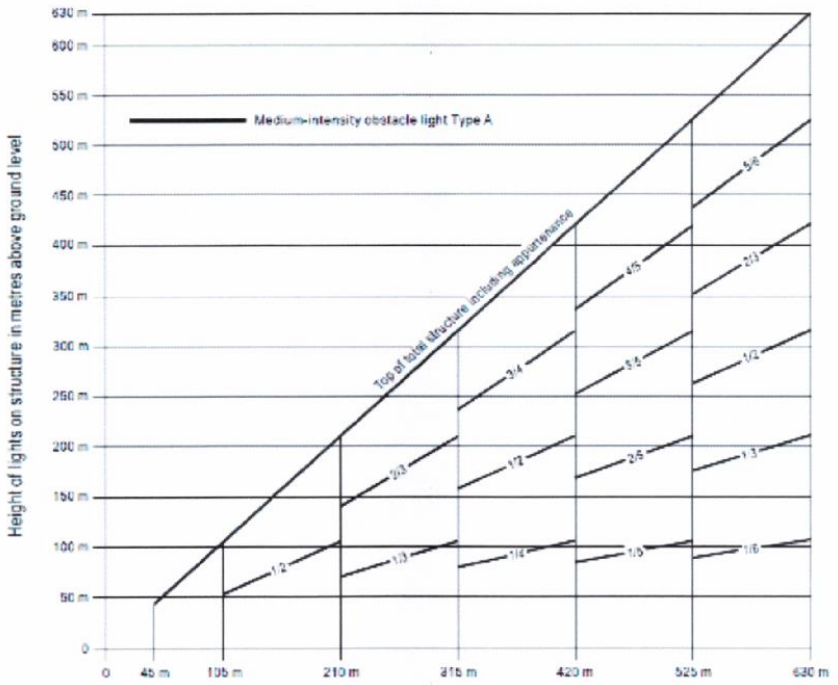
APPENDIX 5. LOCATION OF LIGHTS ON OBSTACLES

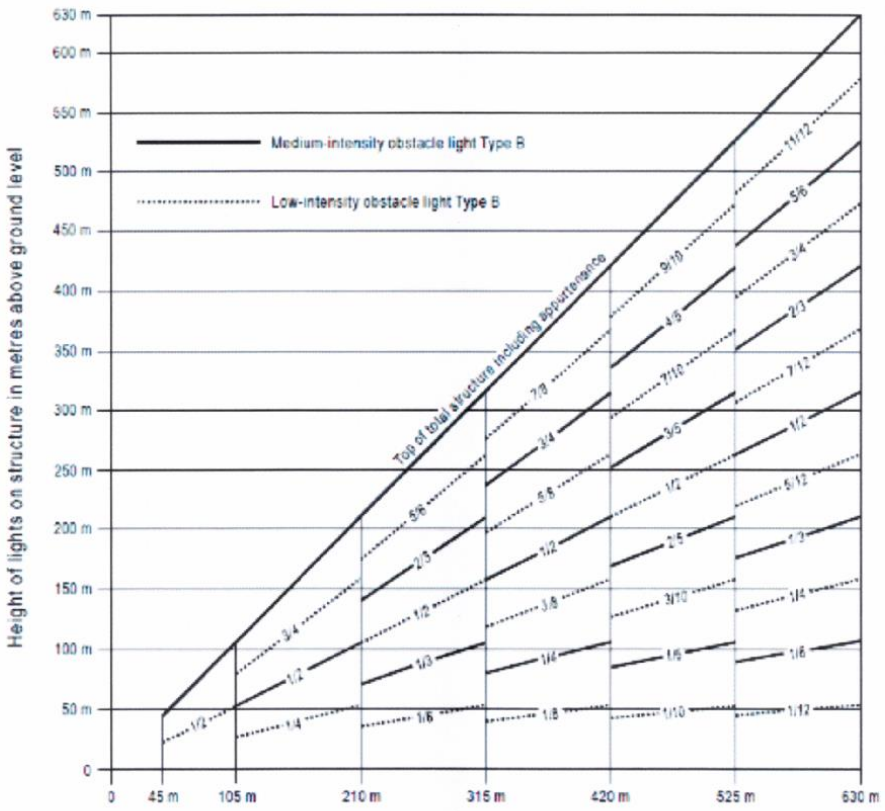


Height of structure in metres above ground level

Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required

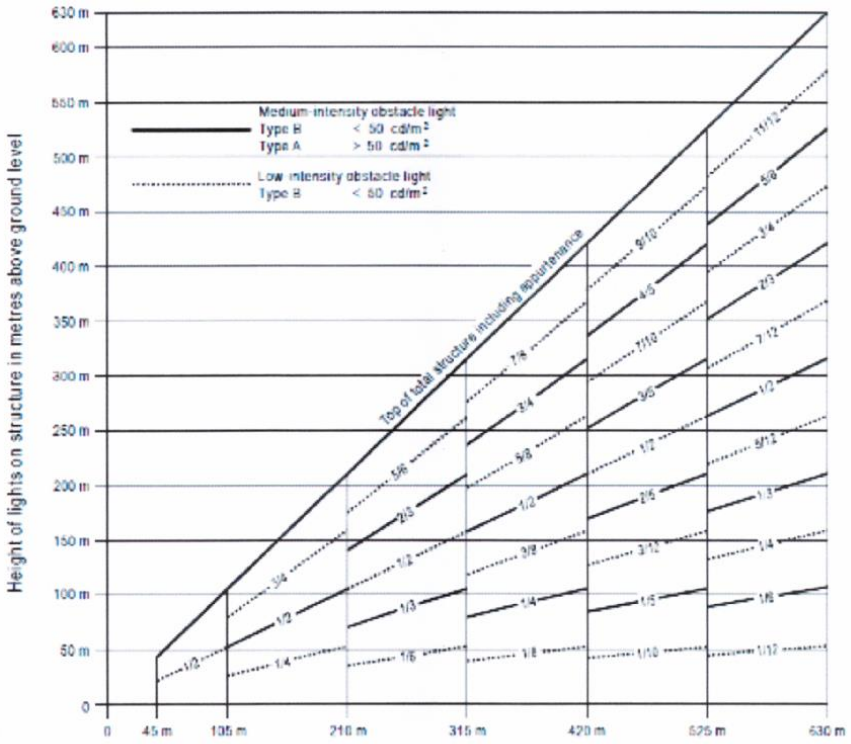
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Figure A5-1. Medium-intensity flashing-white obstacle lighting system, Type A



Note.— For night-time use only.

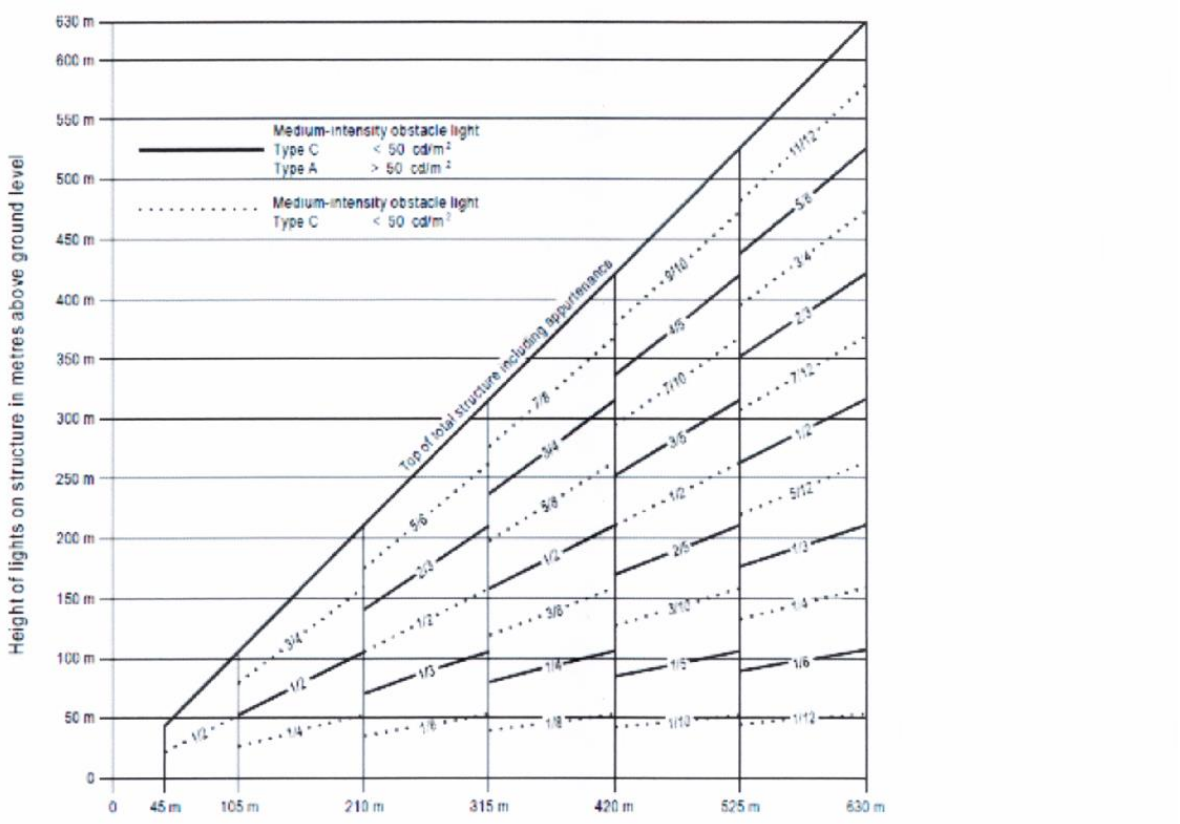
Figure A5-2. Medium-intensity flashing-red obstacle lighting system, Type B



Height of structure in metres above ground level

Note.— For night-time use only.

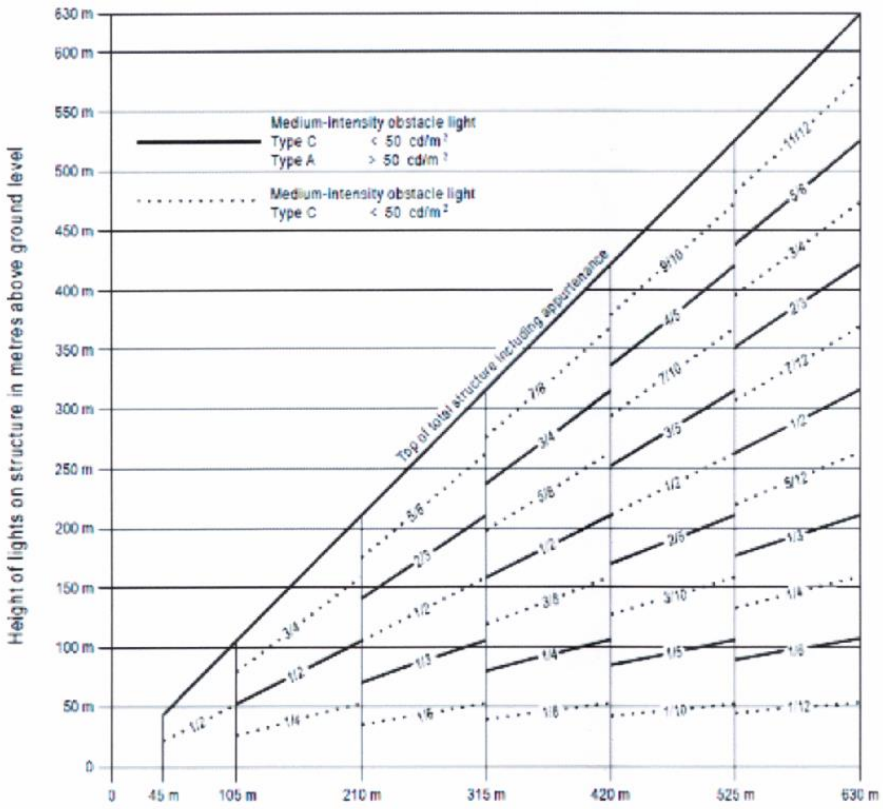
Figure A5-3. Medium-intensity fixed-red obstacle lighting system, Type C



Height of structure in metres above ground level

Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

Figure A5-4. Medium-intensity dual obstacle lighting system, Type A/Type B



Height of structure in metres above ground level

Note.— High-intensity obstacle lighting is recommended on structures with a height of more than 150 m above ground level. If medium-intensity lighting is used, marking will also be required.

Figure A5-5. Medium-intensity dual obstacle lighting system, Type A/Type C

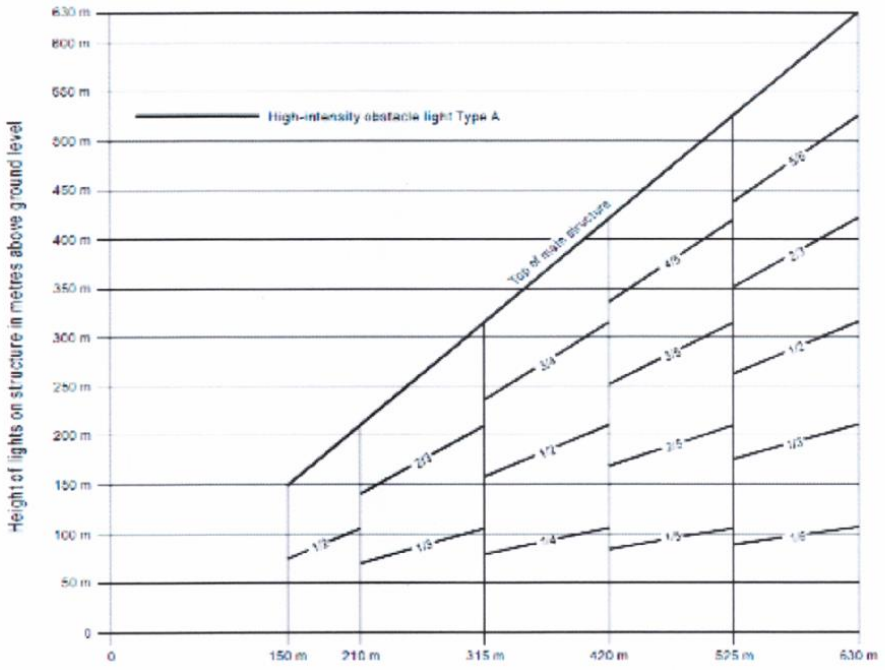


Figure A5-6.High-intensity flashing-white obstacle lighting system, Type A

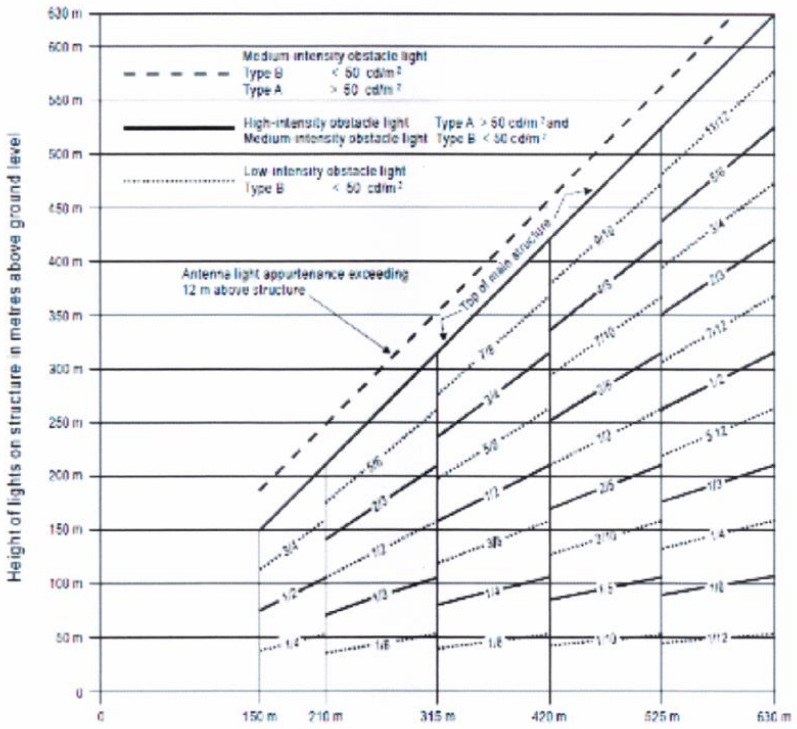


Figure A5-7. High-/medium-intensity dual obstacle lighting system, Type A/Type B

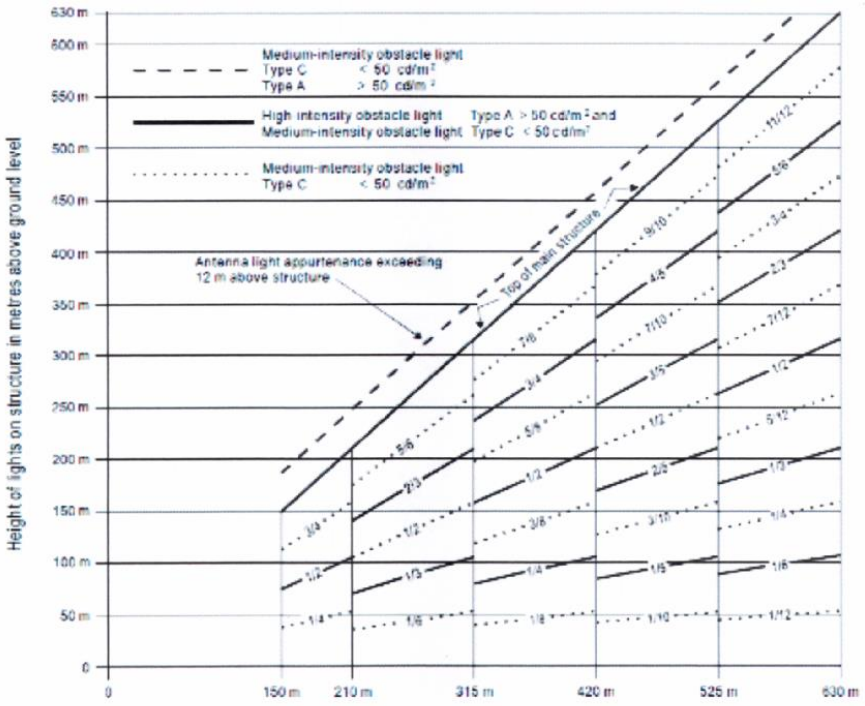


Figure A5-8. High-/medium-intensity dual obstacle lighting system, Type A/Type C

PART 1

GENERAL

General information, including the following:

a) purpose and scope of the aerodrome manual;
b) the legal requirement for an aerodrome certificate and an aerodrome manual as prescribed in the Civil Aviation Requirements for Certified Aerodromes 2024;
c) conditions for use of the aerodrome — a statement to indicate that the aerodrome shall at all times, when it is available for the take-off and landing of aircraft, be so available to all persons on equal terms and conditions;
d) the available aeronautical information system and procedures for its promulgation;
e) the system for recording aircraft movements; and
f) obligations of the Operator of a Certified Aerodrome.
g) responsibilities attributed to other aerodrome stakeholders should be clearly identified and listed.
h) the aim and objectives of the aerodrome manual and how it is to be used by operating staff and other stakeholders.
i) all the relevant information to describe the management and operational structure.
j) a table of contents;
k) a list of the corrigenda/amendments: this section should log the updates and/or corrections made to the aerodrome manual; and
l) a distribution list;

PART 2

PARTICULARS OF THE AERODROME SITE

General information, including the following:

a) a plan of the aerodrome showing the main aerodrome facilities for the operation of the aerodrome including, particularly, the location of each wind direction indicator;

b) a plan of the aerodrome showing the aerodrome boundaries;

c) a plan showing the distance of the aerodrome from the nearest city, town or other populous area, and the location of any aerodrome facilities and equipment outside the boundaries of the aerodrome; and

d) particulars of the title of the aerodrome site. If the boundaries of the aerodrome are not defined in the title documents particulars of the title to, or interest in, the property on which the aerodrome is located and a plan showing the boundaries and position of the aerodrome.

PART 3

PARTICULARS OF THE AERODROME REQUIRED TO BE REPORTED TO THE AERONAUTICAL INFORMATION SERVICE (AIS)

3.1 GENERAL INFORMATION

a) the name of the aerodrome;

b) the location of the aerodrome;

c) the geographical coordinates of the aerodrome reference point determined in terms of the World Geodetic System — 1984 (WGS-84) reference datum;

d) the aerodrome elevation and geoid undulation;

e) the Aerodrome reference code

f) the elevation of each threshold and geoid undulation, the elevation of the runway end and any significant high and low points along the runway, and the highest elevation of the touchdown zone of a precision approach runway;

g) the aerodrome reference temperature;

h) details of the aerodrome beacon;

i) the name of the Operator of a Certified Aerodrome and the address and telephone numbers at which the Operator of a Certified Aerodrome may be contacted at all times; and

j) a description of the intended operations, including:

i. the critical aeroplanes the aerodrome is intended to serve;
ii. the category of runway(s) provided (non-instrument, instrument including non-precision and precision);
iii. the different runways and their associated levels of service;
iv. the nature of aviation activities (commercial, passenger, air transport, cargo, aerial work, general aviation);
v. the type of traffic permitted to use the aerodrome (international/national, IFR/VFR, scheduled/non- scheduled); and
vi. the minimum RVR that aerodrome operations can be permitted;

3.2 AERODROME DIMENSIONS AND RELATED INFORMATION

General information, including the following:

a. runway — true bearing, designation number, length, width, displaced threshold location, slope, surface type, type of runway and, for a precision approach runway, the existence of an obstacle free zone;
b. length, width and surface type of strip, runway end safety areas, stopways;
c. length, width and surface type of taxiways;
d. apron surface type and aircraft stands;
e. clearway length and ground profile;
f. visual aids for approach procedures, viz. approach lighting type and visual approach slope indicator system (PAPI/APAPI); marking and lighting of runways, taxiways, and aprons; other visual guidance and control aids on taxiways (including runway holding positions, intermediate holding positions and stop bars) and aprons, location and type of visual docking guidance system; availability of standby power for lighting;
g. the location and radio frequency of VOR aerodrome checkpoints;
h. the location and designation of standard taxi routes;
i. the geographical coordinates of each threshold;
j. the geographical coordinates of appropriate taxiway centre line points;
k. the geographical coordinates of each aircraft stand;
l. the geographical coordinates and the top elevation of significant obstacles in the approach

and take-off areas, in the circling area and in the vicinity of the aerodrome;

Note: This information may best be shown in the form of charts such as those required for the preparation of aeronautical information publications, as specified in Chapter 2 of Requirements for Aeronautical Charts 2024.

m. pavement surface type and bearing strength using the Aircraft Classification Number — Pavement Classification Number (ACN-PCN) method;

n. one or more pre-flight altimeter check locations established on an apron and their elevation;

o. declared distances: take-off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), landing distance available (LDA);

p. disabled aircraft removal plan: the telephone/telex/ facsimile numbers and e-mail address of the aerodrome coordinator for the removal of a disabled aircraft on or adjacent to the movement area, information on the capability to remove a disabled aircraft, expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove; and

q. rescue and fire-fighting: the level of protection provided, expressed in terms of the category of the rescue and fire-fighting services, which should be in accordance with the longest aeroplane normally using the aerodrome and the type and amounts of extinguishing agents normally available at the aerodrome.

Note.— The accuracy of the information in Part 3 is critical to aircraft safety. Information requiring engineering survey and assessment should be gathered or verified by qualified technical persons.

PART 4

PARTICULARS OF THE AERODROME OPERATING PROCEDURES AND SAFETY MEASURES

4.1 AERODROME REPORTING

Particulars of the procedures for reporting any changes to the aerodrome information set out in the AIP and procedures for requesting the issue of NOTAMs, including the following:

a. arrangements for reporting any changes to the Authority and recording the reporting of changes during and outside the normal hours of aerodrome operations;
b. the names and roles of persons responsible for notifying the changes, and their telephone numbers during and outside the normal hours of aerodrome operations; and
c. the address and telephone numbers, as provided by the Authority, of the place where changes are to be reported to the Authority.

4.2 ACCESS TO THE AERODROME MOVEMENT AREA

Particulars of the procedures that have been developed and are to be followed in coordination with the agency responsible for preventing unlawful interference in civil aviation at the aerodrome and for preventing unauthorized entry of persons, vehicles, equipment, animals or other things into the movement area, including the following:

a. the role of the Operator of a Certified Aerodrome, the aircraft operator, aerodrome fixed-base operators, the aerodrome security entity, the Authority and other government departments, as applicable; and
b. the names and roles of the personnel responsible for controlling access to the aerodrome, and the telephone numbers for contacting them during and after working hours.

4.3 AERODROME EMERGENCY PLAN

Particulars of the aerodrome emergency plan, including the following:

a. plans for dealing with emergencies occurring at the aerodrome or in its vicinity, including the malfunction of aircraft in flight; structural fires; sabotage, including bomb threats (aircraft or structure); unlawful seizure of aircraft; and incidents on the airport covering "during the emergency" and "after the emergency" considerations;
b. details of tests for aerodrome facilities and equipment to be used in emergencies, including the frequency of those tests;
c. details of exercises to test emergency plans, including the frequency of those exercises;
d. An up-to-date list of organizations, agencies and persons of authority, both on- and off-airport, for site roles; their telephone and facsimile numbers, e-mail and SITA addresses

and the radio frequencies of their offices;

e. the establishment of an aerodrome emergency committee to organize training and other preparations for dealing with emergencies;
f. the appointment of an on-scene commander for the overall emergency operation; and
g. the required minimum emergency equipment available, including an adequately equipped emergency operation centre and mobile command post;

4.4 RESCUE AND FIRE-FIGHTING

Particulars of the facilities, equipment, personnel and procedures for meeting the rescue and fire-fighting requirements, including the names and roles of the persons responsible for dealing with the rescue and fire-fighting services at the aerodrome.

Note.— This subject should also be covered in appropriate detail in the aerodrome emergency plan.

12.5 INSPECTION OF THE AERODROME MOVEMENT AREA AND OBSTACLE LIMITATION SURFACE BY THE AERODROME OPERATOR

Particulars of the procedures for the inspection of the aerodrome movement area and obstacle limitation surfaces, including the following:

a. arrangements for carrying out inspections, including runway friction and water-depth measurements on runways and taxiways, during and outside the normal hours of aerodrome operations;
b. arrangements and means of communicating with air traffic control during an inspection;
c. arrangements for keeping an inspection logbook, and the location of the logbook;
d. details of inspection intervals and times;
e. inspection checklist;
f. arrangements for reporting the results of inspections and for taking prompt follow-up actions to ensure correction of unsafe conditions; and
g. the names and roles of persons responsible for carrying out inspections, and their telephone

numbers during and after working hours.

4.6 VISUAL AIDS AND AERODROME ELECTRICAL SYSTEMS

Particulars of the procedures for the inspection and maintenance of aeronautical lights (including obstacle lighting), signs, markers and aerodrome electrical systems, including the following:

a. arrangements for carrying out inspections during and outside the normal hours of aerodrome operation, and the checklist for such inspections;
b. arrangements for recording the result of inspections and for taking follow-up action to correct deficiencies;
c. arrangements for carrying out routine maintenance and emergency maintenance;
d. arrangements for secondary power supplies, if any, and, if applicable, the particulars of any other method of dealing with partial or total system failure; and
e. the names and roles of the persons responsible for the inspection and maintenance of the lighting, and the telephone numbers for contacting those persons during and after working hours.

4.7 MAINTENANCE OF THE MOVEMENT AREA

Particulars of the facilities and procedures for the maintenance of the movement area, including:

a. arrangements for maintaining the paved areas including the runway friction assessment;
b. arrangements for maintaining the unpaved runways and taxiways;
c. arrangements for maintaining the runway and taxiway strips;
d. arrangements for the maintenance of aerodrome drainage;
e. arrangements for maintaining the visual aids, including the measurement of intensity, beam spread and orientation of lights;
f. arrangements for maintaining the obstacle lighting; and
g. arrangements for reporting and action taken in the event of failure or unsafe occurrence.

4.8 AERODROME WORKS — SAFETY

Particulars of the procedures for planning and carrying out construction and maintenance work safely (including work that may have to be carried out at short notice) on or in the vicinity of the movement area which may extend above an obstacle limitation surface, including the following:

a. The process of planning shall clearly establish and document the responsibilities and procedures for:
    a. the authorization of the works;
    b. the implementation of any proposed change to operational facilities;
    c. the date and time when the facilities will be withdrawn or changed from normal operations;
    d. the methods by which such changes will be promulgated;
    e. the oversight and control of the work in progress; and
    f. the compliance with all relevant movement area safety rules.
b. arrangements for communicating with air traffic control during the progress of such work;
c. the names, telephone numbers and roles of the persons and organizations responsible for planning and carrying out the work, and arrangements for contacting those persons and organizations at all times;
d. the names and telephone numbers, during and after working hours, of the aerodrome fixed-base operators, ground handling agents and aircraft operators who are to be notified of the work; and
e. a distribution list for work plans, if required.

4.9 APRON MANAGEMENT

Particulars of the apron management procedures, including the following:

a. arrangements between air traffic control and the apron management unit;
b. arrangements for allocating aircraft parking positions;
c. arrangements for initiating engine start and ensuring clearance of aircraft push-back;
d. marshalling service;and
e. leader (van) service.

4.10 APRON SAFETY MANAGEMENT

Procedures to ensure apron safety, including:

a. protection from jet blasts;
b. enforcement of safety precautions during aircraft refuelling operations;
c. apron sweeping;
d. apron cleaning;
e. arrangements for reporting incidents and accidents on an apron; and
f. arrangements for auditing the safety compliance of all personnel working on the apron.

4.11 AIRSIDE VEHICLE CONTROL

Particulars of the procedure for the control of surface vehicles operating on or in the vicinity of the movement area, including the following:

a. a procedure to ensure the vehicles on the movement area are adequately equipped to safely operate on the movement area;
b. details of the applicable traffic rules (including speed limits and the means of enforcing the rules); and
c. the method of issuing driving permits for operating vehicles in the movement area.

4.12 WILDLIFE HAZARD MANAGEMENT

4.12.1 Particulars of the procedures to deal with the danger posed to aircraft operations by the presence of birds, mammals, or reptiles in the aerodrome flight pattern or movement area, including the following:

a. arrangements for the monitoring and assessing wildlife hazards;
b. arrangements for implementing wildlife control programmes; and
c. the names and roles of the persons responsible for dealing with wildlife hazards, their training/qualification, and their telephone numbers during and after working hours.

4.12.2 Requirements for Wildlife Hazard Assessments

Section 4.12.1 above requires the aerodrome operator to make arrangements for assessing wildlife hazards. This assessment shall be conducted when any of the events listed below occurs at and in the vicinity of the aerodrome.:

i. An air carrier aircraft experiences multiple wildlife strikes
ii. An air carrier aircraft experiences substantial damage from striking wildlife
iii. An air carrier aircraft experiences an engine ingestion of wildlife
iv. Wildlife of a size, or in numbers, capable of causing an event described in (1), (2), or (3) above is observed to have access to any airport flight pattern or aircraft movement area.

4.12.3 Necessary Elements of a Wildlife Hazard Assessment

The Wildlife Hazard Assessment shall be conducted by a Wildlife Specialist, having training or experience in wildlife hazard management or an individual working under the direct supervision of such an individual. At a minimum, the Wildlife Hazard Assessment shall contain:

1. Analysis of the event or circumstances that prompted the assessment. (Who, what, when, where, and why of the situation prompting the Assessment.)
2. Identification of the wildlife species observed and their numbers, locations, local movements, and daily and seasonal occurrences. (What wildlife species have access to the airport? What are their movement and seasonal patterns? Data should cover 12 consecutive months. What is the protective status of notable wildlife?)
3. Identification and location of features on and near the airport that attract wildlife. (Wildlife are attracted to an airport because something exists on or near the airport that they desire. Forested areas near the Aerodrome and large open areas provide relatively safe loafing, nesting and feeding locations. Food and water sources can vary seasonally or temporarily. These attractants and others, such as easily accessible travel corridors, should be analyzed.)
4. A description of wildlife hazards to air carrier operations (Consider the types of wildlife observed. Also consider wildlife documented in the strike database and the severity of damage they caused.)
5. Recommended actions for reducing identified wildlife hazards to air carrier operations. (Prioritize recommendations for mitigating hazardous wildlife and their attractants. Also recommend operational and maintenance changes in response to wildlife hazards (e.g.,

airport operations personnel, Air Traffic Control (ATC), air carriers, and pilots).)

4.12.4 Necessary Elements of a Wildlife Hazard Assessment Report

4.12.4.1 The final Assessment report shall discuss elements given in 4.12.3 above. If there was no triggering event or circumstance that prompted the Assessment, then the discussion of triggering event 4.12.2 may be omitted. Although there are many acceptable formats to present the findings of an Assessment, it must include those key components listed in 4.12.2 above. The required components include sections summarizing methodologies, results, and any recommendations. The report shall be submitted to the GCAA within 90 days following completion of field work and shall contain the name of the WLS who conducted the Assessment.

4.12.4.2 The details of the assessment procedures, such as point counts, trapping indices, vehicle routes, avian radar, etc, which were used shall be described to allow for the duplication of the procedures for consistent, continued monitoring or comparison to previous findings. The report shall include any maps, imagery and/or detailed descriptions whenever location information is necessary, such as assessment techniques, wildlife hazard attractants, or airport layout. The report shall cite the presence or absence of protected species identified during the Assessment. If enough data is available, it is recommended that the discussion include whether the species is resident on or near the airport or is considered transient to the location observed. The report should contain an evaluation of all available wildlife strike data for the airport. When available, key strike data such as species, number struck, phase of flight, altitude, time of day, time of year, and damage (if any) shall be summarized in the report.

4.12.4.3 The analysis of strike data may include different methodologies that can provide a key component for a comprehensive risk analysis and assessment. Beyond descriptive statistics that summarize strike characteristics at an airport, a WLS shall determine the number of overall strikes and damaging strikes per number of operations or during a six-month period. Another useful alternative for analysis may include determining the amount of biomass struck equated to number of operations or strikes. These analyses can provide a better understanding of risk and as a metric to evaluate the effectiveness of an airport's wildlife program.

4.12.4.4 Recommended actions for reducing identified wildlife hazards shall include detailed, task-specific objectives or general measures. Pay attention to both proactive mitigation such as habitat modification and exclusion techniques, and reactive measures that involve harassment, dispersal and removal procedures. When applicable, airports are encouraged to maintain all relevant wildlife permits. The Guyana wildlife Conservation and Management Commission can be contacted for guidance on this matter.

OBSTACLE CONTROL

4.13.1 Particulars setting out the procedures for:

a. monitoring the obstacle limitation surfaces and Type A Chart for obstacles in the take-off surface;
b. controlling obstacles within the authority of the Operator of the Certified Aerodrome;
c. monitoring the height of buildings or structures within the boundaries of the obstacle limitation surfaces, describing the checks, their frequency, filing and follow-up actions;
d. controlling new developments in the vicinity of aerodromes, to ensure that the obstacles do not represent a danger for safety; and
e. notifying the Authority of the nature and location of obstacles and any subsequent addition or removal of obstacles for action as necessary, including amendment of the AIS publications.

4.13.2 The parties having responsibility shall be clearly defined. These include the following:

a. responsible for obstacle surveys;
b. responsible for the surveillance of the emergence of new obstacles; and
c. when obstacles are identified, who is responsible for taking action (i.e. removal, marking, lighting, displacement, instrument procedures) and enforcing that action

REMOVAL OF DISABLED AIRCRAFT

Particulars of the procedures for removing a disabled aircraft on or adjacent to the movement area,

including the following:

a. the roles of the Operator of a Certified Aerodrome and the holder of the aircraft certificate of registration;
b. the largest size of aircraft that can be removed
c. arrangements for notifying the holder of the certificate of registration;
d. arrangements for liaising with the air traffic control unit;
e. arrangements for obtaining equipment and personnel to remove the disabled aircraft; and
f. the names, role and telephone numbers of persons responsible for arranging for the removal of disabled aircraft.

HANDLING OF HAZARDOUS MATERIALS

4.15.1 Particulars of the procedures for the safe handling and storage of hazardous materials on the aerodrome, including the following:

a. arrangements for special areas on the aerodrome to be set up for the storage of inflammable liquids (including aviation fuels) and any other hazardous materials; and
b. the method to be followed for the delivery, storage, dispensing and handling of hazardous materials.

4.15.2 Fuel, pyrotechnic materials and other highly inflammable or dangerous goods shall not be stored an aerodrome except with the permission of the Authority

Note.— Hazardous materials include inflammable liquids and solids, corrosive liquids, compressed gases and magnetized or radioactive materials. Arrangements for dealing with the accidental spillage of hazardous materials should be included in the aerodrome emergency plan.

4.16 LOW-VISIBILITY OPERATIONS

Particulars of procedures to be introduced for low-visibility operations, including the measurement and reporting of runway visual range as and when required, and the names and telephone numbers, during and after working hours, of the persons responsible for measuring the runway visual range.

4.17 PROTECTION OF SITES FOR RADAR AND NAVIGATIONAL AIDS

Particulars of the procedures for the protection of sites for radar and radio navigational aids located on the aerodrome to ensure that their performance will not be degraded, including the following:

a. arrangements for the control of activities in the vicinity of radar and navaids installations;
b. arrangements for ground maintenance in the vicinity of these installations; and
c. arrangements for the supply and installation of signs warning of hazardous microwave radiation.

Note 1.— In writing the procedures for each category, clear and precise information should be included on:

— *when, or in what circumstances, an operating procedure is to be activated;*
— *how an operating procedure is to be activated;*
— *actions to be taken;*
— *the persons who are to carry out the actions; and*
— *the equipment necessary for carrying out the actions, and access to such equipment.*

Note 2.— If any of the procedures specified above are not relevant or applicable, the reason should be given.

PART 5

AERODROME ADMINISTRATION AND SAFETY MANAGEMENT SYSTEM

Aerodrome administration

Particulars of the aerodrome administration, including the following:

a. an aerodrome organizational chart showing the names and positions of key personnel, including their responsibilities;
b. the name, position and telephone number of the person who has overall responsibility for aerodrome safety; and

c. airport committees.

Safety management system (SMS)

Particulars of the safety management system established for ensuring compliance with all safety requirements and achieving continuous improvement in safety performance, the essential features being:

a. the safety policy, insofar as applicable, on the safety management process and its relation to the operational and maintenance process;
b. the structure or organization of the SMS, including staffing and the assignment of individual and group responsibilities for safety issues;
c. SMS strategy and planning, such as setting safety performance targets, allocating priorities for implementing safety initiatives and providing a framework for controlling the risks to as low a level as is reasonably practicable keeping always in view the requirements as stated in Chapters 1 to 10 of this document and other national regulations, standards, rules or orders;
d. SMS implementation, including facilities, methods and procedures for the effective communication of safety messages and the enforcement of safety requirements;
e. a system for the implementation of, and action on, critical safety areas which require a higher level of safety management integrity (safety measures programme);
f. measures for safety promotion and accident prevention and a system for risk control involving analysis and handling of accidents, incidents, complaints, defects, faults, discrepancies and failures, and continuing safety monitoring;
g. the internal safety audit and review system detailing the systems and programmes for quality control of safety;
h. the system for documenting all safety-related airport facilities as well as airport operational and maintenance records, including information on the design and construction of aircraft pavements and aerodrome lighting. The system should enable easy retrieval of records including charts;
i. staff training and competency, including the review and evaluation of the adequacy of training provided to staff on safety-related duties and of the certification system for testing

their competency; and

j. the incorporation and enforcement of safety-related clauses in the contracts for construction work at the aerodrome.

k. Procedures to allow for the coordination between the aerodrome operator, aeroplane operators, air navigation service providers and all other relevant stakeholders to ensure the safety of operations.

l. Procedures to ensure that all users of the aerodrome, including ground-handling agencies and other organizations that perform activities independently at the aerodrome in relation to flight or aircraft handling, comply with the safety requirements of the aerodrome operator. The aerodrome operator monitors such compliance.

m. Procedures to report safety occurrences at their aerodromes. Accidents and serious incidents that must be reported include:

   i. runway excursions;
   ii. undershoots;
   iii. runway incursions;
   iv. landing or take-off on a taxiway; and
   v. wildlife strike-related events.

In addition to reporting accidents and serious incidents, said procedures must include the reporting of safety occurrences of the following types:

   i. foreign object debris/damage- (FOD) related event;
   ii. other excursions (i.e. from a taxiway or apron);
   iii. other incursions (i.e. on taxiway or apron); and
   iv. ground collisions.

n. Aerodrome operators should ensure that analysis of safety occurrences at the aerodrome is performed by competent personnel who have been trained to perform these tasks.

o. procedures to coordinate with all users of the aerodrome, including aircraft operators, ground-handling agencies, air navigation service providers and other stakeholders to ensure the completeness and accuracy of the collection of safety occurrences and their related critical data.

p. a description of each of the aerodrome operator's procedures related to the safety of aeronautical operations at the aerodrome. For each procedure:

i. the responsibilities of the aerodrome operator are clearly described;

ii. the tasks that are to be achieved by the aerodrome operator or its subcontractors are listed; and

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

Aerodrome operators shall also implement procedures to ensure that third parties comply with the safety provisions established by the aerodrome operator.

APPENDIX 7. SAMPLE APPLICATION FORM FOR ANAERODROME CERTIFICATE

GUYANA CIVIL AVIATION AUTHORITY
AVIATION SAFETY REGULATION DIRECTORATE
AERODROME CERTIFICATION MANUAL

Issue: 3

Document No: GCAA/AGA/C/M001

Appendix 6 – Application for Aerodrome Certificate

1. Particulars of Owner (Give details as required to be shown on the Certificate)
Name:
Address: _____
2. Particulars of Aerodrome
Name: _____ Region: _____ Position (Magnetic Coordinates): _____ Lat. /Long.: _____ Length:_____ Width:_____ Obstructions: yes ☐ no ☐ If yes state: _____
3. Particulars of Aircraft
Type(s): _____ Model(s): _____ MTW of largest aircraft: _____
4. Classification of Aerodrome
Public ☐ Cargo ☐ Medivac ☐ Day ☐ Night ☐ Heliport ☐ Stolport ☐ Private ☐ Training ☐ Aerial work ☐ VFR ☐ IFR ☐ Land ☐ Water ☐ Permanent ☐ Temporary ☐
5. Particulars of Applicant (If different from Owner)
State: _____ _____
6. Approvals from Ministry (Give details of the approvals obtained from the ministries as indicated below. Mention details of objection raised, if any):

Name of Ministry	Reference of Approval
(a)	
(b)	
(c)	
(d)	

7. Are the safe guarding measures taken with local planning ministry to control new construction in the vicinity of the aerodrome which may cause an obstacle? Yes ☐ No ☐
8. NB.: Any other information relevant to this application that you would like to offer can be attached. Enclosure(s):
9.Certification
I hereby certify that the foregoing information is correct in every respect and no relevant information has been withheld. Name:_____ Signature:_____ Seal: _____ Date: _____

1 Aug 2016 Appendix 6-1

APPENDIX 8. AERONAUTICAL STUDIES

PURPOSE

An aeronautical study is conducted to assess the impact of deviations from the aerodrome requirements specified in chapters 1 to 10 of these requirements and any other applicable national regulations, to present alternative means of ensuring the safety of aircraft operations, to estimate the effectiveness of each alternative and to recommend procedures to compensate for the deviation.

APPLICABILITY

An aeronautical study may be carried out when aerodrome standards cannot be met as a result of development. Such a study is most frequently undertaken during the planning of a new airport or during the certification of an existing aerodrome.

Note.— Aeronautical studies may not be conducted in cases of deviations from the standards, if not specifically stated in chapters 1 to 10 of these Requirements.

DEFINITION

An aeronautical study is a study of an aeronautical problem to identify possible solutions and select a solution that is acceptable without degrading safety.

TECHNICAL ANALYSIS

Technical analysis will provide justification for a deviation on the grounds that an equivalent level of safety can be attained by other means. It is generally applicable in situations where the cost of correcting a problem that violates a standard is excessive but where the unsafe effects of the problem can be overcome by some procedural means which offers both practical and reasonable solutions. In conducting a technical analysis, inspectors will draw upon their practical experience and specialized knowledge. They may also consult other specialists in relevant areas. When

considering alternative procedures in the deviation approval process, it is essential to bear in mind the safety objective of the aerodrome certification regulations/requirements and the applicable standards so that the intent of the regulations/requirements is not circumvented.

APPROVAL OF DEVIATIONS

In some instances, the only reasonable means of providing an equivalent level of safety is to adopt suitable procedures and to require, as a condition of certification, that cautionary advice be published in the appropriate AIS publications.

The determination to require caution will be primarily dependent on two considerations:

a. a pilot's need to be made aware of potentially hazardous conditions; and
b. the responsibility of the Authority to publish deviations from standards that would otherwise be assumed under certificate status.

APPENDIX 9. AERODROME CERTIFICATE TEMPLATE

FORM NO.: GCAA/AGA/ACM-80C

GUYANA
CIVIL AVIATION AUTHORITY

AERODROME OPERATOR CERTIFICATE

CERTIFICATE NO.: AGA/01

This Certificate is issued by the Guyana Civil Aviation Authority pursuant to the Civil Aviation Act 2016, Sections 36 – 39, and Guyana Aviation Requirements Part: 12, for the time being in force, to:

Name of Aerodrome	Name of Aerodrome Operator
Location	Aerodrome Designator
Coordinates	Rescue and Fire Fighting Category
Aerodrome Reference Code	Type of Operation

as a **CERTIFIED AERODROME** to be operated and maintained subject to the conditions listed below:

1. This Aerodrome Operator Certificate authorizes the operator named above and in the approved Aerodrome Operations Manual to operate this aerodrome.
2. The Authority may amend, suspend, revoke or cancel this Certificate pursuant to Sections 40 - 43 of the Civil Aviation Act 2016 at any time the Authority has determined that the Aerodrome Operator has failed to comply with the applicable provisions of the Act.
3. This certificate is subject to the provisions and conditions established herein under the Civil Aviation Act 2016 and the approved Aerodrome Operations Manual.
4. This Aerodrome Operator Certificate is not transferable and shall remain in effect until surrendered, suspended, revoked or cancelled.

Date of Original Issue: _____

Date Renewed: _____

Date Expired: _____

_____
Name of Director General Civil Aviation

_____
Signature of Director General Civil Aviation

EXEMPTIONS/RESTRICTIONS/LIMITATIONS

ATTACHMENT A. GUIDANCE MATERIAL SUPPLEMENTARY TO THE GUYANA CIVIL AVIATION REQUIREMENTS FOR CERTIFIED AERODROMES

1. NUMBER, SITING AND ORIENTATION OF RUNWAYS

SITING AND ORIENTATION OF RUNWAYS

1.1 Many factors should be taken into account in the determination of the siting and orientation of runways. Without attempting to provide an exhaustive list of these factors nor an analysis of their effects, it appears useful to indicate those which most frequently require study. These factors may be classified under four headings:

1.1.1 Type of operation. Attention should be paid in particular to whether the aerodrome is to be used in all meteorological conditions or only in visual meteorological conditions, and whether it is intended for use by day and night, or only by day.

1.1.2 Climatological conditions. A study of the wind distribution should be made to determine the usability factor. In this regard, the following comments should be taken into account:

(a) Wind statistics used for the calculation of the usability factor are normally available in ranges of speed and direction, and the accuracy of the results obtained depends, to a large extent, on the assumed distribution of observations within these ranges. In the absence of any sure information as to the true distribution, it is usual to assume a uniform distribution since, in relation to the most favourable runway orientations, this generally results in a slightly conservative usability factor.

(b) The maximum mean crosswind components given in Chapter 3, 3.1.3, refer to normal circumstances. There are some factors which may require that a reduction of those maximum values be taken into account at a particular aerodrome. These include:

1) the wide variations which may exist, in handling characteristics and maximum permissible crosswind components, among diverse types of aeroplanes (including future types) within each of the three groups given in 3.1.3;

2) prevalence and nature of gusts;

3) prevalence and nature of turbulence;

4) the availability of a secondary runway;

5) the width of runways;

6) the runway surface conditions — water, on the runway materially reduce the allowable crosswind component; and

7) the strength of the wind associated with the limiting crosswind component.

A study should also be made of the occurrence of poor visibility and/or low cloud base. Account should be taken of their frequency as well as the accompanying wind direction and speed.

1.1.3 Topography of the aerodrome site, its approaches, and surroundings, particularly:

(a) compliance with the obstacle limitation surfaces;

(b) current and future land use. The orientation and layout should be selected so as to protect as far as possible the particularly sensitive areas such as residential, school and hospital zones from the discomfort caused by aircraft noise. Detailed information on this topic is provided in the *Airport Planning Manual* (Doc 9184), Part 2, and in *Guidance on the Balanced Approach to Aircraft Noise Management* (Doc 9829);

(c) current and future runway lengths to be provided;

(d) construction costs; and

(e) possibility of installing suitable non-visual and visual aids for approach-to-land.

1.1.4 Air traffic in the vicinity of the aerodrome, particularly:

(a) proximity of other aerodromes or ATS routes;

(b) traffic density; and

(c) air traffic control and missed approach procedures.

NUMBER OF RUNWAYS IN EACH DIRECTION

1.2 The number of runways to be provided in each direction depends on the number of aircraft movements to be catered to.

2 CLEARWAYS AND STOPWAYS

2.1 The decision to provide a stopway and/or a clearway as an alternative to an increased length of runway will depend on the physical characteristics of the area beyond the runway end, and on the operating performance requirements of the prospective aeroplanes. The runway, stopway and clearway lengths to be provided are determined by the aeroplane take-off performance, but a check should also be made of the landing distance required by the aeroplanes using the runway to ensure that adequate runway length is provided for landing. The length of a clearway, however, cannot exceed half the length of take-off run available.

2.2 The aeroplane performance operating limitations require a length which is enough to ensure that the aeroplane can, after starting a take-off, either be brought safely to a stop or complete the take-off safely. For the purpose of discussion it is supposed that the runway, stopway and clearway lengths provided at the aerodrome are only just adequate for the aeroplane requiring the longest take-off and accelerate-stop distances, taking into account its take-off mass, runway characteristics and ambient atmospheric conditions. Under these circumstances there is, for each take-off, a speed, called the decision speed; below this speed, the take-off must be abandoned if an engine fails, while above it the take-off must be completed. A very long take-off run and take-off distance would be required to complete a take-off when an engine fails before the decision speed is reached, because of the insufficient speed and the reduced power available. There would be no difficulty in stopping in the remaining accelerate-stop distance available provided action is taken immediately. In these circumstances the correct course of action would be to abandon the take-off.

2.3 On the other hand, if an engine fails after the decision speed is reached, the aeroplane will have sufficient speed and power available to complete the take-off safely in the remaining take-off distance available. However, because of the high speed, there would be difficulty in stopping the aeroplane in the remaining accelerate-stop distance available.

2.4 The decision speed is not a fixed speed for any aeroplane, but can be selected by the pilot within limits to suit the accelerate-stop and take-off distance available, aeroplane take-off mass, runway characteristics and ambient atmospheric conditions at the aerodrome. Normally, a higher decision speed is selected as the accelerate-stop distance available increases.

2.5 A variety of combinations of accelerate-stop distances required and take-off distances required can be obtained to accommodate a particular aeroplane, taking into account the aeroplane take-off mass,

runway characteristics, and ambient atmospheric conditions. Each combination requires its particular length of take-off run.

2.6 The most familiar case is where the decision speed is such that the take-off distance required is equal to the accelerate-stop distance required; this value is known as the balanced field length. Where stopway and clearway are not provided, these distances are both equal to the runway length. However, if landing distance is for the moment ignored, runway is not essential for the whole of the balanced field length, as the take-off run required is, of course, less than the balanced field length. The balanced field length can, therefore, be provided by a runway supplemented by an equal length of clearway and stopway, instead of wholly as a runway. If the runway is used for take-off in both directions, an equal length of clearway and stopway has to be provided at each runway end. The saving in runway length is, therefore, bought at the cost of a greater overall length.

2.7 In case economic considerations preclude the provision of stopway and, as a result, only runway and clearway are to be provided, the runway length (neglecting landing requirements) should be equal to the accelerate-stop distance required or the take-off run required, whichever is the greater. The take-off distance available will be the length of the runway plus the length of clearway.

2.8 The minimum runway length and the maximum stopway or clearway length to be provided may be determined as follows, from the data in the aeroplane flight manual for the aeroplane considered to be critical from the viewpoint of runway length requirements:

(a) if a stopway is economically possible, the lengths to be provided are those for the balanced field length. The runway length is the take-off run required or the landing distance required, whichever is the greater. If the accelerate-stop distance required is greater than the runway length so determined, the excess may be provided as stopway, usually at each end of the runway. In addition, a clearway of the same length as the stopway must also be provided;

(b) if a stopway is not to be provided, the runway length is the landing distance required, or if it is greater, the accelerate-stop distance required, which corresponds to the lowest practical value of the decision speed. The excess of the take-off distance required over the runway length may be provided as clearway, usually at each end of the runway.

2.9 In addition to the above consideration, the concept of clearways in certain circumstances can be

applied to a situation where the take-off distance required for all engines operating exceeds that required for the engine failure case.

2.10 The economy of a stopway can be entirely lost if, after each usage, it must be regraded and compacted. Therefore, it should be designed to withstand at least a certain number of loadings of the aeroplane which the stopway is intended to serve without inducing structural damage to the aeroplane.

3 CALCULATION OF DECLARED DISTANCES

3.1 The declared distances to be calculated for each runway direction comprise: the take-off run available (TORA), take-off distance available (TODA), accelerate-stop distance available (ASDA), and landing distance available (LDA).

3.2 Where a runway is not provided with a stopway or clearway and the threshold is located at the extremity of the runway, the four declared distances should normally be equal to the length of the runway, as shown in Figure A-1 (A). Where a runway is provided with a clearway (CWY), then the TODA will include the length of clearway, as shown in Figure A-1 (B).

3.3 Where a runway is provided with a stopway (SWY), then the ASDA will include the length of stopway, as shown in Figure A-1 (C).

3.4 Where a runway has a displaced threshold, then the LDA will be reduced by the distance the threshold is displaced, as shown in Figure A-1 (D). A displaced threshold affects only the LDA for approaches made to that threshold; all declared distances for operations in the reciprocal direction are unaffected.

3.5 Figures A-1 (B) through A-1 (D) illustrate a runway provided with a clearway or a stopway or having a displaced threshold. Where more than one of these features exist, then more than one of the declared distances will be modified — but the modification will follow the same principle illustrated. An example showing a situation where all these features exist is shown in Figure A-1 (E).

3.6 A suggested format for providing information on declared distances is given in Figure A-1 (F). If a runway direction cannot be used for take-off or landing, or both, because it is operationally forbidden,

then this should be declared and the words "not usable" or the abbreviation "NU" entered.

4 SLOPES ON A RUNWAY

4.1 DISTANCE BETWEEN SLOPE CHANGES

The following example illustrates how the distance between slope changes is to be determined (see Figure A-2): D for a runway where the code number is 3 should be at least:

15 000 ($|x - y| + |y - z|$) m

$|x - y|$ being the absolute numerical value of $x - y$

$|y - z|$ being the absolute numerical value of $y - z$

Assuming $x = +0.01$

$y = -0.005$

$z = +0.005$

then $|x - y| = 0.015$

$|y - z| = 0.01$

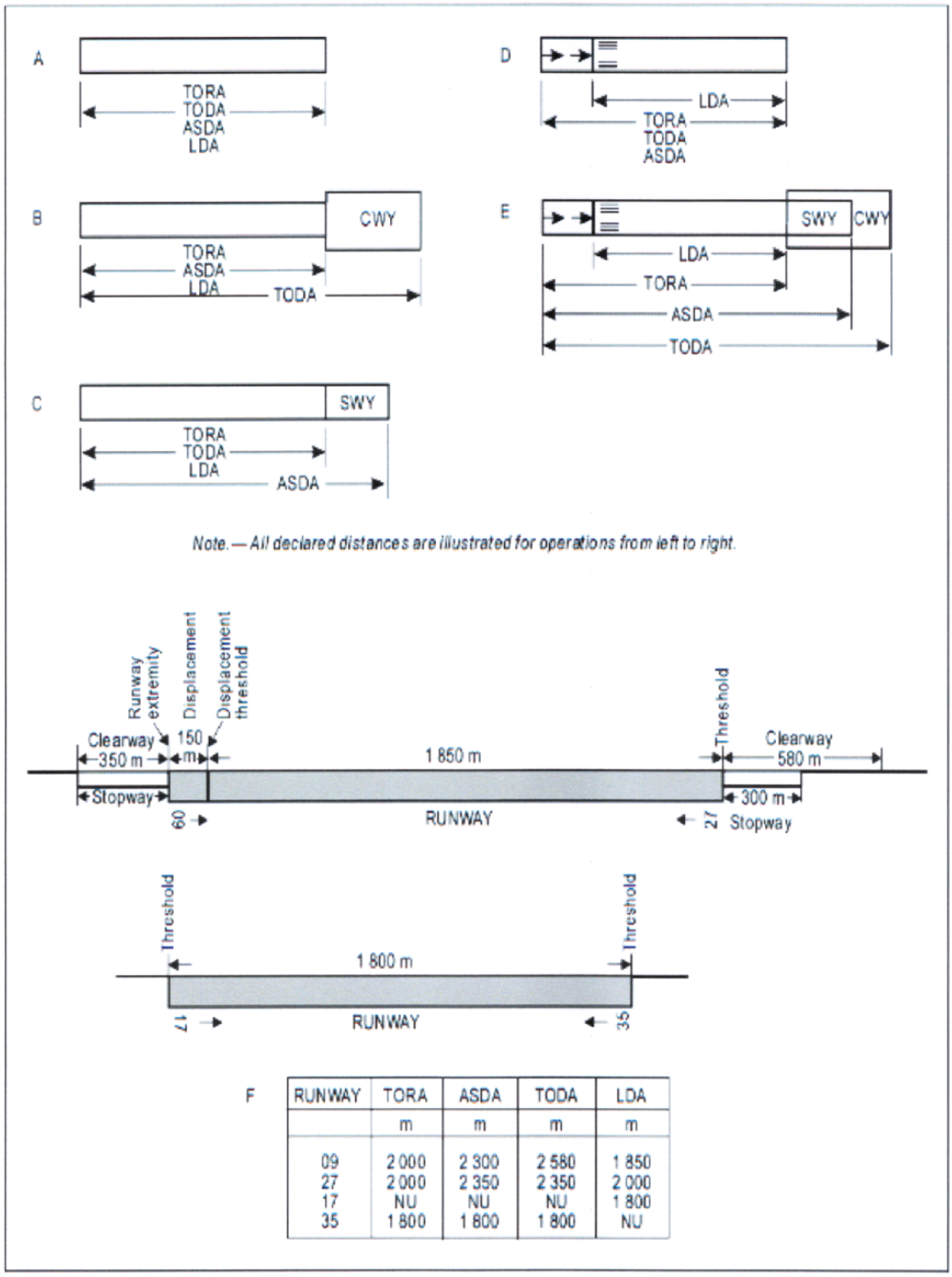
To comply with the specifications, D should be not

less than: 15 000 (0.015 + 0.01) m,

that is, 15 000 × 0.025 = 375 m

4.1 Consideration of longitudinal and transverse slopes

When a runway is planned that will combine the extreme values for the slopes and changes in slope permitted under Chapter 3, 3.1.13 to 3.1.19, a study should be made to ensure that the resulting surface profile will not hamper the operation of aeroplanes.



F

RUNWAY	TORA	ASDA	TODA	LDA
	m	m	m	m
09	2 000	2 300	2 580	1 850
27	2 000	2 350	2 350	2 000
17	NU	NU	NU	1 800
35	1 800	1 800	1 800	NU

Figure A-1. Illustration of declared distances

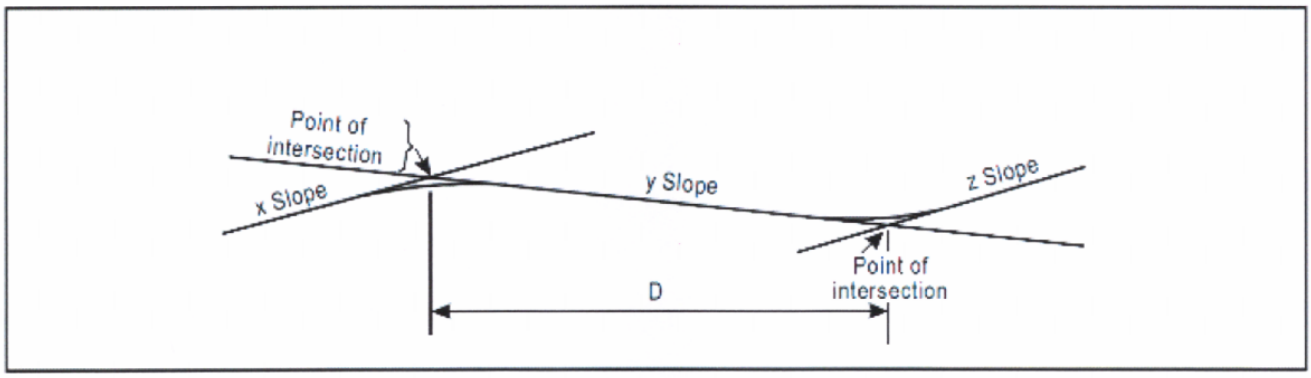


Figure A-2. Profile on centre line of runway

4.2 RADIO ALTIMETER OPERATING AREA

In order to accommodate aeroplanes making auto-coupled approaches and automatic landings (irrespective of weather conditions) it is desirable that slope changes be avoided or kept to a minimum, on a rectangular area at least 300 m long before the threshold of a precision approach runway. The area should be symmetrical about the extended centre line, 120 m wide. When special circumstances so warrant, the width may be reduced to no less than 60 m if an aeronautical study indicates that such reduction would not affect the safety of operations of aircraft. This is desirable because these aeroplanes are equipped with a radio altimeter for final height and flare guidance, and when the aeroplane is above the terrain immediately prior to the threshold, the radio altimeter will begin to provide information to the automatic pilot for auto-flare. Where slope changes cannot be avoided, the rate of change between two consecutive slopes should not exceed 2 per cent per 30 m.

5 RUNWAY SURFACE EVENNESS

5.1 In adopting tolerances for runway surface irregularities, the following standard of construction is achievable for short distances of 3 m and conforms to good engineering practice:

Except across the crown of a camber or across drainage channels, the finished surface of the wearing course is to be of such regularity that, when tested with a 3 m straight-edge placed anywhere in any direction on the surface, there is no deviation greater than 3 mm between the bottom of the straight-edge and the surface of the pavement anywhere along the straight-edge.

5.2 Caution should also be exercised when inserting runway lights or drainage grilles in runway surfaces to ensure that adequate smoothness of the surface is maintained.

5.3 The operation of aircraft and differential settlement of surface foundations will eventually lead to increases in surface irregularities. Small deviations in the above tolerances will not seriously hamper aircraft operations. In general, isolated irregularities of the order of 2.5 cm to 3 cm over a 45 m distance are acceptable, as shown in Figure A-3. Although maximum acceptable deviations vary with the type and speed of an aircraft, the limits of acceptable surface irregularities can be estimated to a reasonable extent. The following table describes acceptable, tolerable and excessive limits:

(a) if the surface irregularities exceed the heights defined by the acceptable limit curve but are less than the heights defined by the tolerable limit curve, at the specified minimum acceptable length, herein noted by the tolerable region, then maintenance action should be planned. The runway may remain in service. This region is the start of possible passenger and pilot discomfort;

(b) if the surface irregularities exceed the heights defined by the tolerable limit curve, but are less than the heights defined by the excessive limit curve, at the specified minimum acceptable length, herein noted by the excessive region, then maintenance corrective action is mandatory to restore the condition to the acceptable region. The runway may remain in service but be repaired within a reasonable period. This region could lead to the risk of possible aircraft structural damage due to a single event or fatigue failure over time; and

(c) if the surface irregularities exceed the heights defined by the excessive limit curve, at the specified minimum acceptable length, herein noted by the unacceptable region, then the area of the runway where the roughness has been identified warrants closure. Repairs must be made to restore the condition to within the acceptable limit region and the aircraft operators may be advised accordingly. This region runs the extreme risk of a structural failure and must be addressed immediately.

Surface irregularity	Length of irregularity (m)								
	3	6	9	12	15	20	30	45	60
Acceptable surface irregularity height (cm)	2.9	3.8	4.5	5	5.4	5.9	6.5	8.5	10
Tolerable surface irregularity height (cm)	3.9	5.5	6.8	7.8	8.6	9.6	11	13.6	16
Excessive surface irregularity height (cm)	5.8	7.6	9.1	10	10.8	11.9	13.9	17	20

Note that "surface irregularity" is defined herein to mean isolated surface elevation deviations that do not lie along a uniform slope through any given section of a runway. For the purposes of this concern, a "section of a runway" is defined herein to mean a segment of a runway throughout which a continuing general uphill, downhill or flat slope is prevalent. The length of this section is generally between 30 and 60 metres, and can be greater, depending on the longitudinal profile and the condition of the pavement.

The maximum tolerable step type bump, such as that which could exist between adjacent slabs, is simply the bump height corresponding to zero bump length at the upper end of the tolerable region of the roughness criteria of Figure A-3. The bump height at this location is 1.75 cm.

5.4 Figure A-3 illustrates a comparison of the surface roughness criteria with those developed by the United States Federal Aviation Administration. Further guidance regarding temporary slopes for overlay works on operational runways can be found in the Aerodrome Design Manual, Part 3 — Pavements (Doc 9157).

5.5 Deformation of the runway with time may also increase the possibility of the formation of water pools. Pools as shallow as approximately 3 mm in depth, particularly if they are located where they are likely to be encountered at high speed by landing aeroplanes, can induce aquaplaning, which can then be sustained on a wet runway by a much shallower depth of water. Improved guidance regarding the significant length and depth of pools relative to aquaplaning is the subject of further research. It is, of course, especially necessary to prevent pools from forming whenever there is a possibility that they might become frozen.

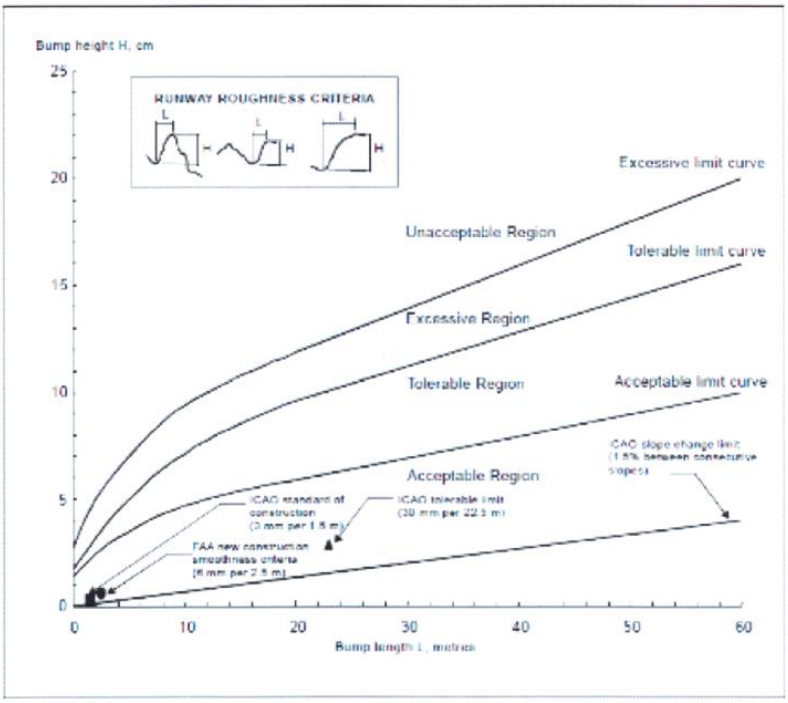


Figure A-3.Comparison of roughness criteria

Note.— These criteria address single event roughness, not long wavelength harmonic effects nor the effect of repetitive surface undulations.

6 RUNWAY CONDITION REPORT FOR REPORTING RUNWAY SURFACE CONDITION

6.1 On a global level, movement areas are exposed to a multitude of climatic conditions and consequently a significant difference in the condition to be reported. The runway condition report (RCR) describes a basic methodology applicable for all these climatic variations and is structured in such a way that States can adjust them to the climatic conditions applicable for that State or region.

6.2 The concept of the RCR is premised on:

(a) an agreed set of criteria used in a consistent manner for runway surface condition assessment, aeroplane (performance) certification and operational performance calculation;

(b) a unique runway condition code (RWYCC) linking the agreed set of criteria with the aircraft landing and take- off performance table, and related to the braking action experienced and eventually reported by flight crews;

(c) reporting of contaminant type and depth that is relevant to take-off performance;

(d) a standardized common terminology and phraseology for the description of runway surface conditions that can be used by aerodrome operator inspection personnel, air traffic controllers, aircraft operators and flight crew; and

(e) globally-harmonized procedures for the establishment of the RWYCC with a built-in flexibility to allow for local variations to match the specific weather, infrastructure and other particular conditions.

6.3 These harmonized procedures are reflected in a runway condition assessment matrix (RCAM) which correlates the RWYCC, the agreed set of criteria and the aircraft braking action which the flight crew should expect for each value of the RWYCC.

6.4 Procedures which relate to the use of the RCAM are provided in the PANS-Aerodromes (Doc 9981).

6.5 It is recognized that information provided by the aerodrome's personnel assessing and reporting runway surface condition is crucial to the effectiveness of the runway condition report. A misreported runway condition alone should not lead to an accident or incident. Operational margins should cover for a reasonable error in the assessment, including unreported changes in the runway condition. But a misreported runway condition can mean that the margins are no longer available to cover for other operational variance (such as unexpected tailwind, high and fast approach above threshold or long flare).

6.6 This is further amplified by the need for providing the assessed information in the proper format for dissemination, which requires insight into the limitations set by the syntax for dissemination. This in turn restricts the wording of plain text remarks that can be provided.

6.7 It is important to follow standard procedures when providing assessed information on the runway surface conditions to ensure that safety is not compromised when aeroplanes use wet or contaminated runways. Personnel should be trained in the relevant fields of competence and their competence verified in a manner required by the State to ensure confidence in their assessments.

6.8 The training syllabus may include initial and periodic recurrent training in the following areas:

(a) aerodrome familiarization, including aerodrome markings, signs and lighting;
(b) aerodrome procedures as described in the aerodrome manual;
(c) aerodrome emergency plan;
(d) Notice to Airmen (NOTAM) initiation procedures;
(e) completion of/initiation procedures for RCR;
(f) aerodrome driving rules;
(g) air traffic control procedures on the movement area;
(h) radiotelephone operating procedures;
(i) phraseology used in aerodrome control, including the ICAO spelling alphabet;
(j) aerodrome inspection procedures and techniques;
(k) type of runway contaminants and reporting;
(l) assessment and reporting of runway surface friction characteristics;
(m) use of runway friction measurement device;
(n) calibration and maintenance of runway friction measurement device;
(o) awareness of uncertainties related to l) and m); and
(p) low visibility procedures.

7 DRAINAGE CHARACTERISTICS OF THE MOVEMENT AREA AND ADJACENT AREAS

7.1 GENERAL

7.1.1 Rapid drainage of surface water is a primary safety consideration in the design, construction and maintenance of the movement area and adjacent areas. The objective is to minimize water depth on the surface by draining water off the runway in the shortest path possible and particularly out of the area of the wheel path. There are two distinct drainage processes taking place:

(a) natural drainage of the surface water from the top of the pavement surface until it reaches the final recipient such as rivers or other water bodies; and
(b) dynamic drainage of the surface water trapped under a moving tire until it reaches outside the tire-to-ground contact area.

7.1.2 Both processes can be controlled through:

(a) design;

(b) construction; and

(c) maintenance.

of the pavements in order to prevent accumulation of water on the pavement surface.

7.2 DESIGN OF PAVEMENT

7.2.1 Surface drainage is a basic requirement and serves to minimize water depth on the surface. The objective is to drain water off the runway in the shortest path. Adequate surface drainage is provided primarily by an appropriately sloped surface (in both the longitudinal and transverse directions). The resulting combined longitudinal and transverse slope is the path for the drainage run-off. This path can be shortened by adding transverse grooves.

7.2.2 Dynamic drainage is achieved through built-in texture in the pavement surface. The rolling tire builds up water pressure and squeezes the water out the escape channels provided by the texture. The dynamic drainage of the tire-to-ground contact area may be improved by adding transverse grooves provided that they are subject to rigorous maintenance.

7.3 CONSTRUCTION OF PAVEMENT

7.3.1 Through construction, the drainage characteristics of the surface are built into the pavement. These surface characteristics are:

(a) slopes;

(b) texture

1) microtexture;

2) macrotexture;

7.3.2 Slopes for the various parts of the movement area and adjacent parts are described in Chapter 3 and figures are given as per cent. Further guidance is given in the *Aerodrome Design Manual* (Doc 9157), Part 1, Chapter 5.

7.3.3 Texture in the literature is described as microtexture or macrotexture. These terms are understood differently in various parts of the aviation industry.

7.3.4 Microtexture is the texture of the individual stones and is hardly detectable by the eye. Microtexture is considered a primary component in skid resistance at slow speeds. On a wet surface at higher speeds a water film may prevent direct contact between the surface asperities and the tire due to insufficient drainage from the tire-to-ground contact area.

7.3.5 Microtexture is a built-in quality of the pavement surface. By specifying crushed material that will withstand polishing microtexture, drainage of thin waterfilms are ensured for a longer period of time. Resistance against polishing is expressed in terms of the Polished Stone Values (PSV) which is in principle a value obtained from a friction measurement in accordance with international standards. These standards define the PSV minima that will enable a material with a good microtexture to be selected.

7.3.6 A major problem with microtexture is that it can change within short time periods without being easily detected. A typical example of this is the accumulation of rubber deposits in the touchdown area which will largely mask microtexture without necessarily reducing macrotexture.

7.3.7 Macrotexture is the texture among the individual stones. This scale of texture may be judged approximately by the eye. Macrotexture is primarily created by the size of aggregate used or by surface treatment of the pavement and is the major factor influencing drainage capacity at high speeds. Materials shall be selected so as to achieve good macrotexture.

7.3.8 The primary purpose of grooving a runway surface is to enhance surface drainage. Natural drainage can be slowed down by surface texture, but grooving can speed up the drainage by providing a shorter drainage path and increasing the drainage rate.

7.3.9 For measurement of macrotexture, simple methods such as the "sand and grease patch" methods described in the *Airport Services Manual* (Doc 9137), Part 2 were developed. These methods were used for the early research on which current airworthiness requirements are based, which refer to a classification categorizing macrotexture from A to E. This classification was developed, using sand or grease patch measuring techniques, and issued in 1971 by the Engineering Sciences Data Unit (ESDU).

Runway classification based on texture information from ESDU 71026:

Classification	*Texture depths (mm)*
A	0.10 – 0.14
B	0.15 – 0.24
C	0.25 – 0.50
D	0.51 – 1.00
E	1.01 – 2.54

7.3.10 Using this classification, the threshold value between microtexture and macrotexture is 0.1 mm mean texture depth (MTD). Related to this scale, the normal wet runway aircraft performance is based upon texture giving drainage and friction qualities midway between classification B and C (0.25 mm). Improved drainage through better texture might qualify for a better aircraft performance class. However such credit must be in accordance with aeroplane manufacturers' documentation and agreed by the State. Presently credit is given to grooved or porous friction course runways following design, construction and maintenance criteria acceptable to the State. The harmonized certification standards of some States refer to texture giving drainage and friction qualities midway between classification D and E (1.0 mm).

7.3.11 For construction, design and maintenance, States use various international standards. Currently ISO 13473-1: Characterization of pavement texture by use of surface profiles — Part 1: Determination of Mean Profile Depth links the volumetric measuring technique with non-contact profile measuring techniques giving comparable texture values. These standards describe the threshold value between microtexture and macrotexture as 0.5 mm. The volumetric method has a validity range from 0.25 to 5 mm MTD. The profilometry method has a validity range from 0 to 5 mm mean profile depth (MPD). The values of MPD and MTD differ due to the finite size of the glass spheres used in the volumetric technique and because the MPD is derived from a two-dimensional profile rather than a three-dimensional surface. Therefore a transformation equation must be established for the measuring equipment used to relate MPD to MTD.

7.3.12 The ESDU scale groups runway surfaces based on macrotexture from A through E, where E represents the surface with best dynamic drainage capacity. The ESDU scale thus reflects the dynamic drainage characteristics of the pavement. Grooving any of these surfaces enhances the dynamic drainage

capacity. The resulting drainage capacity of the surface is thus a function of the texture (A through E) and grooving. The contribution from grooving is a function of the size of the grooves and the spacing between the grooves. Aerodromes exposed to heavy or torrential rainfall must ensure that the pavement and adjacent areas have drainage capability to withstand these rainfalls or put limitations on the use of the pavements under such extreme situations. These airports should seek to have the maximum allowable slopes and the use of aggregates providing good drainage characteristics. They should also consider grooved pavements in the E classification to ensure that safety is not impaired.

7.4 MAINTENANCE OF DRAINAGE CHARACTERISTICS OF PAVEMENT

7.4.1 Macrotexture does not change within a short timespan but accumulation of rubber can fill up the texture and as such reduce the drainage capacity, which can result in impaired safety. Furthermore the runway structure may change over time and give unevenness which results in ponding after rainfall. Guidance on rubber removal and unevenness can be found in the Airport Services Manual (Doc 9137), Part 2. Guidance on methods for improving surface texture can be found in the Aerodrome Design Manual (Doc 9157), Part 3.

7.4.2 When groovings are used, the condition of the grooves should be regularly inspected to ensure that no deterioration has occurred and that the grooves are in good condition. Guidance on maintenance of pavements is available in the Airport Services Manual (Doc 9137), Part 2 — Pavement Surface Conditions and Part 9 — Airport Maintenance Practices and the Aerodrome Design Manual (Doc 9157), Part 2.

7.4.3 The pavement may be shot blasted in order to enhance the pavement macrotexture.

8 STRIPS

8.1 SHOULDERS

8.1.1 The shoulder of a runway or stopway should be prepared or constructed so as to minimize any hazard to an aeroplane running off the runway or stopway. Some guidance is given in the following paragraphs on certain special problems which may arise, and on the further question of measures to avoid the ingestion of loose stones or other objects by turbine engines.

8.1.2 In some cases, the bearing strength of the natural ground in the strip may be sufficient, without

special preparation, to meet the requirements for shoulders. Where special preparation is necessary, the method used will depend on local soil conditions and the mass of the aeroplanes the runway is intended to serve. Soil tests will help in determining the best method of improvement (e.g. drainage, stabilization, surfacing, light paving).

8.1.3 Attention should also be paid when designing shoulders to prevent the ingestion of stones or other objects by turbine engines. Similar considerations apply here to those which are discussed for the margins of taxiways in the Aerodrome Design Manual (Doc 9157), Part 2, both as to the special measures which may be necessary and as to the distance over which such special measures, if required, should be taken.

8.1.4 Where shoulders have been treated specially, either to provide the required bearing strength or to prevent the presence of stones or debris, difficulties may arise because of a lack of visual contrast between the runway surface and that of the adjacent strip. This difficulty can be overcome either by providing a good visual contrast in the surfacing of the runway or strip, or by providing a runway side stripe marking.

8.2 OBJECTS ON STRIPS

Within the general area of the strip adjacent to the runway, measures should be taken to prevent an aeroplane's wheel, when sinking into the ground, from striking a hard vertical face. Special problems may arise for runway light fittings or other objects mounted in the strip or at the intersection with a taxiway or another runway. In the case of construction, such as runways or taxiways, where the surface must also be flush with the strip surface, a vertical face can be eliminated by chamfering from the top of the construction to not less than 30 cm below the strip surface level. Other objects, the functions of which do not require them to be at surface level, should be buried to a depth of not less than 30 cm.

8.3 GRADING OF A STRIP FOR PRECISION APPROACH RUNWAYS

Chapter 3, 3.4.8, recommends that the portion of a strip of an instrument runway within at least 75 m from the centre line should be graded where the code number is 3 or 4. For a precision approach runway, it may be desirable to adopt a greater width where the code number is 3 or 4. Figure A-4 shows the shape and

dimensions of a wider strip that may be considered for such a runway. This strip has been designed using information on aircraft running off runways. The portion to be graded extends to a distance of 105 m from the centre line, except that the distance is gradually reduced to 75 m from the centre line at both ends of the strip, for a length of 150 m from the runway end.

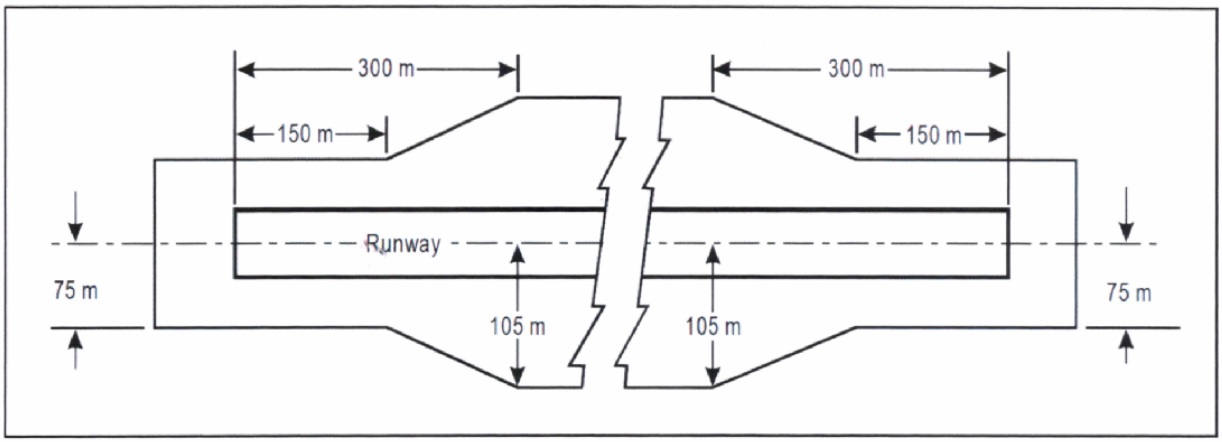


Figure A-4. Graded portion of a strip including a precision approach runway where the code number is 3 or 4

9 RUNWAY END SAFETY AREAS

9.1 Where a runway end safety area is provided in accordance with Chapter 3, consideration should be given to providing an area long enough to contain overruns and undershoots resulting from a reasonably probable combination of adverse operational factors. On a precision approach runway, the ILS localizer is normally the first upstanding obstacle, and the runway end safety area should extend up to this facility. In other circumstances, the first upstanding obstacle may be a road, a railroad or other constructed or natural feature. The provision of a runway end safety area should take such obstacles into consideration.

9.2 Where provision of a runway end safety area would be particularly prohibitive to implement, consideration would have to be given to reducing some of the declared distances of the runway for the provision of a runway end safety area and installation of an arresting system.

9.3 Research programmes, as well as evaluation of actual aircraft overruns into arresting systems, have demonstrated that the performance of some arresting systems can be predictable and effective in

arresting aircraft overruns.

9.4 Demonstrated performance of an arresting system can be achieved by a validated design method, which can predict the performance of the system. The design and performance should be based on the type of aircraft anticipated to use the associated runway that imposes the greatest demand upon the arresting system.

9.5 The design of an arresting system must consider multiple aircraft parameters, including but not limited to, allowable aircraft gear loads, gear configuration, tire contact pressure, aircraft centre of gravity and aircraft speed. Accommodating undershoots must also be addressed. Additionally, the design must allow the safe operation of fully loaded rescue and firefighting vehicles, including their ingress and egress.

9.6 The information relating to the provision of a runway end safety area and the presence of an arresting system should be published in the AIP.

9.7 Additional information is contained in the Aerodrome Design Manual (Doc 9157), Part 1.

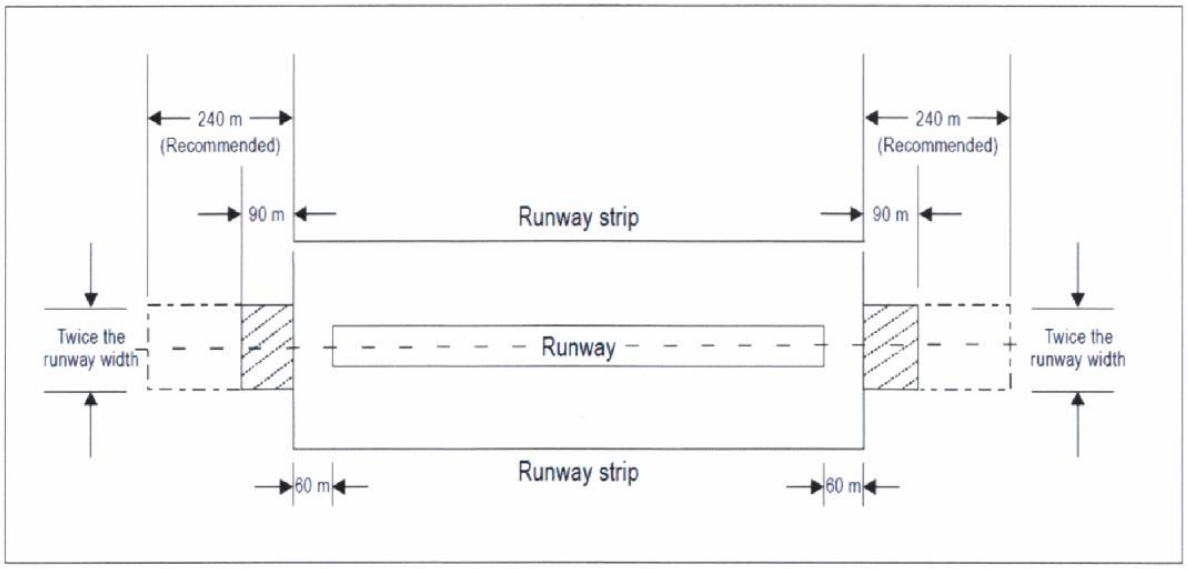


Figure A-5. Runway end safety area for a runway where the code number is 3 or 4

10 LOCATION OF THRESHOLD

GENERAL

10.1.1 The threshold is normally located at the extremity of a runway, if there are no obstacles penetrating above the approach surface. In some cases, however, due to local conditions it may be desirable to displace the threshold permanently (see below). When studying the location of a threshold, consideration should also be given to the height of the ILS reference datum and/or MLS approach reference datum and the determination of the obstacle clearance limits. (Specifications concerning the height of the ILS reference datum and MLS approach reference datum are given in Annex 10, Volume I.)

10.1.2 In determining that no obstacles penetrate above the approach surface, account should be taken of mobile objects (vehicles on roads, trains, etc.) at least within that portion of the approach area within 1 200 m longitudinally from the threshold and of an overall width of not less than 150 m.

10.2 DISPLACED THRESHOLD

10.2.1 If an object extends above the approach surface and the object cannot be removed, consideration should be given to displacing the threshold permanently.

10.2.2 To meet the obstacle limitation objectives of Chapter 4, the threshold should ideally be displaced down the runway for the distance necessary to provide that the approach surface is cleared of obstacles.

10.2.3 However, displacement of the threshold from the runway extremity will inevitably cause reduction of the landing distance available, and this may be of greater operational significance than penetration of the approach surface by marked and lighted obstacles. A decision to displace the threshold, and the extent of such displacement, should therefore have regard to an optimum balance between the considerations of clear approach surfaces and adequate landing distance. In deciding this question, account will need to be taken of the types of aeroplanes which the runway is intended to serve, the limiting visibility and cloud base conditions under which the runway will be used, the position of the obstacles in relation to the threshold and extended centre line and, in the case of a precision approach runway, the significance of the obstacles to the determination of the obstacle clearance limit.

10.2.4 Notwithstanding the consideration of landing distance available, the selected position for the

threshold should not be such that the obstacle free surface to the threshold is steeper than 3.3 per cent where the code number is 4 or steeper than 5 per cent where the code number is 3.

10.2.5 In the event of a threshold being located according to the criteria for obstacle free surfaces in the preceding paragraph, the obstacle marking requirements of Chapter 6 should continue to be met in relation to the displaced threshold.

10.2.6 Depending on the length of the displacement, the RVR at the threshold could differ from that at the beginning of the runway for take-offs. The use of red runway edge lights with photometric intensities lower than the nominal value of 10 000 cd for white lights increases that phenomenon. The impact of a displaced threshold on take-off minima should be assessed by the Operator of a Certified Aerodrome.

10.6.7 Provisions in Annex 14, Volume I, regarding marking and lighting of displaced thresholds and some operational recommendations can be found in 5.2.4.9, 5.2.4.10, 5.3.5.5, 5.3.8.1, 5.3.9.7, 5.3.10.3, 5.3.10.7 and 5.3.12.6.

11 APPROACH LIGHTING SYSTEMS

11.1 TYPES AND CHARACTERISTICS

11.1.1 The specifications in this volume provide for the basic characteristics for simple and precision approach lighting systems. For certain aspects of these systems, some latitude is permitted, for example, in the spacing between centre line lights and crossbars. The approach lighting patterns that have been generally adopted are shown in Figures A-7 and A-8. A diagram of the inner 300 m of the precision approach category II and III lighting system is shown in Figure 5-14.

11.1.2 The approach lighting configuration is to be provided irrespective of the location of the threshold, i.e. whether the threshold is at the extremity of the runway or displaced from the runway extremity. In both cases, the approach lighting system should extend up to the threshold. However, in the case of a displaced threshold, inset lights are used from the runway extremity up to the threshold to obtain the specified configuration. These inset lights are designed to satisfy the structural requirements specified in Chapter 5, 5.3.1.9, and the photometric requirements specified in Appendix 2, Figure A2-1 or A2-2.

11.2.3 Flight path envelopes to be used in designing the lighting are shown in Figure A-6.

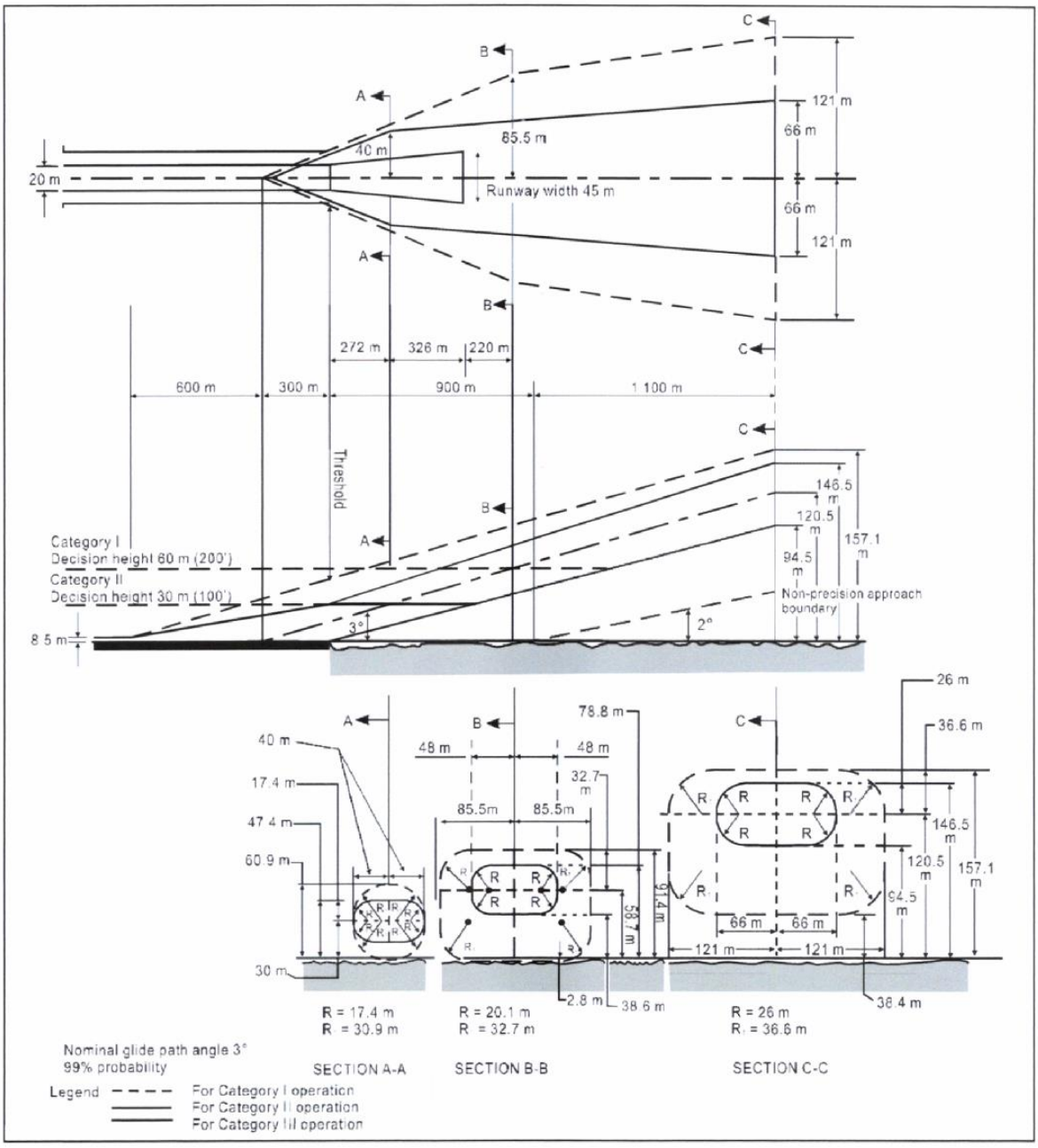


Figure A-6. Flight path envelopes to be used for lighting design for category I, II and III operations

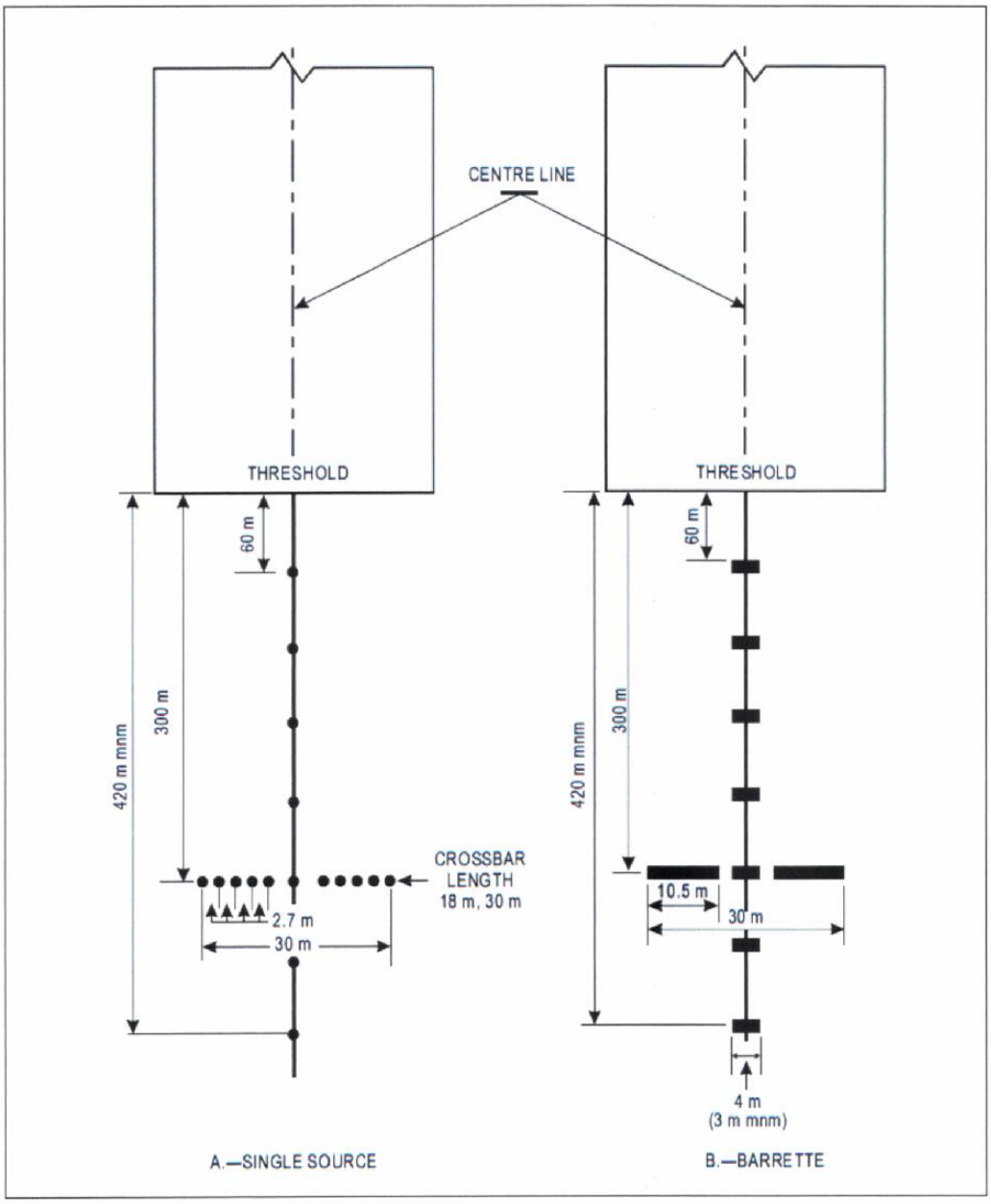


Figure A-7.Simple approach lighting systems

11.2 INSTALLATION TOLERANCES

Horizontal

11.2.1 The dimensional tolerances are shown in Figure A-8.

11.2.2 The centre line of an approach lighting system should be as coincident as possible with the extended centre line of the runway with a maximum tolerance of ±15□.

11.2.3 The longitudinal spacing of the centre line lights should be such that one light (or group of lights) is located in the centre of each crossbar, and the intervening centre line lights are spaced as evenly as practicable between two crossbars or a crossbar and a threshold.

11.2.4 The crossbars and barrettes should be at right angles to the centre line of the approach lighting system with a tolerance of ±30□, if the pattern in Figure A-8 (A) is adopted or ± 2°, if Figure A-8 (B) is adopted.

11.2.5 When a crossbar has to be displaced from its standard position, any adjacent crossbar should, where possible, be displaced by appropriate amounts in order to reduce the differences in the crossbar spacing.

11.2.6 When a crossbar in the system shown in Figure A-8 (A) is displaced from its standard position, its overall length should be adjusted so that it remains one-twentieth of the actual distance of the crossbar from the point of origin. It is not necessary, however, to adjust the standard 2.7 m spacing between the crossbar lights, but the crossbars should be kept symmetrical about the centre line of the approach lighting.

Vertical

11.2.7 The ideal arrangement is to mount all the approach lights in the horizontal plane passing through the threshold (see Figure A-9), and this should be the general aim as far as local conditions permit. However, buildings, trees, etc., should not obscure the lights from the view of a pilot who is assumed to be 1° below the electronic glide path in the vicinity of the outer marker.

11.2.8 Within a stopway or clearway, and within 150 m of the end of a runway, the lights should be mounted as near to the ground as local conditions permit in order to minimize risk of damage to aeroplanes in the event of an overrun or undershoot. Beyond the stopway and clearway, it is not so necessary for the lights to be mounted close to the ground, and therefore undulations in the ground contours can be compensated for by mounting the lights on poles of appropriate height.

11.2.9 It is desirable that the lights be mounted so that, as far as possible, no object within a distance of 60 m on each side of the centre line protrudes through the plane of the approach lighting system. Where a tall object exists within 60 m of the centre line and within 1 350 m from the threshold for a precision approach lighting system, or 900 m for a simple approach lighting system, it may be advisable to install the lights so that the plane of the outer half of the pattern clears the top of the object.

11.2.10 In order to avoid giving a misleading impression of the plane of the ground, the lights should not be mounted below a gradient of 1 in 66 downwards from the threshold to a point 300 m out, and below a gradient of 1 in 40 beyond the 300 m point. For a precision approach category II and III lighting system, more stringent criteria may be necessary, e.g. negative slopes not permitted within 450 m of the threshold.

11.2.11 Centre line. The gradients of the centre line in any section (including a stopway or clearway) should be as small as practicable, and the changes in gradients should be as few and small as can be arranged and should not exceed 1 in 60. Experience has shown that as one proceeds outwards from the runway, rising gradients in any section of up to 1 in 66, and falling gradients of down to 1 in 40, are acceptable.

11.2.12 Crossbars. The crossbar lights should be so arranged as to lie on a straight line passing through the associated centre line lights, and wherever possible this line should be horizontal. It is permissible, however, to mount the lights on a transverse gradient not more than 1 in 80, if this enables crossbar lights within a stopway or clearway to be mounted nearer to the ground on sites where there is a cross-fall.

11.3 CLEARANCE OF OBSTACLES

11.3.1 An area, hereinafter referred to as the light plane, has been established for obstacle clearance purposes, and all lights of the system are in this plane. This plane is rectangular in shape and symmetrically located about the approach lighting system's centre line. It starts at the threshold and extends 60 m beyond

the approach end of the system, and is 120 m wide.

11.3.2 No objects are permitted to exist within the boundaries of the light plane which are higher than the light plane except as designated herein. All roads and highways are considered as obstacles extending 4.8 m above the crown of the road, except aerodrome service roads where all vehicular traffic is under control of the aerodrome operators and coordinated with the aerodrome traffic control tower. Railroads, regardless of the amount of traffic, are considered as obstacles extending 5.4 m above the top of the rails.

11.3.3 It is recognized that some components of electronic landing aids systems, such as reflectors, antennas, monitors, etc., must be installed above the light plane. Every effort should be made to relocate such components outside the boundaries of the light plane. In the case of reflectors and monitors, this can be done in many instances.

11.3.4 Where an ILS localizer is installed within the light plane boundaries, it is recognized that the localizer, or screen if used, must extend above the light plane. In such cases the height of these structures should be held to a minimum and they should be located as far from the threshold as possible. In general the rule regarding permissible heights is 15 cm for each 30 m the structure is located from the threshold. As an example, if the localizer is located 300 m from the threshold, the screen will be permitted to extend above the plane of the approach lighting system by $10 \times 15 = 150$ cm maximum, but preferably should be kept as low as possible consistent with proper operation of the ILS.

11.3.5 In locating an MLS azimuth antenna the guidance contained in Annex 10, Volume I, Attachment G, should be followed. This material, which also provides guidance on collocating an MLS azimuth antenna with an ILS localizer antenna, suggests that the MLS azimuth antenna may be sited within the light plane boundaries where it is not possible or practical to locate it beyond the outer end of the approach lighting for the opposite direction of approach. If the MLS azimuth antenna is located on the extended centre line of the runway, it should be as far as possible from the closest light position to the MLS azimuth antenna in the direction of the runway end. Furthermore, the MLS azimuth antenna phase centre should be at least 0.3 m above the light centre of the light position closest to the MLS azimuth antenna in the direction of the runway end. (This could be relaxed to 0.15 m if the site is otherwise free of significant multipath problems.) Compliance with this requirement, which is intended to ensure that the MLS signal quality is not affected by the approach lighting system, could result in the partial obstruction of the lighting system by the MLS

azimuth antenna. To ensure that the resulting obstruction does not degrade visual guidance beyond an acceptable level, the MLS azimuth antenna should not be located closer to the runway end than 300 m and the preferred location is 25 m beyond the 300 m crossbar (this would place the antenna 5 m behind the light position 330 m from the runway end). Where an MLS azimuth antenna is so located, a central part of the 300 m crossbar of the approach lighting system would alone be partially obstructed. Nevertheless, it is important to ensure that the unobstructed lights of the crossbar remain serviceable all the time.

11.3.6 Objects existing within the boundaries of the light plane, requiring the light plane to be raised in order to meet the criteria contained herein, should be removed, lowered or relocated where this can be accomplished more economically than raising the light plane.

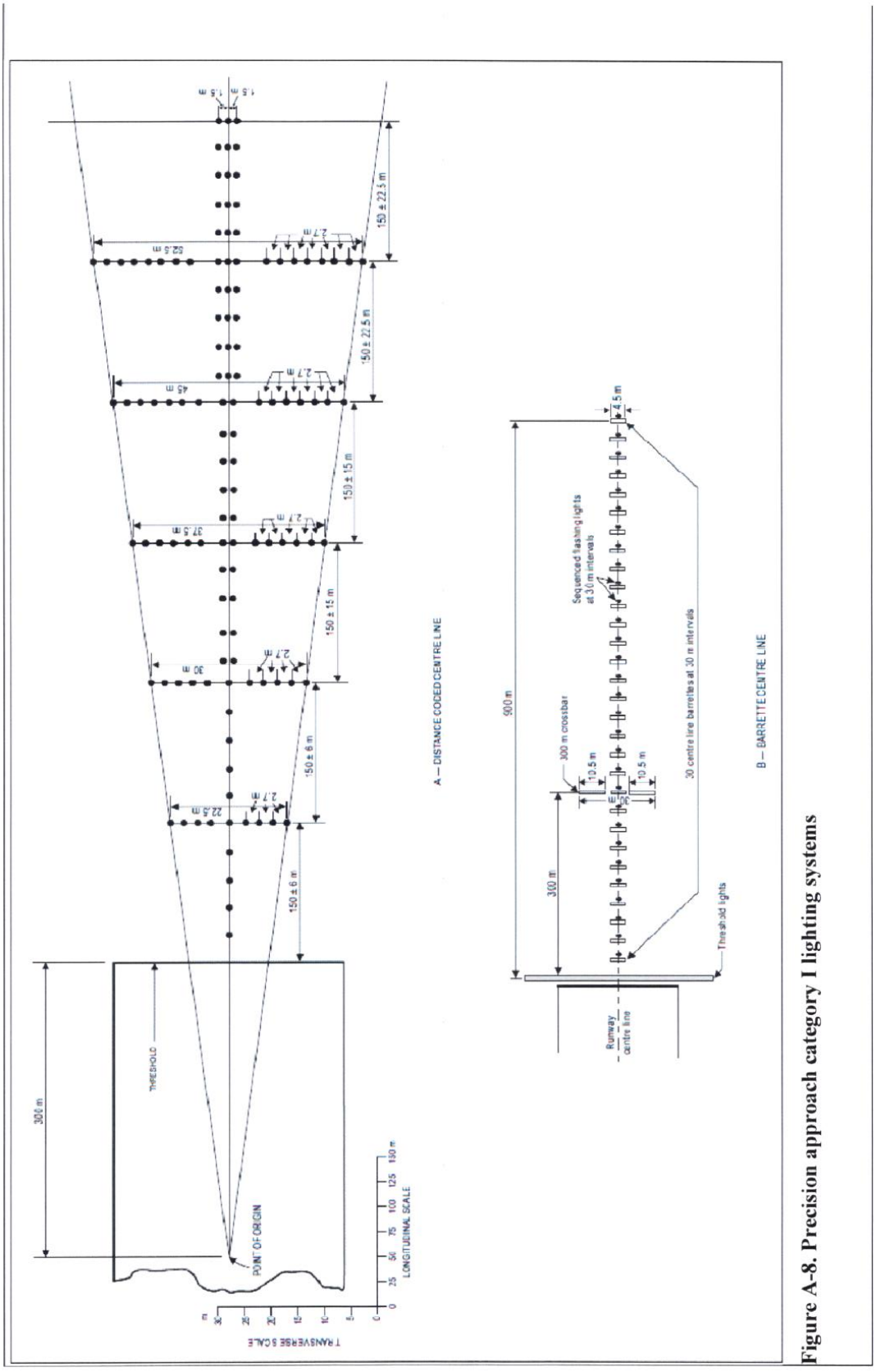


Figure A-8. Precision approach category I lighting systems

ATT A-29

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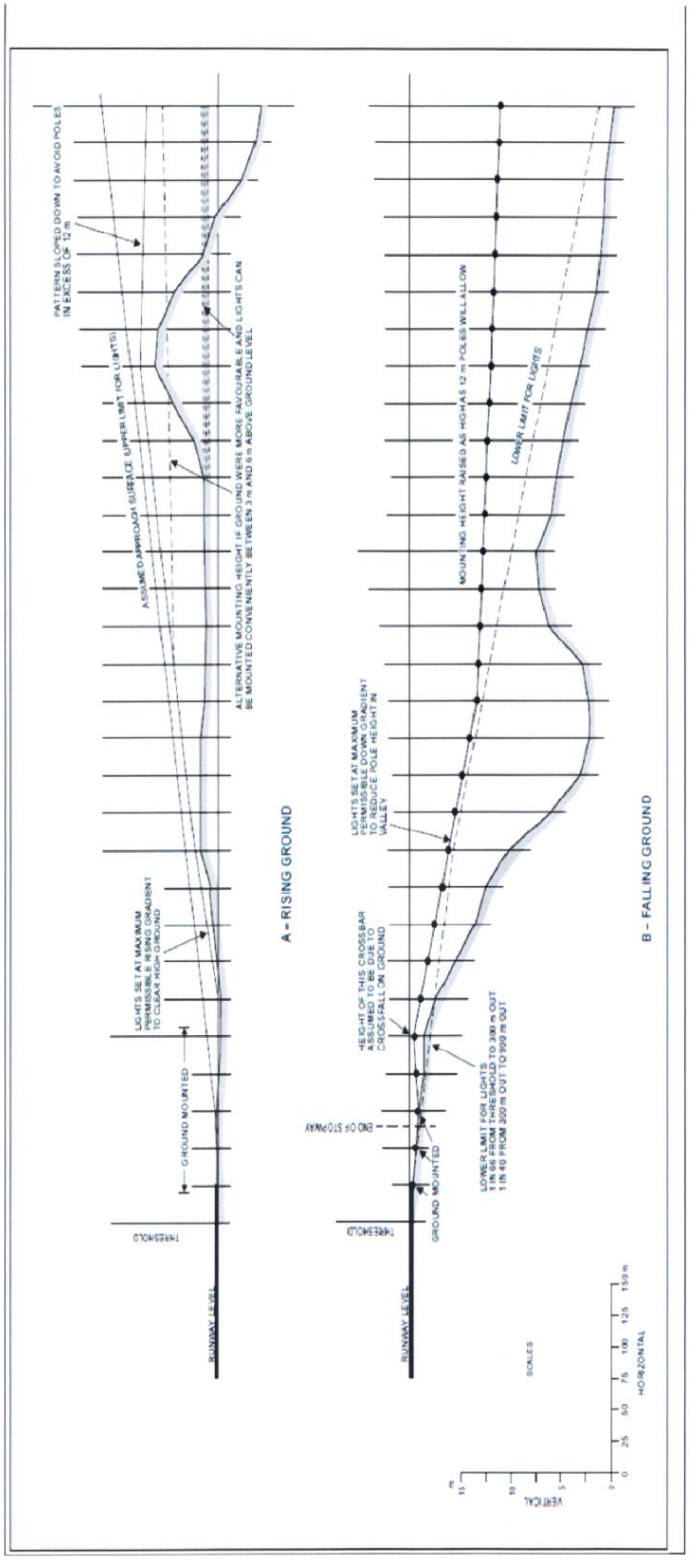


Figure A-9. Vertical installation tolerance

EFFECTIVE DATE: 31ST MARCH, 2024

ATT A-30

11.3.7 In some instances objects may exist which cannot be removed, lowered or relocated economically. These objects may be located so close to the threshold that they cannot be cleared by the 2 per cent slope. Where such conditions exist and no alternative is possible, the 2 per cent slope may be exceeded or a "stair step" resorted to in order to keep the approach lights above the objects. Such "step" or increased gradients should be resorted to only when it is impracticable to follow standard slope criteria, and they should be held to the absolute minimum. Under this criterion no negative slope is permitted in the outermost portion of the system.

11.4 CONSIDERATION OF THE EFFECTS OF REDUCED LENGTHS

11.4.1 The need for an adequate approach lighting system to support precision approaches where the pilot is required to acquire visual references prior to landing cannot be stressed too strongly. The safety and regularity of such operations is dependent on this visual acquisition. The height above runway threshold at which the pilot decides there are sufficient visual cues to continue the precision approach and land will vary, depending on the type of approach being conducted and other factors such as meteorological conditions, ground and airborne equipment, etc. The required length of approach lighting system which will support all the variations of such approaches is 900 m, and this shall always be provided whenever possible.

11.4.2 However, there are some runway locations where it is impossible to provide the 900 m length of approach lighting system to support precision approaches.

11.4.3 In such cases, every effort should be made to provide as much approach lighting system as possible. The Operator of a Certified Aerodrome may impose restrictions on operations to runways equipped with reduced lengths of lighting. There are many factors which determine at what height the pilot must have decided to continue the approach to land or execute a missed approach. It must be understood that the pilot does not make an instantaneous judgement upon reaching a specified height. The actual decision to continue the approach and landing sequence is an accumulative process which is only concluded at the specified height. Unless lights are available prior to reaching the decision point, the visual assessment process is impaired and the likelihood of missed approaches will increase substantially. There are many operational considerations which must be taken into account by the Operator of a Certified Aerodrome in deciding if any restrictions are necessary to any precision approach and these are detailed in Annex 6.

12 PRIORITY OF INSTALLATION OF VISUAL APPROACH SLOPE INDICATOR SYSTEMS

12.1 It has been found impracticable to develop guidance material that will permit a completely objective analysis to be made of which runway on an aerodrome should receive first priority for the installation of a visual approach slope indicator system. However, factors that must be considered when making such a decision are:

(a) frequency of use;

(b) seriousness of the hazard;

(c) presence of other visual and non-visual aids;

(d) type of aeroplanes using the runway; and

(e) frequency and type of adverse weather conditions under which the runway will be used.

12.2 With respect to the seriousness of the hazard, the order given in the application specifications for a visual approach slope indicator system, 5.3.5.1 b) to e) of Chapter 5, may be used as a general guide. These may be summarized as:

(a) inadequate visual guidance because of:

1) approaches over water or featureless terrain, or absence of sufficient extraneous light in the approach area by night;

2) deceptive surrounding terrain;

(b) serious hazard in approach;

(c) serious hazard if aeroplanes undershoot or overrun; and

(d) unusual turbulence.

12.3 The presence of other visual or non-visual aids is a very important factor. Runways equipped with ILS or MLS would generally receive the lowest priority for a visual approach slope indicator system installation. It must be remembered, though, that visual approach slope indicator systems are visual approach aids in their own right and can supplement electronic aids. When serious hazards exist and/or a substantial number of aeroplanes not equipped for ILS or MLS use a runway, priority might be given to installing a visual approach slope indicator on this runway.

12.4 Priority should be given to runways used by turbojet aeroplanes.

Where a temporarily unserviceable area exists, it may be marked with fixed-red lights. These lights should mark the most potentially dangerous extremities of the area. A minimum of four such lights should be used, except where the area is triangular in shape where a minimum of three lights may be employed. The number of lights should be increased when the area is large or of unusual configuration. At least one light should be installed for each 7.5 m of peripheral distance of the area. If the lights are directional, they should be orientated so that as far as possible their beams are aligned in the direction from which aircraft or vehicles will approach. Where aircraft or vehicles will normally approach from several directions, consideration should be given to adding extra lights or using omnidirectional lights to show the area from these directions. Unserviceable area lights should be frangible. Their height should be sufficiently low to preserve clearance for propellers and for engine pods of jet aircraft.

14 RAPID EXIT TAXIWAY INDICATOR LIGHTS

14.1 Rapid exit taxiway indicator lights (RETILs) comprise a set of yellow unidirectional lights installed in the runway adjacent to the centre line. The lights are positioned in a 3-2-1 sequence at 100 m intervals prior to the point of tangency of the rapid exit taxiway centre line. They are intended to give an indication to pilots of the location of the next available rapid exit taxiway.

14.2 In low visibility conditions, RETILs provide useful situational awareness cues while allowing the pilot to concentrate on keeping the aircraft on the runway centre line.

14.3 Following a landing, runway occupancy time has a significant effect on achievable runway capacity. RETILs allow pilots to maintain a good roll-out speed until it is necessary to decelerate to an appropriate speed for the turn into a rapid exit turn-off. A roll-out speed of 60 knots until the first RETIL (three-light barrette) is reached is seen as the optimum.

15 INTENSITY CONTROL OF APPROACH AND RUNWAY LIGHTS

15.1 The conspicuity of a light depends on the impression received of contrast between the light and its background. If a light is to be useful to a pilot by day when on approach, it must have an intensity of at least 2 000 or 3 000 cd, and in the case of approach lights an intensity of the order of 20 000 cd is desirable. In conditions of very bright daylight fog it may not be possible to provide lights of sufficient intensity to be effective. On the other hand, in clear weather on a dark night, an intensity of the order of 100 cd for approach lights and 50 cd for the runway edge lights may be found suitable. Even then, owing to the closer range at which they are viewed, pilots have sometimes complained that the runway edge lights seemed unduly bright.

15.2 In fog the amount of light scattered is high. At night this scattered light increases the brightness of the fog over the approach area and runway to the extent that little increase in the visual range of the lights can be obtained by increasing their intensity beyond 2 000 or 3 000 cd. In an endeavour to increase the range at which lights would first be sighted at night, their intensity must not be raised to an extent that a pilot might find excessively dazzling at diminished range.

15.3 From the foregoing will be evident the importance of adjusting the intensity of the lights of an aerodrome lighting system according to the prevailing conditions, so as to obtain the best results without excessive dazzle that would disconcert the pilot. The appropriate intensity setting on any particular occasion will depend both on the conditions of background brightness and the visibility. Detailed guidance material on selecting intensity setting for different conditions is given in the Aerodrome Design Manual (Doc 9157), Part 4.

16 SIGNAL AREA

A signal area need be provided only when it is intended to use visual ground signals to communicate with aircraft in flight. Such signals may be needed when the aerodrome does not have an aerodrome control tower or an aerodrome flight information service unit, or when the aerodrome is used by aeroplanes not equipped with radio. Visual ground signals may also be useful in the case of failure of two-way radio communication with aircraft. It should be

recognized, however, that the type of information which may be conveyed by visual ground signals should normally be available in AIPs or NOTAM. The potential need for visual ground signals should therefore be evaluated before deciding to provide a signal area.

17 RESCUE AND FIREFIGHTING SERVICES

17.1 ADMINISTRATION

17.1.1 The rescue and firefighting service at an aerodrome should be under the administrative control of the aerodrome management, which should also be responsible for ensuring that the service provided is organized, equipped, staffed, trained and operated in such a manner as to fulfil its proper functions.

17.1.2 In drawing up the detailed plan for the conduct of search and rescue operations in accordance with 4.2.1 of Annex 12 — Search and Rescue, the aerodrome management should coordinate its plans with the relevant rescue coordination centres to ensure that the respective limits of their responsibilities for an aircraft accident within the vicinity of an aerodrome are clearly delineated.

17.1.3 Coordination between the rescue and firefighting service at an aerodrome and public protective agencies, such as local fire brigade, police force, coast guard and hospitals, should be achieved by prior agreement for assistance in dealing with an aircraft accident.

17.1.4 A grid map of the aerodrome and its immediate vicinity should be provided for the use of the aerodrome services concerned. Information concerning topography, access roads and location of water supplies should be indicated. This map should be conspicuously posted in the control tower and fire station, and available on the rescue and firefighting vehicles and such other supporting vehicles required to respond to an aircraft accident or incident. Copies should also be distributed to public protective agencies as desirable.

17.1.5 A grid map of the aerodrome and its immediate vicinity should be provided for the use of the aerodrome services concerned. Information concerning topography, access roads and

location of water supplies should be indicated. This map should be conspicuously posted in the control tower and fire station, and available on the rescue and firefighting vehicles and such other supporting vehicles required to respond to an aircraft accident or incident. Copies should also be distributed to public protective agencies as desirable.

17.1.6 Coordinated instructions should be drawn up detailing the responsibilities of all concerned and the action to be taken in dealing with emergencies. The Operator of a Certified Aerodrome should ensure that such instructions are promulgated and observed.

17.2 TRAINING

The training curriculum should include initial and recurrent instruction in at least the following areas:

(a) airport familiarization;

(b) aircraft familiarization;

(c) rescue and firefighting personnel safety;

(d) emergency communications systems on the aerodrome, including aircraft fire-related alarms;

(e) use of the fire hoses, nozzles, turrets and other appliances required for compliance with Chapter 9, 9.2;

(f) application of the types of extinguishing agents required for compliance with Chapter 9, 9.2;

emergency aircraft evacuation assistance;

(g) firefighting operations;

(h) adaptation and use of structural rescue and firefighting equipment for aircraft rescue and firefighting;

(i) dangerous goods;

(j) familiarization with firefighters' duties under the aerodrome emergency plan; and

(j) protective clothing and respiratory protection.

17.3 LEVEL OF PROTECTION TO BE PROVIDED

17.3.1 In accordance with Chapter 9, 9.2, aerodromes should be categorized for rescue and firefighting purposes and the level of protection provided should be appropriate to the aerodrome category.

17.3.2 However, Chapter 9, 9.2.3, permits a lower level of protection to be provided for a limited period 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. It is important to note that the concession included in 9.2.3 is applicable only where there is a wide range of difference between the dimensions of the aeroplanes included in reaching 700 movements.

17.4 RESCUE EQUIPMENT FOR DIFFICULT ENVIRONMENTS

17.4.1 Suitable rescue equipment and services should be available at an aerodrome where the area to be covered by the service includes water, swampy areas or other difficult environment that cannot be fully served by conventional wheeled vehicles. This is particularly important where a significant portion of approach/departure operations takes place over these areas.

17.4.2 The rescue equipment should be carried on boats or other vehicles such as helicopters and amphibious or air cushion vehicles, capable of operating in the area concerned. The vehicles should be so located that they can be brought into action quickly to respond to the areas covered by the service.

17.4.3 At an aerodrome bordering the water, the boats or other vehicles should preferably be located on the aerodrome, and convenient launching or docking sites provided. If these vehicles are located off the aerodrome, they should preferably be under the control of the aerodrome rescue and firefighting service or, if this is not practicable, under the control of another competent public or private organization working in close coordination with the aerodrome rescue and firefighting service (such as police, military services, harbour patrol or coast guard).

17.4.4 Boats or other vehicles should have as high a speed as practicable so as to reach an accident site in minimum time. To reduce the possibility of injury during rescue operations, water

jet-driven boats are preferred to water propeller- driven boats unless the propellers of the latter boats are ducted. Should the water areas to be covered by the service be frozen for a significant period of the year, the equipment should be selected accordingly. Vehicles used in this service should be equipped with life rafts and life preservers related to the requirements of the larger aircraft normally using the aerodrome, with two-way radio communication, and with floodlights for night operations. If aircraft operations during periods of low visibility are expected, it may be necessary to provide guidance for the responding emergency vehicles.

17.4.5 The personnel designated to operate the equipment should be adequately trained and drilled for rescue services in the appropriate environment.

17.5 FACILITIES

17.5.1 The provision of special telephone, two-way radio communication and general alarm systems for the rescue and firefighting service is desirable to ensure the dependable transmission of essential emergency and routine information. Consistent with the individual requirements of each aerodrome, these facilities serve the following purposes:

(a) direct communication between the activating authority and the aerodrome fire station in order to ensure the prompt alerting and dispatch of rescue and firefighting vehicles and personnel in the event of an aircraft accident or incident;

(b) direct communication between the rescue and firefighting service and the flight crew of an aircraft in emergency;

(c) emergency signals to ensure the immediate summoning of designated personnel not on standby duty;

(d) as necessary, summoning essential related services on or off the aerodrome; and

(e) maintaining communication by means of two-way radio with the rescue and firefighting vehicles in attendance at an aircraft accident or incident.

17.5.2 The availability of ambulance and medical facilities for the removal and after-care of casualties arising from an aircraft accident should receive the careful consideration of the Operator of a Certified Aerodrome and should form part of the overall emergency plan established to deal

with such emergencies.

18 OPERATORS OF VEHICLES

18.1 The authorities responsible for the operation of vehicles on the movement area should ensure that the operators are properly qualified. This may include, as appropriate to the driver's function, knowledge of:

(a) the geography of the aerodrome;

(b) aerodrome signs, markings and lights;

(c) radiotelephone operating procedures;

(d) terms and phrases used in aerodrome control including the ICAO spelling alphabet;

(e) rules of air traffic services as they relate to ground operations;

(f) airport rules and procedures; and

(g) specialist functions as required, for example, in rescue and firefighting.

18.2 The operator should be able to demonstrate competency, as appropriate, in:

(a) the operation or use of vehicle transmit/receive equipment;

(b) understanding and complying with air traffic control and local procedures;

(c) vehicle navigation on the aerodrome; and

(d) special skills required for the particular function.

In addition, as required for any specialist function, the operator should be the holder of a valid Guyana driver's licence, a valid Guyana radio operator's licence or other licences.

18.3 The above should be applied as is appropriate to the function to be performed by the operator, and it is not necessary that all operators be trained to the same level, for example, operators whose functions are restricted to the apron.

18.4 If special procedures apply for operations in low visibility conditions, it is desirable to verify an operator's knowledge of the procedures through periodic checks.

19 THE AIRCRAFT CLASSIFICATION NUMBER-PAVEMENT CLASSIFICATION NUMBER (ACN-PCN) METHOD OF REPORTING PAVEMENT STRENGTH

Applicable until 27 November 2024

19.1 OVERLOAD OPERATIONS

19.1.1 Overloading of pavements can result either from loads too large, or from a substantially increased application rate, or both. Loads larger than the defined (design or evaluation) load shorten the design life, whilst smaller loads extend it. With the exception of massive overloading, pavements in their structural behaviour are not subject to a particular limiting load above which they suddenly or catastrophically fail. Behaviour is such that a pavement can sustain a definable load for an expected number of repetitions during its design life. As a result, occasional minor overloading is acceptable, when expedient, with only limited loss in pavement life expectancy and relatively small acceleration of pavement deterioration. For those operations in which magnitude of overload and/or the frequency of use do not justify a detailed analysis, the following criteria are suggested:

(a) for flexible pavements, occasional movements by aircraft with ACN not exceeding 10 per cent above the reported PCN should not adversely affect the pavement;

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

(c) if the pavement structure is unknown, the 5 per cent limitation should apply; and

(d) the annual number of overload movements should not exceed approximately 5 per cent of the total annual aircraft movements.

19.1.2 Such overload movements should not normally be permitted on pavements exhibiting signs of distress or failure or when the strength of the pavement or its subgrade could be weakened by water. Where overload operations are conducted, the Operator of a Certified Aerodrome should review the relevant pavement condition regularly, and should also review the criteria for overload operations periodically since excessive repetition of overloads can cause severe shortening of

pavement life or require major rehabilitation of pavement.

19.2 ACNs FOR SEVERAL AIRCRAFT TYPES

For convenience, several aircraft types currently in use have been evaluated on rigid and flexible pavements founded on the four subgrade strength categories in Chapter 2, 2.6.6 b), and the results tabulated in the Aerodrome Design Manual (Doc 9157), Part 3.

19 THE AIRCRAFT CLASSIFICATION RATING-PAVEMENT CLASSIFICATION RATING (ACR-PCR) METHOD OF REPORTING PAVEMENT STRENGTH

Applicable as of 28 November 2024

19.1 OVERLOAD OPERATIONS

19.1.1 Overloading of pavements can result either from loads too large, or from a substantially increased application rate, or both. Loads larger than the defined (design or evaluation) load shorten the design life, whilst smaller loads extend it. With the exception of massive overloading, pavements in their structural behaviour are not subject to a particular limiting load above which they suddenly or catastrophically fail. Behaviour is such that a pavement can sustain a definable load for an expected number of repetitions during its design life. As a result, occasional minor overloading is acceptable, when expedient, with only limited loss in pavement life expectancy and relatively small acceleration of pavement deterioration. For those operations in which magnitude of overload and/or the frequency of use do not justify a detailed analysis, the following criteria are suggested:

(a) for flexible and rigid pavements, occasional movements by aircraft with ACR not exceeding 10 per cent above the reported PCR should not adversely affect the pavement; and

(b) the annual number of overload movements should not exceed approximately 5 per cent of the total annual movements excluding light aircraft.

19.1.2 Such overload movements should not normally be permitted on pavements exhibiting

signs of distress or failure or when the strength of the pavement or its subgrade could be weakened by water. Where overload operations are conducted, the Operator of a Certified Aerodrome should review the relevant pavement condition regularly, and should also review the criteria for overload operations periodically since excessive repetition of overloads can cause severe shortening of pavement life or require major rehabilitation of pavement.

19.2 ACRs FOR SEVERAL AIRCRAFT TYPES

For convenience, a dedicated software is available on the ICAO website, for computing any aircraft ACRs at any mass on rigid and flexible pavements for the four standard subgrade strength categories detailed in Chapter 2, 2.6.6 b).

20 AUTONOMOUS RUNWAY INCURSION WARNING SYSTEM (ARIWS)

Note 1.— These autonomous systems are generally quite complex in design and operation and, as such, deserve careful consideration by all levels of the industry, from the regulating authority to the end user. This guidance is offered to provide a more clear description of the system(s) and offer some suggested actions required in order to properly implement these system(s) at an aerodrome in any State.

Note 2.— The Manual on the Prevention of Runway Incursion (Doc 9870) presents different approaches for the prevention of runway incursion.

20.1 GENERAL DESCRIPTION

20.1.1 The operation of an ARIWS is based upon a surveillance system which monitors the actual situation on a runway and automatically returns this information to warning lights at the runway (take-off) thresholds and entrances. When an aircraft is departing from a runway (rolling) or arriving at a runway (short final), red warning lights at the entrances will illuminate, indicating that it is unsafe to enter or cross the runway. When an aircraft is aligned on the runway for take-off and another aircraft or vehicle enters or crosses the runway, red warning lights will illuminate

at the threshold area, indicating that it is unsafe to start the take-off roll.

20.1.2 In general, an ARIWS consists of an independent surveillance system (primary radar, multilateration, specialized cameras, dedicated radar, etc.) and a warning system in the form of extra airfield lighting systems connected through a processor which generates alerts independent from ATC directly to the flight crews and vehicle operators.

20.1.3 An ARIWS does not require circuit interleaving, secondary power supply or operational connection to other visual aid systems.

20.1.4 In practice, not every entrance or threshold needs to be equipped with warning lights. Each aerodrome will have to assess its needs individually depending on the characteristics of the aerodrome. There are several systems developed offering the same or similar functionality.

20.2 FLIGHT CREW ACTIONS

20.2.1 It is of critical importance that flight crews understand the warning being transmitted by the ARIWS system. Warnings are provided in near real-time, directly to the flight crew because there is no time for "relay" types of communications. In other words, a conflict warning generated to ATS which must then interpret the warning, evaluate the situation and communicate to the aircraft in question, would result in several seconds being taken up where each second is critical in the ability to stop the aircraft safely and prevent a potential collision. Pilots are presented with a globally consistent signal which means "STOP IMMEDIATELY" and must be taught to react accordingly. Likewise, pilots receiving an ATS clearance to take-off or cross a runway, and seeing the red light array, must STOP and advise ATS that they aborted/stopped because of the red lights. Again, the criticality of the timeline involved is so tight that there is no room for misinterpretation of the signal. It is of utmost importance that the visual signal be consistent around the world.

20.2.2 It must also be stressed that the extinguishing of the red lights does not, in itself, indicate a clearance to proceed. That clearance is still required from air traffic control. The absence of red warning lights only means that potential conflicts have not been detected.

20.2.3 In the event that a system becomes unserviceable, one of two things will occur. If the system fails in the extinguished condition, then no procedural changes need to be accomplished. The only thing that will happen is the loss of the automatic, independent warning system. Both ATS operations and flight crew procedures (in response to ATS clearances) will remain unchanged.

20.2.4 Procedures should be developed to address the circumstance where the system fails in the illuminated condition. It will be up to the ATS and/or aerodrome operator to establish those procedures depending on their own circumstances. It must be remembered that flight crews are instructed to "STOP" at all red lights. If the affected portion of the system, or the entire system, is shut off the situation is reverted to the extinguished scenario described in 20.2.3.

20.3 AERODROMES

20.3.1 An ARIWS does not have to be provided at all aerodromes. An aerodrome considering the installation of such a system may wish to assess its needs individually, depending on traffic levels, aerodrome geometry, ground taxi patterns, etc. Local user groups such as the Local Runway Safety Team (LRST) can be of assistance in this process. Also, not every runway or taxiway needs to be equipped with the lighting array(s), and not every installation requires a comprehensive ground surveillance system to feed information to the conflict detection computer.

20.3.2 Although there may be local specific requirements, some basic system requirements are applicable to all ARIWS:

(a) the control system and energy power supply of the system must be independent from any other system in use at the aerodrome, especially the other parts of the lighting system;

(b) the system must operate independently from ATS communications;

(c) the system must provide a globally accepted visual signal that is consistent and instantly understood by crews; and

(d) local procedures should be developed in the case of malfunction or failure of a portion of, or the entire system.

20.4 AIR TRAFFIC SERVICES

20.4.1 The ARIWS is designed to be complementary to normal ATS functions, providing warnings to flight crews and vehicle operators when some conflict has been unintentionally created or missed during normal aerodrome operations. The ARIWS will provide a direct warning when, for example, ground control or tower (local) control has provided a clearance to hold short of a runway but the flight crew or vehicle operator has "missed" the hold short portion of their clearance and tower has issued a take-off or landing clearance to that same runway, and the non-read back by the flight crew or vehicle operator was missed by air traffic control.

29.4.2 In the case where a clearance has been issued and a crew reports a non-compliance due to "red lights", or aborting because of "red lights", then it is imperative that the controller assess the situation and provide additional instructions as necessary. It may well be that the system has generated a false warning or that the potential incursion no longer exists; however, it may also be a valid warning. In any case, additional instructions and/or a new clearance need to be provided. In a case where the system has failed, then procedures will need to be put into place as described in 20.2.3 and 20.2.4. In no case should the illumination of the ARIWS be dismissed without confirmation that, in fact, there is no conflict. It is worth noting that there have been numerous incidents avoided at aerodromes with such systems installed. It is also worth noting that there have been false warnings as well, usually as a result of the calibration of the warning software, but in any case, the potential conflict existence or non-existence must be confirmed.

20.4.3 While many installations may have a visual or audio warning available to ATS personnel, it is in no way intended that ATS personnel be required to actively monitor the system. Such warnings may assist ATS personnel in quickly assessing the conflict in the event of a warning and help them to provide appropriate further instructions, but the ARIWS should not play an active part in the normal functioning of any ATS facility.

20.4.4 Each aerodrome where the system is installed will develop procedures depending upon its unique situation. Again, it must be stressed that under no circumstances should pilots or operators be instructed to "cross the red lights". As indicated previously, the use of local runway

safety teams can greatly assist in this development process.

20.5 PROMULGATION OF INFORMATION

20.5.1 Information on the characteristics and status of an ARIWS at an aerodrome are promulgated in the AIP section AD 2.9 in PANS-AIM (Doc 10066), and its status updated as necessary through NOTAM or ATIS in compliance with 2.9.1 of this Annex.

20.5.2 Aircraft operators are to ensure that flight crews' documentation include procedures regarding ARIWS and appropriate guidance information, in compliance with Annex 6, Part I.

20.5.3 Aerodromes may provide additional sources of guidance on operations and procedures for their personnel, aircraft operators, ATS and third-party personnel who may have to deal with an ARIWS.

21 TAXIWAY DESIGN GUIDANCE FOR MINIMIZING THE POTENTIAL FOR RUNWAY INCURSIONS

21.1 Good aerodrome design practices can reduce the potential for runway incursions while maintaining operating efficiency and capacity. The following taxiway design guidance may be considered to be part of a runway incursion prevention programme as a means to ensure that runway incursion aspects are addressed during the design phase for new runways and taxiways. Within this focused guidance, the prime considerations are to limit the number of aircraft or vehicles entering or crossing a runway, provide pilots with enhanced unobstructed views of the entire runway, and correct taxiways identified as hot spots as much as possible.

21.2 The centre line of an entrance taxiway should be perpendicular to the runway centre line, where possible. This design principle provides pilots with an unobstructed view of the entire runway, in both directions, to confirm that the runway and approach are clear of conflicting traffic before proceeding towards the runway. Where the taxiway angle is such that a clear unobstructed view, in both directions, is not possible, consideration should be given to providing a perpendicular portion of the taxiway immediately adjacent to the runway to allow for a full visual scan by the

pilots prior to entering or crossing a runway.

21.3 For taxiways intersecting with runways, avoid designing taxiways wider than recommended in this Annex. This design principle offers improved recognition of the location of the runway holding position and the accompanying sign, marking and lighting visual cues.

21.4 Existing taxiways wider than recommended in this Annex, can be rectified by painting taxi side stripe markings to the recommended width. As far as practicable, it is preferable to redesign such locations properly rather than to repaint such locations.

21.5 Multi-taxiway entrances to a runway should be parallel to each other and should be distinctly separated by an unpaved area. This design principle allows each runway holding location an earthen area for the proper placement of accompanying sign, marking and lighting visual cues at each runway holding position. Moreover, the design principle eliminates the needless costs of building unusable pavement and as well as the costs for painting taxiway edge markings to indicate such unusable pavement. In general, excess paved areas at runway holding positions reduce the effectiveness of sign, marking and lighting visual cues.

21.6 Build taxiways that cross a runway as a single straight taxiway. Avoid dividing the taxiway into two after crossing the runway. This design principle avoids constructing "Y-shaped" taxiways known to present risk of runway incursions.

21.7 If possible, avoid building taxiways that enter at the mid-runway location. This design principle helps to reduce the collision risks at the most hazardous locations (high energy location) because normally departing aircraft have too much energy to stop, but not enough speed to take-off, before colliding with another errant aircraft or vehicle.

21.8 Provide clear separation of pavement between a rapid exit taxiway and other non-rapid taxiways entering or crossing a runway. This design principle avoids two taxiways from overlapping each other to create an excessive paved area that would confuse pilots entering a runway.

21.9 Avoid the placement of different pavement materials (asphalt and cement concrete) at or near the vicinity of the runway holding position, as far as practicable. This design principle avoids creating visual confusion as to the actual location of the runway holding position.

21.10 Many aerodromes have more than one runway, notably paired parallel runways (two runways on one side of the terminal), which creates a difficult problem in that either on arrival or departure an aircraft is required to cross a runway. Under such a configuration, the safety objective here is to avoid or at least keep to a minimum the number of runway crossings. This safety objective may be achieved by constructing a "perimeter taxiway". A perimeter taxiway is a taxi route that goes around the end of a runway, enabling arrival aircraft (when landings are on outer runway of a pair) to get to the terminal, or departure aircraft (when departures are on outer runway of a pair) to get to the runway, without either crossing a runway or conflicting with a departing or approaching aircraft.

21.11 A perimeter taxiway would be designed according to the following criteria:

(a) Sufficient space is required between the landing threshold and the taxiway centre line where it crosses under the approach path to enable the critical taxiing aircraft to pass under the approach without penetrating any approach surface.

(b) The jet blast impact of aircraft taking off should be considered in consultation with aircraft manufacturers; the extent of take-off thrust should be evaluated when determining the location of a perimeter taxiway.

(c) The requirement for a runway end safety area, as well as possible interference with landing systems and other navigation aids should also be taken into account. For example, in the case of an ILS, the perimeter taxiway should be located behind the localiser antenna, not between the localiser antenna and the runway, due to the potential for severe ILS disturbance, noting that this is harder to achieve as the distance between the localizer and the runway increases.

(d) Human factors issues should also be taken into account. Appropriate measures should be put in place to assist pilots to distinguish between aircraft that are crossing the runway and those that are safely on a perimeter taxiway.

22 AERODROME MAPPING DATA

22.1 INTRODUCTION

Chapter 2, 2.1.2 and 2.1.3, relate to the provision of aerodrome mapping data. The aerodrome mapping data features are collected and made available to the aeronautical information services for aerodromes designated by States with consideration of the intended applications. These applications are closely tied to an identified need and operational use where the application of the data would provide a safety benefit or could be used as mitigation of a safety concern.

22.2 APPLICATIONS

22.2.1 Aerodrome mapping data include aerodrome geographic information that supports applications which improve the user's situational awareness or supplement surface navigation, thereby increasing safety margins and operational efficiency. With appropriate data element accuracy, these data sets support collaborative decision-making, common situational awareness and aerodrome guidance applications. The data sets are intended to be used in the following air navigation applications:

(a) on-board positioning and route awareness including moving maps with own aircraft position, surface guidance and navigation;

(b) traffic awareness including surveillance and runway incursion detection and alerting (such as, respectively, in A-SMGCS levels 1 and 2);

(c) ground positioning and route awareness including situational displays with aircraft and vehicles position and taxi route, surface guidance and navigation (such as A-SMGCS levels 3 and 4);

(d) facilitation of aerodrome-related aeronautical information, including NOTAMs;

(e) resource and aerodrome facility management; and

(f) aeronautical chart production.

22.2.2 The data may also be used in other applications such as training/flight simulators and on-board or ground enhanced vision systems (EVS), synthetic vision systems (SVS) and combined

vision systems (CVS).

22.3 DETERMINATION OF AERODROMES TO BE CONSIDERED FOR COLLECTION OF AERODROME MAPPING DATA FEATURES

In order to determine which aerodromes may make use of applications requiring the collection of aerodrome mapping data features, the following aerodrome characteristics may be considered:

- safety risks at the aerodrome;
- visibility conditions;
- aerodrome layout; and
- traffic density.

Note.— Further guidance on aerodrome mapping data can be found in the Airport Services Manual, Part 8 — Airport Operational Service (Doc 9137)

ATTACHMENT B. OBSTACLE LIMITATION SURFACES

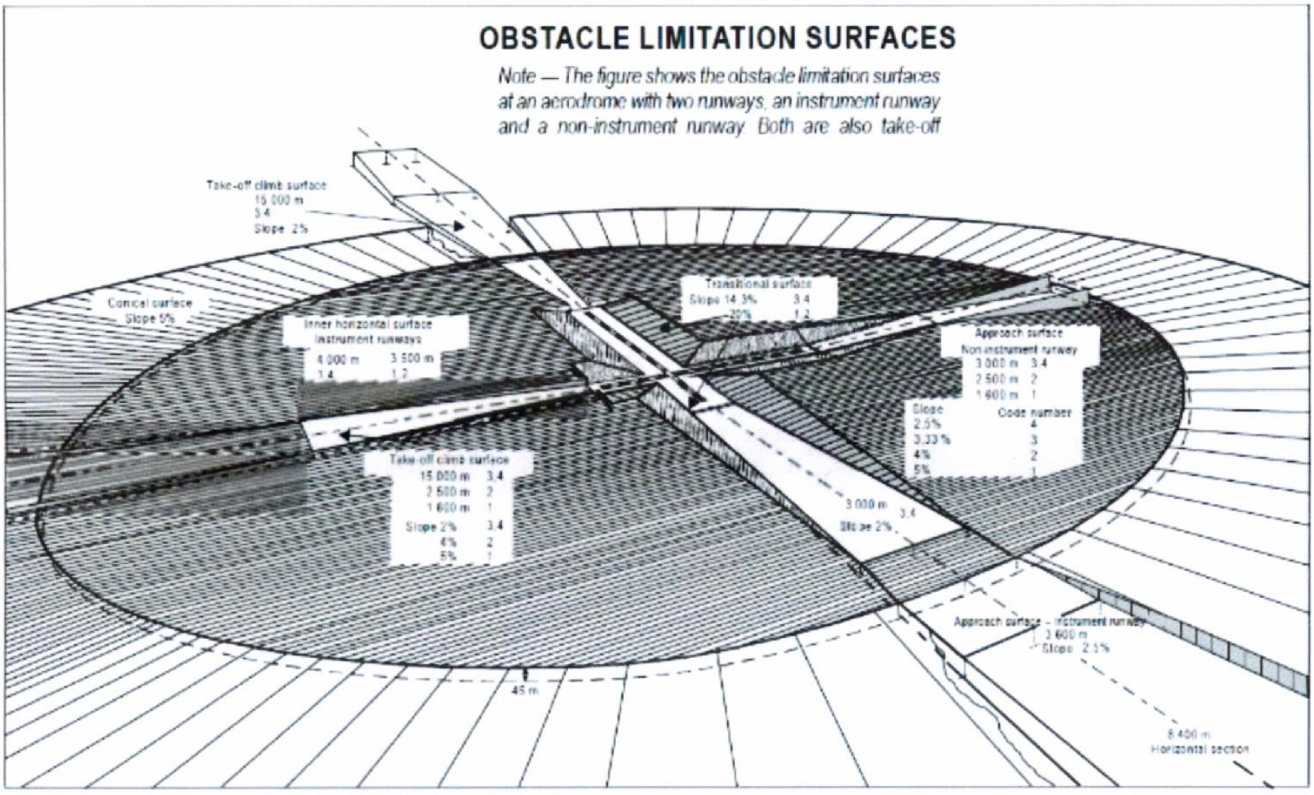


Figure B-1

ATTACHMENT C - AERODROME SAFETY MANAGEMENT SYSTEMS (SMS)

1 INTRODUCTION

1.1 Safety management addresses all of the operational activities of the entire organization. The scope of a Safety Management System (SMS) encompasses most of the activities of the organization, and all operational activities that support delivery of services and contain the potential to generate hazards. The scope of an SMS directly includes operations, maintenance, repair, support services, training and checking and other operational activities. The scope of an SMS indirectly includes, as appropriate and relevant to service delivery, other organizational activities that support operational activities, such as finance, human resources and legal.

1.2 An SMS must start with senior management. The management of safety, as a core business function of an organization, requires resources, just like any other core business function. The allocation of resources is eminently a function of senior management, in that senior management has both the authority and the responsibility for resource allocation. If senior management is not apprised of the role and objectives of the organization's SMS or involved at an appropriate level in the organization's SMS, it will not have an appreciation of the extent of the threat that safety risks represent to the capabilities of the organization. Without such an appreciation, allocation of resources may fall short of real needs.

1.3 An SMS aims to make continuous improvements to the overall level of safety of an organization. In accordance with the nature of safety management as a core business function, an SMS involves non-stop, daily hazard identification, collection and analysis, safety risk estimation, and implementation of mitigation strategies. There is no specific point at which an SMS stops or slows down. An SMS is a constant, never-ending operation that aims at maintaining and, if possible, improving safety levels that are commensurate with the organization's strategic objectives and supporting core business functions. In this sense, an SMS is profoundly different from the traditional notion of accident investigation, which waited for an accident to occur, then

extracted and distributed as many safety lessons as possible learned from the investigation in order to prevent similar accidents. An SMS actively looks for hazards, continuously assesses safety Fs, to contain them before they result in an accident.

2 SAFETY MANAGEMENT SYSTEM

2.1 General

2.1.1 This chapter covers the principles for Aerodrome Safety Management Systems.

2.1.2 A Safety Management System (SMS) should be established by an aerodrome operator for operations and maintenance of its aerodrome.

2.1.3 Every operator of a certified aerodrome shall establish and implement an operating safety management system at the aerodromes.

2.1.4 The information contained in this Chapter is not intended to be a prescriptive formula but serves to provide basic explanation of the essential components of an SMS. An aerodrome operator should start to develop its own SMS taking into account these guidelines and any other supplementary material that the Authority may publish from time to time.

2.2 General features of an SMS

2.2.1 An SMS is a systematic, proactive and explicit process for the management of safety risks.

2.2.2 An SMS is systematic because safety management activities are in accordance with a pre-determined plan and applied in a consistent manner throughout the organization. A long-range plan to keep the safety risks of the consequences of hazards under control is developed, approved,

implemented and operated on a non-stop, daily basis. As a consequence of their systematic and strategic nature, SMS activities aim at gradual but constant improvement, as opposed to instant dramatic change. The systematic nature of an SMS also leads to a focus on processes rather than outcomes. Although outcomes (i.e. Adverse events) are duly considered to extract conclusions that support the control of safety risks, the main focus of an SMS is the capture of hazards, which are the precursors to outcomes, during the course of the routine operational activities (processes) that the organization engages in during delivery of services.

2.2.3 An SMS is proactive because it builds upon an approach that emphasizes hazard identification and safety risk control and mitigation, before events that affect safety occur. It involves strategic planning, seeking to keep safety risks under the constant control of the organization, instead of engaging in repair action when an adverse event is experienced, and then reverting to "sleep mode" until the next adverse event is experienced, and repair action is reengaged. In order to sustain effective hazard identification, constant monitoring is conducted of operational activities necessary for the provision of services. This in turn allows for the collection of safety data on hazards, allowing data driven organizational decisions on safety risks and their control, as opposed to formulating decisions on safety risks based on opinion or, even worse, on bias or prejudice.

2.2.4 An SMS is explicit because all safety management activities are documented, visible and therefore defensible. Safety management activities and the ensuing safety management know-how of the organization are formally recorded in official documentation that is available for anyone to access. Thus, safety management activities are transparent. In this respect, maintaining a "safety library" is fundamental in ensuring that safety management activities and know-how are documented in formal organizational structures.

2.3 General description of an aerodrome SMS

2.3.1 The SMS applies to all activities related to the requirements for aerodrome certification and for ensuring the continuous safe functioning of aerodrome operations. The SMS should permeate throughout the aerodrome operator organization and be implemented through a continuing safety program based on a coherent policy that leads to well- designed work procedures. The SMS should also extend to include interfaces between the aerodrome operator and its suppliers, sub-contractors, agents, business partners and other relevant external service providers.

2.3.2 The SMS should focus principally on the hazards associated with the operation of the aerodrome and their effects upon those activities critical to safety. It should provide for goal setting, planning and measuring performance, and should place emphasis on organizational safety rather than conventional health and safety at- work concerns. Active monitoring and auditing processes should be applied to validate that the necessary controls identified through the hazard management process are effectively put in place so as to ensure continuing active commitment to safety and to achieve continuous improvement in safety performance.

2.3.3 An aerodrome operator's SMS defines how it intends to manage aerodrome safety as an integral part of its business management activities. The SMS should be woven into the fabric of an aerodrome operator's organization and become part of its culture – the way people do their jobs.

2.4 Aerodrome SMS Framework

The framework for an aerodrome SMS is described in Appendix 7 to this Manual

2.5 Safety policy

The SMS should have a clear definition of the philosophy and fundamental approach an aerodrome operator will adopt for the management of safety within its organization. This includes the setting

of policies on the process of safety management and how they relate to the operations and maintenance processes at an aerodrome.

2.6 Safety roles and responsibilities

The SMS should have a well-defined organization structure, including staffing positions, lines of responsibility and clear assignment of group and individual safety accountabilities at all levels involved in the safety process within the organization. The staff positions responsible for the safety compliance of externally supplied services should also be identified. The dedication and involvement of top management towards safety and safety practices should be clearly visible, including their commitment to provide priority to tackle safety initiatives and setting aside adequate time, financial and human resources necessary to attain the strategic safety objectives established by the organization.

2.7 Safety committee(s)

The SMS should include forums for discussing safety-related issues from a cross- functional perspective and for streamlining the implementation of the safety management plan across the aerodrome operator organization. This will provide a means of looking at safety from a broader viewpoint, to review safety achievements and broadcast safety information. Safety committee(s) could take the form of a high-level committee(s) as well as sub-committees with specific areas of responsibility.

2.8 Safety standards, goals and strategy

The SMS should have a plan and strategy involving setting of safety performance targets and the establishment of a framework for controlling risks to a level as low as reasonably practicable.

2.9 Safety assessment

The SMS should comprise a proactive means to assess safety by seeking out potential safety hazards so as to enable the evaluation and sound management of the associated risks. Hazard identification is the act of identifying any condition with the potential for causing injury to personnel, damage to equipment, structures or property, loss of material, or reduction of the ability to perform a prescribed function. Risk management involves analysing the risks associated with an identified hazard, making an assessment of its potential severity and likelihood of occurrence, and finally developing and implementing preventive or corrective actions to reduce the risks to an acceptable level. Appropriate tools/techniques for the identification of and action on critical safety areas, which require a higher level of safety management integrity, should also be used in the risk management process, where needed. Hazard identification and risk management should be performed in the following circumstances:

(1) Through regular reviews;

(2) When major operational changes are planned;

(3) When the organization is undergoing rapid change, such as expansion or downsizing; introduction of new facilities or procedures; decommissioning of existing facilities or modification of procedures, etc.;

(4) When key personnel change takes place.

The safety assessment should extend to the management of contracts with external service providers. Tender or proposal invitation documents shall be assessed and reviewed to ensure that safety requirements are adequately defined and documented for the performance by the external service providers.

2.10 Safety monitoring

The SMS should have built-in active safety monitoring techniques for data collection, which should include:

(1) Routine detailed inspections of specific task areas (e.g. using safety checklists);

(2) Regular reviews of appropriateness and effectiveness of current modes of operation – equipment performance, process, practices and procedures;

(3) Internal audits of compliance with SMS requirements; and

(4) Examination of adequacy of SMS setup and of management and line commitment.

Safety performance records should be documented and used as feedback to improve the system.

2.11 Safety reporting

Every event is an opportunity to learn valuable safety lessons. The lessons, however, will only be understood if the occurrence is analysed so that all staff, including management, are aware of not only what happened but also why it happened. This involves looking beyond the event and investigating the contributing factors, e.g. organizational and human factors within the organization that played a role in the event. The SMS developed and maintained by the aerodrome operator should therefore include procedures for the internal reporting and recording of occurrences, hazards and other safety related issues. The aerodrome operator should make use of appropriate, accurate and timely collected data to identify the root cause and to apply the necessary corrective afs for aerodrome occurrence reporting and investigations, as detailed in section 11.3 of this Manual. The safety reporting system should encompass the following fundamental elements:

(1) System to allow staff to report hazards, events or safety concerns in a simple, convenient and nonpunitive way;

(2) Procedures for investigating and analysing safety data, safety reports and any other safety related information;

(3) Methods for the collection, storage and distribution of data;

(4) Corrective actions and risk reduction strategies;

(5) On-going monitoring; and

(6) Validation of the effectiveness of corrective actions.

2.12 Safety information dissemination and awareness

The SMS setup should allow all safety-related information to be disseminated throughout the organization. An aerodrome operator should endeavour to inform all staff as to where safety related information and messages can be found and provide a means to keep staff notified whenever a potential safety threat is discovered. In this way, the entire organization will become aware of safety issues and understand that the company is actively seeking to address these issues.

2.13 Safety improvement

The SMS should encourage and allow opportunities for all staff to proactively participate in the safety process. Staff should have the opportunity to feedback and contribute to the development and implementation of the SMS. Their involvement in the decision-making process fosters ownership of the system and helps to promote a positive safety culture that is geared towards continuous improvement of safety performance.

2.14 Safety competencies

The SMS should account for staff training and competency, including review and evaluation on the adequacy of training provided to staff on safety related duties and of the certification system for testing their competency. An aerodrome operator should document the training requirements for each area of work within the organization, including those required of external service providers. The training should include initial, recurrent and update training requirements and, where necessary, training specific to the operation of the SMS. It is recommended that a training file be developed for each operational staff, including management, to assist in identifying and tracking staff competence and training requirements.

2.15 SMS documentation and records

Up to date information is essential for the aerodrome operator organization to operate in a safe and efficient manner in accordance with current aerodrome safety regulations, standards and exemptions. The SMS developed by the aerodrome operator should have a process for documenting the regulations, standards and exemptions by which it is regulated for the various activities it conducts. Consolidated documentation describing each component of the SMS is essential if the aerodrome operator staff are to understand how the whole safety management system is integrated. The safety management plan should be documented in a SMS Manual, where all components of the system stipulated in this section and their interrelationships /interfaces clearly illustrated. The SMS Manual should be a controlled document, i.e. there should be a systematic process to distribute, keep track and update the SMS Manual. Safety assessments carried out, audit findings, preventive and corrective action and monitoring of follow-up procedures should be duly recorded to facilitate easy retrieval and auditing.

2.16 Safety culture and promotion

The SMS should include measures for safety promotion and publication of relevant educational materials on safety initiatives and accident prevention.

3 AERODROME WORK SAFETY

3.1 General

3.1.1 An aerodrome operator shall plan and implement works to be carried out at an aerodrome so as not to create any hazard to aircraft operations or confusion to pilots. The Aerodrome Manual submitted by an aerodrome operator shall include details of the procedures for planning and safe carrying out of such work activities at the aerodrome.

3.1.2 An aerodrome operator shall, in his Aerodrome Manual, address how aerodrome works are to be carried out so that:

(a) Where the works are of a nature that will disrupt operations, these works shall be carried out with proper planning, consultation and coordination with all pertinent parties in advance; and

(b) Where the works are of a minor/maintenance nature, these works may be carried out as time-limited works where normal aircraft operations are not disrupted and the movement area can be restored to normal safety standards and any obstacle created by those works removed in not more than 10 minutes. Depending on the nature and extent of each activity, time-limited works may include minor maintenance of markings and lights, grass mowing, sweeping of aircraft pavements, surveys and inspections, etc.

3.1.3 At a controlled aerodrome, the air traffic control unit may, at the request of the aerodrome operator, vary the time limits set out in paragraph 11.2.1.2 (b) above for restoring normal safety standards or resuming aerodrome works. A variation under this paragraph is subject to such conditions as the air traffic control unit may impose.

3.2 Aerodrome work plans

3.2.1 Unless an aerodrome is closed during works in progress, or the work is of an emergency nature, an aerodrome operator shall not carry out aerodrome works, other than time-limited works, without proper planning in advance.

3.2.2 A plan shall be established, setting out the arrangements for carrying out those aerodrome works in coordination with all other operational, maintenance and development activities at the aerodrome.

3.2.3 When preparing a work plan, an aerodrome operator should consult:

(a) Commercial air transport operators using the aerodrome;

(b) The aerodrome's air traffic control unit; and

(c) If the work plan may affect its operations, the Rescue and Fire

(d) Fighting Service unit at the aerodrome so that the scope and impact of work is understood by related aerodrome users and service providers and to ensure the safety of aircraft operations at the aerodrome.

3.2.4 The aerodrome operator shall ensure that clear and ample prior notification is provided to the Aeronautical Information Services, the aerodrome air traffic control unit, aircraft operators and other users or service providers of the aerodrome. Such notification shall include timely and accurate promulgation of AIP Supplements or NOTAMs, with clear details of the extent and period of works.

3.2.5 An aerodrome operator shall be required to provide an explanation of his work plan, and any alterations or updates thereof, to the Authority upon request.

3.2.6 Aerodrome works, for which a work plan is required, shall be carried out in accordance with the arrangements set out in the work plan and any subsequent alterations or updates.

3.2.7 The work plan should address details of any special requirements or restrictions arising during or on completion of the works.

3.2.8 The work plan should outline details, if any, of special arrangements to be made during works if emergencies or adverse weather conditions occur.

3.2.9 A work plan may not be required if the aerodrome operator closes the aerodrome to aircraft operations while aerodrome works are being carried out. The Authority, commercial air transport operators and all organizations and persons likely to be affected by the closure shall be given reasonable notice of intention to close the aerodrome.

3.2.10 An aerodrome operator shall not close the aerodrome to aircraft operations due to aerodrome works unless an AIP Supplement or a NOTAM giving notice of the closure has been issued not less than 14 days before the closure takes place.

3.2.11 A work plan is not required for emergency aerodrome works carried out to repair damage to part of the manoeuvring area, or to remove an obstacle, or if the works do not require any restrictions to aircraft operations. Where practicable, a NOTAM giving the nature and time and date of the commencement of the urgent repair works should be issued, as early as possible, before the commencement of the works.

3.3 Management and control of aerodrome works

3.3.1 An aerodrome operator should ensure that aerodrome works are carried out in accordance with the requirements of this Manual.

3.3.2 An aerodrome operator should appoint a person responsible for the safe and proper execution of each item of aerodrome works. This person shall be required to:

(1) Ensure the safety of aircraft operations is not affected by the aerodrome work plan;

(2) Ensure that, where applicable, the aerodrome works are notified by the issue of an AIP Supplement or a NOTAM and that the text of each AIP Supplement or NOTAM pertaining to such notification conveys the information on operational restrictions accurately and clearly to aerodrome users and service providers;

(3) Supply the air traffic control unit with whatever information necessary to ensure the safety of aircraft operations;

(4) Discuss with the work organizations involved, on a regular basis, any matters necessary to ensure the safety of aircraft operations;

(5) Ensure that unserviceable portions of the movement area, temporary obstructions and limits of the work areas are correctly marked and lit in accordance with the required standards and the work plan;

(6) ensure that vehicles, plant and equipment carrying out aerodrome works are properly marked and lit or are properly supervised;

(7) Ensure that all requirements under the work plan pertaining to vehicles, plant and equipment and materials are complied with;

(8) Ensure that access routes to work areas are in accordance with that designated in the work plan and are clearly identified and that access is restricted to these routes;

(9) Ensure that excavation is carried out in accordance with the work plan and relevant requirements, and in particular, that sufficient precautions are taken so as to avoid damage or loss of calibration to any underground power or control cable, utilities or other services associated with a precision approach and landing

(10) System, any navigational aid or facility or equipment essential for the safety of aerodrome operations;

(11) Report immediately to the aerodrome air traffic control unit and the aerodrome operator any incident, or damage to facilities, likely to affect air traffic control services or the safety of aircraft;

(12) Provide adequate supervisors duty at the work areas while major works are in progress and the aerodrome is open to aircraft operations;

(13) Ensure that the aerodrome air traffic control unit is kept informed of the radio call signs of vehicles used by the work organizations that are operating in the aircraft movement areas;

(14) Remove vehicles, plant and personnel from the movement area immediately, where necessary, to ensure the safety of aircraft operations;

(15) Ensure that the movement area is safe for normal aircraft operations following the removal of vehicles, plant and equipment and personnel from the work areas;

(16) In the case of time-limited works, ensure that the work areas are restored to normal safety standards not less than 11 minutes before the time scheduled for opening the work areas to aircraft operations; and

(17) Ensure that floodlighting or any other lighting required for carrying out aerodrome works is shielded so as not to present a hazard to aircraft operations.

3.3.3 The person responsible for the aerodrome works should be satisfied that the work plan is adequately prepared and that sufficient safety measures are put in place on the work site at all times during the execution of the aerodrome works when the aerodrome is open to aircraft operations.

3.3.4 An aerodrome operator should take all reasonable measures to ensure that aerodrome works are wellorganized and that all work personnel carry out aerodrome works in a manner that will ensure the safety of aircraft operations.

3.3.5 Persons, vehicles, plant and equipment required for carrying out aerodrome works must not be permitted to enter the movement area or remain on it except for the purpose of carrying out those works.

3.3.6 Procedures for entering the work areas shall be addressed in the work plan.

3.4 Markers, markings, signs and lights

3.4.1 Aerodrome markers, markings, signs and lights required for, or affected by, aerodrome works shall be adjusted or installed in accordance with the appropriate aerodrome standards.

3.4.2 Parts of the movement area that are unserviceable as a result of the aerodrome works being carried out shall be marked and lit in accordance with the appropriate aerodrome standards.

3.4.3 All obstacles created as a result of aerodrome works being carried out shall be marked and lit in accordance with the appropriate aerodrome standards.

3.4.4 Vehicles and plant used in carrying out aerodrome works shall be marked and lit, where necessary, in accordance with the appropriate aerodrome standards.

3.5 Communication equipment

3.5.1 At a controlled aerodrome, a vehicle used by work parties carrying out aerodrome works on the movement area should be equipped with a radio for two-way communications with the aerodrome air traffic control unit.

3.5.2 For the purpose of communication with the air traffic control unit, each vehicle used for carrying out aerodrome works on the movement area should be given a call sign.

3.5.3 Any vehicle or plant that is not:

(a) Marked or lit in accordance with section 11.1.4 above; or

(b) If applicable, equipped with a two-way radio, may only be used in carrying out aerodrome works if it is:

(1) Used under the direct supervision of another vehicle that is equipped with a two-way radio set and which is responsible for escorting the vehicle or plant without radio when carrying out aerodrome works; or

(2) Used only within the limits of appropriately marked and lit work areas.

3.5.4 The drivers of vehicles equipped with a radio for two-way communications with the aerodrome air traffic control unit shall be properly trained and be responsible for checking that their radio sets are switched on and serviceable at all times when working on the movement area.

Note - The training requirements for airside vehicle drivers are contained in ICAO Airport Service Manual Part 8 – DOC 9137.

3.6 Works near aircraft movement areas

3.6.1 The aerodrome operator shall refer to chapters 6 and 7 of this Manual, ICAO Airport Services Manual Part 6 to determine the extent of work allowed near aircraft movement areas.

3.6.2 Works on or near aircraft movement areas or runway strips should be carried out as quickly as practicable to minimise any potential risks arising out of changes associated with the works in progress.

3.6.3 Where works are to be undertaken in the vicinity of navigational or landing aids located within the runway strips, considerations should be taken to ensure that neither the works nor vehicles or plant associated with the works may affect the performance of the aids.

3.7 Completion of aerodrome works

3.7.1 On the completion of aerodrome works and restoration of normal safety standards to the movement area, the aerodrome operator should cancel any AIP Supplement or NOTAM issued to advice of those works.

3.7.2 Attention is drawn to the requirements for an aerodrome operator to inspect his aerodrome, as circumstances require, to ensure aviation safety during and immediately after any period of construction or repair of an aerodrome facility or equipment that is critical to the safety of aircraft operations, and at any other time when there are conditions at the aerodrome that could affect aviation safety.

4 AERODROME ACCIDENT/INCIDENT REPORTING AND INVESTIGATION

4.1 Aerodrome occurrence reporting

4.1.1 This section prescribes the requirements for reporting the occurrence or detection of defects, failures or malfunctions at an aerodrome, its components or equipment, which could jeopardize the safe operation of the aerodrome or cause it to become a danger to persons or property.

4.1.2 The objectives of the Aerodrome Occurrence Report are as followed:

(a) To ensure that knowledge of these occurrences is disseminated so that other persons and organizations may learn from them.

(b) To enable an assessment to be made by those concerned (whether internal or external to the aerodrome operator) of the safety implications of each occurrence, both in itself and in relation to previous similar occurrences, so that they may take or initiate any necessary action.

4.2 Reportable occurrences and reporting procedures

4.2.1 An aerodrome operator shall notify the Authority of any accident, serious incident, fatal or serious injury occurring at his aerodrome – in accordance with aerodrome operator's standard operating procedures or as soon as practicable – and provide a detailed occurrence report thereafter.

ATTACHMENT D - AERODROME OPERATOR, ORGANIZATIONS AND DOCUMENTATION MANAGEMENT

1 INTRODUCTION

1.1 The provisions of this Attachment are prescribed in respect of the aerodrome operator, organization and documentation management.

1.1.1 An effective management structure is essential for the operation of aerodromes. Duties and responsibilities of managers and senior executives must be clearly defined in writing, and chains of command systematically established.

1.1.2 The number and nature of the appointments at an aerodrome will vary with the size and complexity of the aerodrome and organization. An excess of managers can lead to fragmentation of responsibility and control, and to as much difficulty and inefficiency as too few. In general, the appointment of deputies for managerial posts shall be kept to a minimum and particular care shall be taken in defining their functions and responsibilities. The aerodrome operator shall ensure that the management organization is adequate and properly matched to the operating environment and commitments.

1.1.3 It is important that the operational management has proper status in the organisation and the personnel are competent with suitable qualifications and experience. The positions held by key operations and maintenance personnel shall be listed in the Aerodrome Manual.

1.1.4 Where maintenance activities or aircraft ground handling services are performed by external contractors or agencies and not directly by the aerodrome operator, a senior post shall be established to coordinate arrangements and to provide continuous liaison with the maintenance contractors or handling agencies. It is the responsibility of the aerodrome operator to ensure that his contractors and/or agencies are competent to perform their duties having regard to their experience, equipment, organization, staffing, training and other arrangements.

1.1.5 Attention is drawn to the requirement for aerodrome operators to ensure proper and efficient maintenance of their aerodrome facilities and equipment. In addition, as part of the aerodrome organisation, the aerodrome operator shall, in respect of his aerodrome, make provisions for;

(a) appropriate air traffic services to ensure the safety of aircraft in the airspace associated with the aerodrome; and

(b) aeronautical information services, meteorological services and provision of security and other services related to safety.

1.2 Aerodrome operational staff and competency

1.2.1 An aerodrome operator shall employ an adequate number of qualified and skilled personnel to perform all Safety Critical Activities for the operation and maintenance of the aerodrome.

1.2.2 An aerodrome operator shall ensure that all persons performing duties or providing services at his aerodrome are trained in accordance with the standards for training aerodrome personnel set out in his

Aerodrome Manual.

1.2.3 The Authority requires the competency of specific post holders to be certified in accordance with the regulations, the aerodrome operator shall, employ only persons possessing such qualification defined in 1.3. If for some reason one or more those post- holders will relinquish (temporary or permanent) that post for more than ten (10) days, the aerodrome operator is required to recommend a new person for the post (s) and submit the relevant qualification to the GCAA for approval before assigning the person to the post.

1.2.4 In addition, an aerodrome operator shall implement programmes to upgrade the competency of the personnel referred to in sub-paragraph 1.2.1. above.

1.2.5 Aerodrome operational staff here refers to staff engaged in the day to day operation of the aerodrome whose duties have a bearing on aircraft safety. They include apron control staff, rescue and firefighting personnel, bird control staff, airfield lighting and aircraft pavement maintenance personnel, aircraft movement area inspection staff, etc., who in the course of their duties are concerned with ensuring that the aerodrome is safe for use by aircraft or are required to have access to the aerodrome manoeuvring areas or apron.

1.2.6 For the purpose of certification and aerodrome safety management system, an aerodrome operator shall be required to satisfy the Authority that he has an adequate number of operational staff for the proposed aerodrome operations. This requirement will not be assessed against a set formula, as there will clearly be a wide variation according to particular circumstances.

1.2.7 Arrangements for the supervision of operational staff must be sensibly related to the size of the organization and the nature of the operation and must be in the hands of persons having the experience and qualities necessary to ensure that the maintenance is of high professional standards. The duties and responsibilities of these supervisory personnel and their supporting staff shall be well-defined.

1.2.8 All operational personnel shall be properly trained to perform their duties in an efficient and effective manner. Apart from initial training, refresher training shall also be provided at regular intervals to ensure that a high standard is maintained. Training provisions including any competency test required of staff shall be detailed in the Aerodrome Manual. A record of all such training and tests shall be kept up to date.

1.3 Minimum Qualification for Senior Personnel

1.3.1 Senior /Manger Airport Operations Personnel

a) Airside, terminal and landside operations and;
b) Airport emergency services or ;
c) Safety management system or;

d) Emergency and contingency planning or

e) 5 years relevant experience in airport operations.

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1.3.2 Senior/Manager Airport Maintenance Personnel

a) Civil /Electrical Engineering Degree or

b) Civil /Electrical Engineering Diploma and 3 years' experience; or

c) 5 years Relevant experience in maintenance.

Knowledge of ICAO Annex 14 and or Airport Maintenance will be an asset.

1.3.3 Senior/Manager responsible for Safety

a) Safety management system or;

b) Quality management system or;

c) Auditing techniques or:

d) 5 year relevant experience in airport safety

Knowledge of ICAO Annex 19 requirements will be an asset.

1.3.4 Senior Airport Rescue and Fire Fighting Personnel

a) 3 years Experience in Airport Rescue and Fire Fighting (ARFF) and basic, intermediate and advanced firemanship training.

(a) The Basic Firemanship Training must be designed to equip entry level of ARFF personnel with the necessary knowledge and skills to perform their tasks. Majority of the training will be devoted to practical exercises involving pressure-fed fuel fires to give ARFF personnel adequate exposure related to aircraft fire fighting.

(b) The Intermediate Firemanship Training must be designed to equip experienced ARFF personnel with the theory, principles and practice of fire station management, tactical fire-fighting involving various emergencies and fireground command to prepare them for their roles as airport fire officers. Majority of the training will be devoted to practical exercises.

(c) The Advanced Firemanship Training must be designed to equip senior fire officers with the theory, principles and practice of fire station management, facilities and fire

safety planning, as well as command and control at aircraft crash site to prepare them for their roles as senior fire officers.

1.4 Aerodrome operations library

1.4.1 An aerodrome operator shall maintain an adequate library of maps, charts, guidance material, operations manuals and other documents needed for reference, planning and the effective operation of the aerodrome. The library shall be kept in an orderly fashion and responsibility for its maintenance clearly defined.

1.4.2 Arrangements shall be made for the amendment of manuals, documents and guidance material, and for bringing the amendments to the notice of the staff concerned. A record of the amendments shall be kept, and a system derived to ensure the effective promulgation of information to staff concerned.

1.4.3 The minimum list of the documents and publications that must be kept and made available for access by staff is shown in Appendix F of this Manual of Aerodrome Standards.

1.5 Instruction to aerodrome operational staff

1.5.1 The Aerodrome Manual shall include a systematic procedure for bringing urgent or temporary information to the notice of aerodrome operations and maintenance staff.

2.0 DOCUMENTS AND RECORD MANAGEMENT

2.1 Forms, documents and records

2.1.1 Forms – An aerodrome operator may need to provide various official forms and records for use by the operational staff. Unless the use of such forms is self-explanatory, instructions for their completion shall be included in the Aerodrome Manual. Copies and records of the safety related forms such as forms for the inspection of runway, taxiway, apron, equipment, marking,

lighting etc., the recording of bird strike occurrence and reporting of accidents and incidents shall be made available to all relevant staff who need to use them.

2.1.2 Safety Records – An aerodrome operator shall maintain a quality control system to ensure a systematic means of safekeeping safety records that would enable effective preservation of these records and allow ease of retrieval. These records must be kept for a minimum of 18 months once they are not officially required as evidence in an investigation.

Made this 16th day of May 2024.

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Director-General

For the Guyana Civil Aviation Authority