously as possible in a number commensurate with the largest aeroplane normally using the aerodrome.

Note 3. — Additional guidance is available in Chapter 13 of the Airport Services Manual (Doc 9137), Part 1.

Level of protection to be provided

3.3 The level of protection provided at an aerodrome for rescue and firefighting shall be equal to the aerodrome category determined using the principles in Chapter 4 section 4.1 of this SD-AD.

Note1. — Either a take-off or a landing constitutes a movement.

Note 2. — Guidance for categorizing aerodromes, including those for all-cargo aircraft operations, for rescue and firefighting purposes is given in the Airport Services Manual (Doc 9137), Part 1,

Note 3. — Guidance on training of personnel, rescue equipment for difficult environments and other facilities and services for rescue and firefighting is given in Attachment A, Section 18, and in the Airport Services Manual (Doc 9137), Part 1.

3.4 Both principal and complementary agents *should* normally be provided at an aerodrome.

Note -refer to the Airport Services Manual (Doc 9137) Part 1 for detailed descriptions of the agents.

3.5 The principal extinguishing agent *should* be:

a) a foam meeting the minimum performance level A; or
b) a foam meeting the minimum performance level B; or
c) a foam meeting the minimum performance level C; or
d) a combination of these agents;

except that the principal extinguishing agent for aerodromes in categories 1 to 3 *should* preferably meet a performance level B or C foam.

Note; information on the required physical properties and fire extinguishing performance criteria needed for a foam to achieve an acceptable performance level A, B or C rating is given in the Airport Services Manual (Doc 9137), Part 1.

3.6 The complementary extinguishing agent *should* be a dry chemical powder suitable for extinguishing hydrocarbon fires.

Note 1. — When selecting dry chemical powders for use with foam, care must be exercised to ensure compatibility.

Note 2. —Alternate complementary agents having equivalent firefighting capability may be utilized. Additional information on extinguishing agents is given in the Airport Services Manual (Doc 9137), Part 1.

3.7 The amounts of water for foam production and the complementary agents to be provided on the rescue and firefighting vehicles shall be in accordance with the aerodrome category determined under Chapter 4 section 4.1 and Table 2 of this SD-AD, except that for aerodrome categories 1 and 2, up to 100 per cent of the water may be substituted with complementary agents.

For the purpose of agent substitution, 1kg of complementary agent shall be taken as equivalent to 1.0L of water for production of a foam meeting performance level A.

Note 1. — The amounts of water specified for foam production are predicated on an application rate of 8.2L/min/m^2 for a foam meeting performance level A, 5.5L/min/m^2 for a foam meeting performance level B and 3.75L/min/m^2 for a foam meeting performance level C.

Note 2. — When any other complementary agent is used, the substitution ratios need to be checked.

3.8 At aerodromes where operations by aeroplanes larger than the average size in a given category are planned, the quantities of water shall be recalculated and the amount of water for foam production and the discharge rates for foam solution shall be increased accordingly.

Note. — Guidance on the determination of quantities of water and discharge rates based on the largest overall length of aeroplane in a given category is available in Chapter 2 of the Airport Services Manual (Doc 9137), Part 1.

3.9 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.

3.10 The amount of foam concentrate provided on a vehicle *should* be sufficient to produce at least two loads of foam solution.

3.11 Supplementary water supplies, for the expeditious replenishment of rescue and firefighting vehicles at the scene of an aircraft accident, *should* be provided.

3.12 When a combination of different performance level foams are provided at an aerodrome, the total amount of water to be provided for foam production *should* be calculated for each foam type and the distribution of these quantities *should* be documented for each vehicle and applied to the overall rescue and firefighting requirement.

3.13 The discharge rate of the foam solution shall not be less than the rates shown in Chapter 4 Table 2 of this SD-AD.

3.14 The complementary agents shall comply with the appropriate specifications of the International Organization for Standardization (ISO)*.

*Note. – * refer to ISO Publication 7202 (Powder).*

3.15 The discharge rate of complementary agents should be no less than the values shown in Chapter 4 Table 2 of this SD-AD.

3.16 Dry chemical powders *should* only be substituted with an agent that has equivalent or better firefighting capabilities for all types of fires where complementary agent is expected to be used.

Note. — Guidance on the use of complementary agents can be found in the Airport Services Manual (Doc 9137), Part 1.

3.17 A reserve supply of foam concentrate, equivalent to 200per cent of the quantities identified in Chapter 4 Table 2 of this SD-AD, *should* be maintained on the aerodrome for vehicle replenishment purposes.

Note. — Foam concentrate carried on fire vehicles in excess of the quantity identified in Chapter 4 Table 2 can contribute to the reserve.

3.18 A reserve supply of complementary agent, equivalent to 100 per cent of the quantity identified in Chapter 4 Table 2 of this SD-AD, *should* be maintained on the aerodrome for vehicle replenishment purposes. Sufficient propellant gas *should* be included to utilize this reserve complementary agent.

3.19 Category 1 and 2 aerodromes that have replaced up to 100 per cent of the water with complementary agent shall hold a reserve supply of complementary agent of 200 per cent.

3.20 Where a major delay in the replenishment of the supplies is anticipated, the amount of reserve supply in 3.17, 3.18 and 3.19 shall be increased as determined by a risk assessment.

Note. — See the Airport Services Manual (Doc 9137), Part 1 for guidance on the conduct of a risk analysis to determine the quantities of reserve extinguishing agents.

Rescue equipment

3.21 Rescue equipment commensurate with the level of aircraft operations should be provided on the rescue and firefighting vehicle(s).

Note. — Guidance on the rescue equipment to be provided at an aerodrome is given in the Airport Services Manual (Doc 9137), Part 1.

Response time

3.22 The operational objective of the rescue and firefighting service shall be to achieve a response time not exceeding three minutes to any point of each operational runway, in optimum visibility and surface conditions. However, a response time not exceeding 2 minutes is recommended.

3.23 The operational objective of the rescue and firefighting service *should* be to achieve a response time not exceeding three minutes to any other part of the movement area, in optimum visibility and surface conditions.

Note 1. — Response time is considered to be the time between the initial call to the rescue and firefighting service, and the time when the first responding vehicle(s) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Chapter 4 Table 2 of this SDAD.

Note 2. — Optimum visibility and surface conditions are defined as daytime, good visibility, no precipitation with normal response route free of surface contamination, e.g. water.

3.24 To meet the operational objective as nearly as possible in less than optimum conditions of visibility, especially during low visibility operations, suitable guidance, equipment and/or procedures for rescue and firefighting services *should* be provided.

Note. — Additional guidance is available in the Airport Services Manual (Doc 9137), Part 1.

3.25 Any vehicles, other than the first responding vehicle(s), required to deliver the amounts of extinguishing agents specified in Chapter 4 Table 2 of this SD-AD shall ensure continuous agent application and shall arrive no more than four minutes from the initial call. However, an arrival time not exceeding 3 minutes from the initial call is recommended.

3.26 A system of preventive maintenance of rescue and firefighting vehicles shall be employed to ensure effectiveness of the equipment and compliance with the specified response time throughout the life of the vehicle.

Emergency access roads

3.27 Emergency access roads should be provided on an aerodrome where terrain conditions permit their construction, so as to facilitate achieving minimum response times. Particular attention should be given to the provision of ready access to approach areas up to 1000m from the threshold, or at least within the aerodrome boundary. Where a fence is provided, the need for convenient access to outside areas should be taken into account.

Note. — Aerodrome service roads may serve as emergency access roads when they are suitably located and constructed.

3.28 Emergency access roads should be capable of supporting the heaviest vehicles which will use them and be usable in all weather conditions. Roads within 90m of a runway should be surfaced to prevent surface erosion and the transfer of debris to the runway. Sufficient vertical clearance shall be provided from overhead obstructions for the largest vehicles.

3.29 When the surface of the road is indistinguishable from the surrounding area, edge markers should be placed at intervals of about 10m.

Fire stations

3.30 All rescue and firefighting vehicles *should* normally be housed in a fire station. Satellite fire stations *should* be provided whenever the response time cannot be achieved from a single fire station.

3.31 The fire station should be located so that the access for rescue and firefighting vehicles into the runway area is direct and clear, requiring a minimum number of turns.

Communication and alerting systems

3.32 A discrete communication system should be provided linking a fire station with the control tower, any other fire station on the aerodrome and the rescue and firefighting vehicles.

3.33 An alerting system for rescue and firefighting personnel, capable of being operated from that station, should be provided at a fire station, any other fire station on the aerodrome and the aerodrome control tower.

Number of rescue and firefighting vehicles

3.34 The minimum number of rescue and firefighting vehicles provided at an aerodrome shall be in accordance with the Chapter 4 section 4.3 of this SD-AD.

Note. — Guidance on minimum characteristics of rescue and firefighting vehicles is given in the Airport Services Manual (Doc 9137), Part 1.

Personnel

3.35 All rescue and firefighting personnel shall be properly trained to perform their duties in an efficient manner and shall participate in live fire drills commensurate with the types of aircraft and type of rescue and firefighting equipment in use at the aerodrome, including pressure-fed fuel fires.

Note 1. — Guidance to assist the appropriate authority in providing proper training is given in ICAO Annex 14 Attachment A, Section 18, and the Airport Services Manual (Doc 9137), Part 1.

Note 2. — Fires associated with fuel discharged under very high pressure from a ruptured fuel tank are known as "pressure-fed fuel fires".

3.36 The rescue and firefighting personnel training programme shall include training in human performance, including team coordination.

Note. — Guidance material to design training programmes on human performance and team coordination can be found in the Human Factors Training Manual (Doc 9683).

3.37 During flight operations, sufficient trained and competent personnel should be designated to be readily available to ride the rescue and firefighting vehicles and to operate the equipment at maximum capacity. These personnel should be deployed in a way that ensures that minimum response times can be achieved and that continuous agent application at the appropriate rate can be fully maintained. Consideration should also be given for personnel to use hand lines, ladders and other rescue and firefighting equipment normally associated with aircraft rescue and firefighting operations.

3.38 In determining the minimum number of rescue and firefighting personnel required, a task resource analysis should be completed and the level of staffing documented in the Aerodrome Manual.

Note. — Guidance on the use of a task resource analysis is contained in the Airport Services Manual (Doc 9137), Part 1.

3.39 All responding rescue and firefighting personnel shall be provided with protective clothing and respiratory equipment to enable them to perform their duties in an effective manner.

4.0 DISABLED AIRCRAFT REMOVAL

Note. — Guidance on removal of a disabled aircraft, including recovery equipment, is given in the Airport Services Manual (Doc 9137), Part 5. See also Annex 13 — Aircraft Accident and Incident Investigation concerning protection of evidence, custody and removal of aircraft.

4.1 A plan for the removal of an aircraft disabled on, or adjacent to, the movement area should be established for an aerodrome, and a coordinator designated to implement the plan, when necessary.

4.2 The disabled aircraft removal plan should be based on the characteristics of the aircraft that may normally 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; and

b) arrangements for the rapid receipt of aircraft recovery equipment kits available from other aerodromes.

5.0 WILDLIFE STRIKE HAZARD REDUCTION

Note. —The presence of wildlife (birds and animals) on and in the aerodrome, vicinity poses a serious threat to aircraft operational safety.

5.1 The wildlife strike hazard on, or in the vicinity of, an aerodrome shall be assessed through:

a) the establishment of a 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.

Note. — See Annex 15, Chapter 5.

5.2 Wildlife strike reports shall be collected and forwarded to the Authority for review and onward coordination with ICAO for inclusion in the ICAO Bird Strike Information System (IBIS) database.

Note. — The IBIS is designed to collect and disseminate information on wildlife strikes to aircraft. Information on the system is included in the Manual on the ICAO Bird Strike Information System (IBIS) (Doc 9332).

5.3 Action shall be taken to decrease the risk to aircraft operations by adopting measures to minimize the likelihood of collisions between wildlife and aircraft.

Note. — Guidance on effective measures for establishing whether or not wildlife, on or near an aerodrome, constitute a potential hazard to aircraft operations, and on methods for discouraging their presence, is given in the Airport Services Manual (Doc 9137), Part 3.

5.4 The aerodrome operator shall take action to eliminate or to prevent the establishment of garbage disposal dumps or any other source which may attract wildlife to the aerodrome, or its vicinity, unless an appropriate wildlife assessment indicates that they are unlikely to create conditions conducive to a wildlife hazard problem. Where the elimination of existing sites is not possible, the aerodrome operator shall ensure that any risk to aircraft posed by these sites is assessed and reduced to as low as reasonably practicable.

5.5 Aerodrome operators should give due consideration to aviation safety concerns related to land developments in the vicinity of the aerodrome that may attract wildlife.

6.0 APRON MANAGEMENT SERVICE

6.1 When warranted by the volume of traffic and operating conditions, an appropriate apron management service should be provided on an apron by an aerodrome ATS unit, by another aerodrome operating authority, or by a cooperative combination of these, 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.

6.2 When the aerodrome control tower does not participate in the apron management service, procedures should be established to facilitate the orderly transition of aircraft between the apron management unit and the aerodrome control tower.

Note. — Guidance on an apron management service is given in the Airport Services Manual (Doc 9137), Part 8, and in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).

6.3 An apron management service shall be provided with radiotelephony communications facilities.

6.4 Where low visibility procedures are in effect, persons and vehicles operating on an apron shall be restricted to the essential minimum.

Note. — Guidance on related special procedures is given in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).

6.5 An emergency vehicle responding to an emergency shall be given priority over all other surface movement traffic.

6.6 A vehicle operating on an apron shall:

a) give way to an emergency vehicle; an aircraft taxiing, about to taxi, or being pushed or towed; and

b) give way to other vehicles in accordance with local regulations.

6.7 An aircraft stand shall be visually monitored to ensure that the recommended clearance distances are provided to an aircraft using the stand.

7.0 GROUND SERVICING OF AIRCRAFT

7.1 Fire extinguishing equipment suitable for at least initial intervention in the event of fuel fire and personnel trained in its use shall be readily available during the ground servicing of an aircraft, and there shall be a means of quickly summoning the rescue and firefighting service in the event of a fire or major fuel spill.

7.2 When aircraft refuelling operations take place while passengers are embarking, on board or disembarking, ground equipment shall be positioned so as to allow:

a) the use of a sufficient number of exits for expeditious evacuation; and

b) a ready escape route from each of the exits to be used in an emergency.

8.0 AERODROME VEHICLE OPERATIONS

Note 1. — Guidance on aerodrome vehicle operations is contained in ICAO Annex 14 Attachment A, Section 19, and on traffic rules and regulations for vehicles in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).

Note 2. — It is intended that roads located on the movement area be restricted to the exclusive use of aerodrome personnel and other authorized persons, and that access to the public buildings by an unauthorized person will not require use of such roads.

8.1 A vehicle shall be operated:

a) on a manoeuvring area only as authorized by the aerodrome control tower; and
b) on an apron only as authorized by the appropriate designated authority.

8.2 The driver of a vehicle on the movement area shall comply with all mandatory instructions conveyed by markings and signs unless otherwise authorized by:

a) the aerodrome control tower when on the manoeuvring area; or
b) the appropriate designated authority when on the apron.

8.3 The driver of a vehicle on the movement area shall comply with all mandatory instructions conveyed by lights.

8.4 The driver of a vehicle on the movement area shall be appropriately trained for the tasks to be performed and shall comply with the instructions issued by:

a) the aerodrome control tower, when on the manoeuvring area; and
b) the appropriate designated authority, when on the apron.

8.5 The driver of a radio-equipped vehicle shall establish satisfactory two-way radio communication with the aerodrome control tower before entering the manoeuvring area and with the appropriate designated authority before entering the apron. The driver shall maintain a continuous listening watch on the assigned frequency when on the movement area.

9.0 SURFACE MOVEMENT GUIDANCE AND CONTROL SYSTEMS

9.1 A surface movement guidance and control system (SMGCS) shall be provided at an aerodrome.

Note. — Guidance on surface movement guidance and control systems is contained in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476).

Characteristics

9.2 The design of an SMGCS should take into account:

a) the density of air traffic;
b) the visibility conditions under which operations are intended;
c) the need for pilot orientation;
d) the complexity of the aerodrome layout; and
e) movements of vehicles.

9.3 The visual aid components of an SMGCS, i.e. markings, lights and signs, should be designed to conform with the relevant specifications in SD-AD appendix 5.

9.4 An SMGCS should be designed to assist in the prevention of inadvertent incursions of aircraft and vehicles onto an active runway.

9.5 The system should be designed to assist in the prevention of collisions between aircraft, and between aircraft and vehicles or objects, on any part of the movement area.

Note. — Guidance on control of stop bars through induction loops and on a visual taxiing guidance and control system is contained in the Aerodrome Design Manual (Doc 9157), Part 4.

9.6 Where an SMGCS is provided by selective switching of stop bars and taxiway centre line lights, the following requirements shall be met:

a) taxiway routes which are indicated by illuminated taxiway centre line 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 centre line lights beyond it is suppressed; and
c) the taxiway centre line lights are activated ahead of an aircraft when the stop bar is suppressed.

Note 1. — See SD-AD appendix 5 for specifications on taxiway centre line lights and stop bars, respectively.

Note 2. — Guidance on installation of stop bars and taxiway centre line lights in SMGCSs is given in the Aerodrome Design Manual (Doc 9157), Part 4.

9.7 Surface movement radar for the manoeuvring area should be provided at an aerodrome intended for use in runway visual range conditions less than a value of 350m.

9.8 Surface movement radar for the manoeuvring area should be provided at an aerodrome other than that in 9.7 when traffic density and operating conditions are such that regularity of traffic flow cannot be maintained by alternative procedures and facilities.

Note. — Guidance on the use of surface movement radar is given in the Manual of Surface Movement Guidance and Control Systems (SMGCS) (Doc 9476) and in the Air Traffic Services Planning Manual (Doc 9426).

10.0 SITING OF EQUIPMENT AND INSTALLATIONS ON OPERATIONAL AREAS

Note 1. — Requirements for obstacle limitation surfaces are specified in Appendix 4 of this SD-AD.

Note 2. — The design of light fixtures and their supporting structures, light units of visual approach slope indicators, signs, and markers, is specified in SD-AD appendix 5. Guidance on the frangible design of visual and non-visual aids for navigation is given in the Aerodrome Design Manual (Doc 9157), Part 6.

10.1 Unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation shall be:

a) on a runway strip, a runway end safety area, a taxiway strip or within the distances specified SD AD appendix 3 Table 1, column 11, if it would endanger an aircraft; or

b) on a clearway if it would endanger an aircraft in the air.

10.2 Any equipment or installation required for air navigation or for aircraft safety purposes which must be located:

a) on that portion of a runway strip within:

1) 75 m of the runway centre line where the code number is 3 or 4; or

2) 45 m of the runway centre line where the code number is 1 or 2; or

b) on a runway end safety area, a taxiway strip or within the distances specified in SD-AD appendix 3 Table 1; or

c) on a clearway and which would endanger an aircraft in the air;

shall be frangible and mounted as low as possible.

10.3 Any equipment or installation required for air navigation or for aircraft safety purposes which must be located on the non-graded portion of a runway strip should be regarded as an obstacle and *should* be frangible and mounted as low as possible.

Note. — Guidance on the siting of navigation aids is contained in the Aerodrome Design Manual (Doc 9157), Part 6.

10.4 For a precision approach runway category I, II or III, unless its function requires it to be there for air navigation or for aircraft safety purposes, no equipment or installation shall be located within 240m from the end of the strip and within:

a) 60 m of the extended centre line where the code number is 3 or 4; or

b) 45 m of the extended centre line where the code number is 1 or 2.

10.5 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 which:

a) is situated on that portion of the strip within 77.5 m of the runway centre line 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:

1) 60 m of the extended runway centre line where the code number is 3 or 4; or

2) 45 m of the extended runway centre line where the code number is 1 or 2; or

c) penetrates the inner approach surface, the inner transitional surface or the balked landing surface;

shall be frangible and mounted as low as possible.

10.6 Any equipment or installation required for air navigation or for aircraft safety purposes which is an obstacle of operational significance in accordance with SD-AD appendix 4 section 3.1.4, 3.2.5, 3.3.8 or 3.4.6 should be frangible and mounted as low as possible.

11.0 FENCING

11.1 A fence or other suitable barrier shall be provided on an aerodrome to prevent the entrance to the movement area of animals large enough to be a hazard to aircraft.

11.2 A fence or other suitable barrier shall be provided on an aerodrome to deter the inadvertent or premeditated access of an unauthorized person onto a non-public area of the aerodrome.

Note 1. — This is intended to include the barring of sewers, ducts, tunnels, etc., where necessary to prevent access.

Note 2. — Special measures may be required to prevent the access of an unauthorized person to runways or taxiways which overpass public roads.

11.3 Suitable means of protection shall be provided to deter the inadvertent or premeditated access of unauthorized persons into ground installations and facilities essential for the safety of civil aviation located off the aerodrome.

Location

11.4 The fence or barrier shall be located so as to separate the movement area and other facilities or zones on the aerodrome vital to the safe operation of aircraft from areas open to public access.

11.5 When greater security is thought necessary, a cleared area should be provided on both sides of the fence or barrier to facilitate the work of patrols and to make trespassing more difficult. Consideration should be given to the provision of a perimeter road inside the aerodrome fencing for the use of both maintenance personnel and security patrols.

12.0 SECURITY LIGHTING

12.1 At an aerodrome where it is deemed desirable for security reasons, a fence or other barrier provided for the protection of international civil aviation and its facilities should be illuminated at a minimum essential level. Consideration should be given to locating lights so that the ground area on both sides of the fence or barrier, particularly at access points, is illuminated.

13.0 AUTONOMOUS RUNWAY INCURSION WARNING SYSTEM

Note 1. — The inclusion of detailed specifications for an autonomous runway incursion warning system (ARIWS) in this section is not intended to imply that an ARIWS has to be provided at an aerodrome.

Note 2. — The implementation of an ARIWS is a complex issue deserving careful consideration by aerodrome operators, air traffic services and the Authority, and in coordination with the aircraft operators.

Note 3. — ICAO Annex 14 Attachment A, Section 21, provides a description of an ARIWS and information on its use.

13.1 Where an ARIWS is installed at an aerodrome:

a) it shall provide autonomous detection of a potential incursion or of the occupancy of an active runway and a direct warning to a flight crew or vehicle operator;

b) it shall function and be controlled independently of any other visual system on the aerodrome;

c) its visual aid components, i.e. lights, shall be designed to conform with the relevant specifications in SD-AD appendix 5; and

d) failure of part or all of it shall not interfere with normal aerodrome operations. To this end, provision shall be made to allow the ATC unit to partially or entirely shut down the system.

Note 1. — An ARIWS may be installed in conjunction with enhanced taxiway centre line markings, stop bars or runway guard lights.

Note 2. — It is intended that the system(s) be operational under all weather conditions, including low visibility.

Note 3. — An ARIWS may share common sensory components of an SMGCS or A-SMGCS, however, it operates independently of either system.

13.2 Where an ARIWS is installed at an aerodrome, information on its characteristics and status shall be provided to the appropriate aeronautical information services for promulgation in the AIP with the description of the aerodrome surface movement guidance and control system and markings as specified in Annex 15.

Note.— Detailed specifications concerning the AIP are contained in PANS-AIM (Doc 10066).

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