REPUBLIC OF YEMEN
CIVIL AVIATION & METEOROLOGY AUTHORITY
AVIATION SAFETY SECTOR

الجمهورية اليمنية
الهيئة العامة للطيران المدني والإرصاد
قطاع سلامة الطيران

CIVIL AVIATION ADVISORY PUBLICATION

CAAP 70

HELIPORTS

STANDARDS, GUIDANCE AND INFORMATION REGARDING HELIPORTS

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CHAPTER 1 – INTRODUCTION

1.1 APPLICABILITY

1.1.1 This CAAP is applicable to all operators or prospective operators of land based heliports.

1.1.2 An operator of a heliport shall hold a either a Heliport Certificate or a Landing Area Acceptance as described in Appendix A.

1.1.4 An operator of a heliport which is required to hold a Landing Area Acceptance may apply for a Heliport Certificate under this CAAP.

Note : A landing location that is not identifiable as a heliport and is only used on a temporary or infrequent basis is not required to hold a Heliport Certificate or a Landing Area Acceptance. Helicopter operations to these locations shall comply with the requirements of YCAR Part IV - Ops 3.

1.2 GENERAL

1.2.1 The purpose of this CAAP is to provide guidance and policy information to operators of all heliports within Yemen.

1.2.2 By following the guidance described in this publication and on successful completion of the process listed in Chapter 2 as applicable, heliport operators will be provided with ~~a~~ ***Heliport Certificate*** or a ***Landing Area Acceptance***.

1.2.3 For a Heliport Certificate and a Landing Area Acceptance, applications are provided on CAMA website.

1.2.4 This CAAP should be used in conjunction with YCAR Part IV (YCAR-OPS 3), YCAR Part IX, X, XI and other relevant CAMA publications.

1.3 IMPLEMENTATION OF REGULATION AND SAFETY OVERSIGHT

1.3.1 Implementation will be a phased approach, with new construction and operations complying with this CAAP from 14 January 2020.

1.3.2 Compliance with this CAAP at established heliports will be required from 1 January 2022.

1.3.3 From 1 January 2022 it will be a requirement to hold either a Heliport Certificate or a Landing Area Acceptance in order to operate or to continue operations.

1.4 PURPOSE

1.4.1 The information within this publication will ensure compliance with Yemen Civil Aviation Law and Civil Aviation Regulations and conformance with the international standards of ICAO Annex 14, Volume II.

1.4.2 Civil Aviation Law, article 38, states that “The use of any Airport, or any place therein, shall only be made with a permit thereof from the civil aviation authorities and in accordance with conditions and limitations”.

1.4.3 The guidance material set out in this CAAP indicates the minimum requirements to determine the suitability of a heliport and its continued use.

1.5 STATUS OF THIS CAAP

This is first Issue of CAAP 70 dated January 2020. It will remain current unless withdrawn or superseded.

1.6 REFERENCES

a) YCAR Part IV: Operational Regulations OPS 3: Commercial and Private Air Transportation (Helicopter)

b) YCAR Part IX (Aerodromes)

c) YCAR Part X (Safety Management Requirements)

d) ICAO Annex 14 Volume II (Aerodromes – Heliports)

e) ICAO Heliport Manual Doc 9261-AN/903

f)ICAO Doc 9137 Airport Service Manual Part 1 Rescue and Fire-Fighting

g) Fire Protection Association (NFPA) 418 Standards for Heliports

h) CAAP 22 (Safety Incident Reporting)

i) CAAP 35 (Inspecting and Testing of Rescue and Fire-Fighting Equipment)

j) CAAP 36 (Runway and Movement Area Inspections)

k) CAAP 43 (Foreign Object Debris – FOD)

l) CAAP 57 (Voluntary Occurrence Reporting System)

m) ICAO Annex 15 (Aeronautical Information Services)

1.7 GUIDANCE

For guidance on points that are not covered within this publication, advice should be sought from the Aviation Safety Affairs Sector, CAMA; email: ad.certification@cama.gov.ye.

1.8 POLICY

1.8.1 The CAMA will approve the certification of heliports or provide a Landing Area Acceptance (whichever is deemed appropriate), once the criteria have been met; however the responsibility for the maintenance and condition of the heliport, the facilities, and for obstacle control, remains with the Certificate/Acceptance Holder.

1.8.2 This CAAP includes references to Yemen legislative requirements and ICAO Standards and Recommended Practices; compliance is required wherever the word “shall” is used in this document.

1.8.3 Applications will be assessed and processed by the following CAMA departments:

a) Aerodrome Standrd Department: will assess visual aids (markings, lights, signs

and markers); Heliport Manual and AES (RFFS and Emergency Response) in relation to YCAR Part IX, YCAR Part X and YCAR Part XI, and any ANS such as CNS, MET, AIS, ATS in relation to YCAR Part VIII.

b) Flight Operations Department: will assess the application of the operations for which the facility is designed, in relation to YCAR Part IV – OPS 3. This will include the direction of flight; the assessment of the obstacle environment on the basis of the intended use of a FATO; the acceptance of the Declared Distances and obstacle limitation surfaces in relation to the most critical helicopter type for which the heliport is intended.

c) Aviation Security Department: Heliport Certificate or a Landing Area Acceptance holders must obtain a security clearance through CAMA under security. Contact should be made with CAMA Aviation Security Department for details regarding security requirements.

1.9 DEFINITIONS

Approved by the CAMA	Documented by the CAMA as suitable for the purpose intended.
Certificated Heliport	A heliport whose operator has been granted a Heliport Certificate by the CAMA under applicable regulations for the operation of a heliport.
D or D-value	The largest overall dimension of the helicopter when rotor(s) are turning measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane or helicopter structure. *Note — "D" is sometimes referred to in the text using the terminology "D-value".*
Declared Distances	Take-off distance available (TODAH). The length of the FATO plus the length of helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off. Rejected take-off distance available (RTODAH). The length of the FATO declared available and suitable for helicopters operated in performance class 1 to complete a rejected take-off. Landing distance available (LDAH). The length of the FATO plus any additional area declared available and suitable for helicopters to complete the landing manoeuvre from a defined height.
Dynamic load-bearing Surface	A surface capable of supporting the loads generated by a helicopter conducting an emergency touchdown on it.
Elevated heliport	A heliport located on a raised structure on land.
Emergency Evacuation Helipad	An emergency landing area on top of a building, solely for the purpose of emergency evacuation of the building.
Final approach and take-off area (FATO)	A defined area over which the final phase of the approach manoeuvre to hover or landing is completed and from which the take-off manoeuvre is commenced. Where the FATO is to be used by helicopters operated in performance class 1, the defined area includes the rejected take-off area available.
CAMA	The Civil Aviation and Meteorology Authority of the Republic of Yemen as the competent body responsible for the safety regulation of Civil Aviation.
CAMA Inspector	An Inspector from any discipline within the CAMA, dependent upon the discipline being inspected or audited.
CAMA Service Fees	Those fees on the Civil Aviation and Meteorology Authority bylaw, as varied

	from time to time and in respect to a service delivered by the CAMA, which are required to be paid to the Civil Aviation and Meteorology Authority pursuant to federal government decisions
Helicopter air taxiway	A defined path on the surface established for the air taxiing of helicopters.
Helicopter clearway	A defined area on the ground or water, selected and/or prepared as a suitable area over which a helicopter operated in performance class 1 may accelerate and achieve a specific height.
Helicopter ground Taxiway	A ground taxiway intended for the ground movement of wheeled undercarriage helicopters.
Helicopter stand	A stand which provides for parking a helicopter and where ground taxi operations are completed or where the helicopter touches down and lifts off for air taxi operations.
Heliport	An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure or surface movement of helicopters.
Heliport Certificate	A Certificate issued by the CAMA under Civil Aviation Advisory Publication CAAP 70 for the operation of a heliport.
Heliport elevation	The elevation of the highest point of the FATO.
Heliport facilities and equipment	Facilities and equipment, inside or outside the boundaries of the heliport, that are constructed or installed, operated and maintained for the arrival, departure and surface movement of aircraft.
Heliport Operations Manual	The Manual that forms part of the application for an operational approval for a Certificated Heliport, including any amendments thereto accepted by the CAMA.
Heliport Operator	In relation to a Certificated Heliport, the Heliport Certificate holder or in relation to an accepted landing area, the Helicopter Landing Area Acceptance holder.
Heliport reference point (HRP)	The designated location of a heliport or a landing location.
Hospital Heliport	A heliport located at a hospital or medical facility intended to serve helicopters engaged in HEMS or other hospital related functions.
Landing Area Acceptance	An acceptance issued by the CAMA for the operation of a heliport
Landing Location	A marked or unmarked area that has the same physical characteristics as a visual heliport final approach and take-off area (FATO).
Manoeuvring area	That part of a heliport to be used for the take-off, landing and taxiing of helicopters, excluding aprons.
Movement area	That part of a heliport to be used for the take-off, landing and taxiing of helicopters, consisting of the manoeuvring area and the apron(s).
Operator (Flight Operator)	A person, organization or enterprise engaged in or offering to engage in an aircraft operation.
Point-in-space approach (PinS)	The Point-in-space approach is based on GNSS and is an approach procedure designed for helicopter only. It is aligned with a reference point located to permit subsequent flight manoeuvring or approach and landing using visual manoeuvring in adequate visual conditions to see and avoid obstacles.
Point-in-space (PinS) visual segment	This is the segment of a helicopter PinS approach procedure from the MAPt to the landing location for a PinS “proceed visually” procedure. This visual segment connects the Point-in-space (PinS) to the landing location.

	Note — The procedure design criteria for a PinS approach and the detailed design requirements for a visual segment are established in the Procedures for Air Navigation Services — Aircraft Operations, (PANS-OPS, Doc 8168).
Private Operations	Carriage of persons or cargo not for hire or reward
Protection area	An area within a taxi-route and around a helicopter stand which provides separation from objects, the FATO, other taxi-routes and helicopter stands, for safe manoeuvring of helicopters.
Rejected take-off area	A defined area on a heliport suitable for helicopters operating in performance class 1 to complete a rejected take-off.
Runway-type FATO	A FATO having characteristics similar in shape to a runway.
Safety Area	A defined area on a heliport surrounding the FATO which is free of obstacles, other than those required for air navigation purposes, and intended to reduce the risk of damage to helicopters accidentally diverging from the FATO.
Shipboard heliport.	A heliport located on a ship that may be purpose or non-purpose- built. A purpose-built shipboard heliport is one designed specifically for helicopter operations. A non-purpose-built shipboard heliport is one that utilizes an area of the ship that is capable of supporting a helicopter but not designed specifically for that task.
Static load-bearing Surface	A surface capable of supporting the mass of a helicopter situated upon it.
Surface-level heliport	A heliport located on the ground or on the water.
Taxi-route	A defined path established for the movement of helicopters from one part of a heliport to another. A taxi-route includes a helicopter air or ground taxiway which is centred on the taxi-route.
Technical Inspection	An inspection of a heliport conducted by the CAMA to confirm compliance with the physical characteristics requirements of CAAP 70.
Touchdown and lift-off area (TLOF)	An area on which a helicopter may touch down or lift off.
Verification Audit	An inspection of the heliport facilities, equipment and services and audit of the relevant safety manuals and Compliance Statements conducted prior to the issue of a Heliport Certificate or Landing Area Acceptance.
Water heliport	A heliport on water intended for use by helicopters specifically equipped and approved in relevant Flight Manuals for routine water operations or rejected take-offs on to water.

1.10 ABBREVIATIONS

AIP	Aeronautical Information Publication
ASPSL	Arrays of Segmented Point Source Lighting
DCP	Dry Chemical Powder
DIFFS	Deck Integrated Fire Fighting Systems
FATO	Final Approach and Take-Off Area
FMS	Fixed Monitor System
FOD	Foreign Object Debris
CAMA	Civil Aviation and Meteorology Authority
GNSS	Global navigation satellite system
HAPI	Helicopter Approach Path Indicator
HEMS	Helicopter Emergency Medical Services
HFM	Helicopter Flight Manual
HLO	Heliport Landing Officer
HPA	Heliport Assistant
ICAO	International Civil Aviation Organisation
LED	Light Emitting Diodes
LP	Luminescent Panel
Lpm	Litre per minute
MAPt	Missed approach point
MTOM	Maximum Take-Off Mass
PinS	Point-in-space
RTODAH	Rejected take-off distance available
SMS	Safety Management System
TLOF	Touchdown and Lift-Off Area
UCW	Width of undercarriage

CHAPTER 2 – HELIPORT CERTIFICATE AND LANDING AREA ACCEPTANCE

2.1 GENERAL

Note 1: For new heliports the operator should apply for a Design Acceptance prior to commencing construction of the heliport. For details refer to Appendix G.

Note 2: The applicant should initiate a meeting with the CAMA to discuss the application and the contents of the submission including the anticipated scope of operations for the heliport.

2.1.1 All applicants to apply for a Heliport Certificate or Landing Area Acceptance, application available on the CAMA website: *www.cama.gov.ye*.

2.1.2 Applicants shall make a request to email: *ad.certification@cama.gov.ye* and provide the following details:

a) Operator Name
b) PO Box
c) City
d) Details for courier delivery
e) Telephone number
f) Name, phone and email of point of contact.

2.1.3 Organisation applicants must supply a copy of their Trade License or equivalent.

2.1.4 Individual applicants must supply a copy of their Yemeni ID.

2.1.5 The applicant shall complete the details required application form for the issue of a Heliport Certificate or a Landing Area Acceptance.

2.2 APPLICATION

The initial information required for the completion of the application form includes the following:

a) a point of contact for the application;
b) particulars of the heliport including name, location, intended scope of operations etc.;
c) a copy of a letter of no objection from the local civil aviation department or authority;
d) for a Heliport Certificate the nomination of Responsible Persons (Post Holders) (refer 2.3.2);
e) for a Landing Area Acceptance the nomination of a Person Responsible for Operations;
f) any approvals, permits, or clearances that may be required from other local Authorities;
g) if applicable, evidence that all security, emergency planning and any requirements relating to the provision of Air Navigation have been satisfied; and
h) evidence of payment of any applicable CAMA Service Fees.

2.3 SERVICE FEES

2.3.1 Applicants undertake to pay CAMA Service Fees in respect of an initial issue of Heliport Certificate or a Landing Area Acceptance.

2.3.2 Payment of the CAMA Service Fee does not guarantee the grant or continuation of a Heliport Certificate or a Landing Area Acceptance.

2.4 HELIPORT CERTIFICATION PROCESS

2.4.1 Certification Requirements

2.4.1.1 The Certification requirements include the following:

a) written policy, procedures and other information as required by 2.4.3;
b) any other documents or evidence as requested by the CAMA.

2.4.1.2 The CAMA will conduct a Verification Audit of the facilities and equipment, including sampling of policies and procedures and other related safety activities.

2.4.1.3 The aim of the Verification Audit is to verify compliance with the applicable requirements through a technical inspection, the examination of documentation, and demonstration of compliance. It should be noted that the CAMA audit, inspection, testing or sampling processes do not absolve the applicant from the responsibility to provide accurate information and documentary evidence.

2.4.1.4 The CAMA will produce an audit report identifying any shortfalls in compliance.

2.4.1.5 If shortfalls in compliance are identified during the Verification Audit, the applicant will be required to provide confirmation of the audit report together with an action plan with timescales to rectify or mitigate all findings to a level acceptable to the CAMA.

2.4.1.6 The CAMA will only issue a Heliport Certificate when completely satisfied that all regulatory and critical safety elements have been adequately mitigated. This may require a further audit/inspection follow-up visit and/or special additional operating approvals or restrictions.

2.4.2 Personnel Requirements

2.4.2.1 Each heliport operator prior to the grant of a Heliport Certificate and on an on-going basis shall engage, employ or contract:

a) sufficient and qualified personnel for the planned tasks and activities to be performed related to the operation, maintenance and management of the aerodrome in accordance with the applicable requirements and the heliport operator’s training programme; and
b) sufficient number of supervisors to defined duties and responsibilities, taking into account the structure of the organisation and the number of personnel employed.

2.4.2.2 The heliport operator shall nominate responsible persons (Post Holders) for the management and supervision of the following areas:

a) Heliport Accountable Manager - a person who has full control of the resources, final authority over operations under the certificate/approval of the organisation and ultimate responsibility and accountability for the resolution of all safety issues; and
b) Heliport Operations – a person who is responsible for ensuring that the heliport and its operation comply with the requirements of this CAAP.

2.4.2.3 The heliport operator shall give consideration to the size and complexity of the organization, recognizing that the roles of the Heliport Accountable Manager and Heliport Operations may be combined.

2.4.2.4 The nomination of a single person should depend upon the individual’s competence and capacity

to meet the responsibilities of holding both positions.

2.4.2.5 The heliport operator shall ensure that any changes to the responsible person(s) are notified to the CAMA.

2.4.3 Heliport Operations

2.4.3.1 The applicant shall establish written policy, procedures and other relevant documentation to ensure that the heliport can be operated and maintained in a condition that does not impair the safety of helicopter operations.

2.4.3.2 The heliport operator shall ensure that this information is made available to all applicable personnel and is reviewed and amended so that it remains current.

2.4.3.3 The heliport operator shall ensure that there are sufficient trained and competent personnel for the planned tasks and activities to be performed in accordance with the heliport operator's policy and procedures.

Note: Appendix B and F provides guidance on the information that should be provided and maintained forthe heliport. The level of information provided may be determined based on the scope and complexity of the heliport and helicopter operations.

2.4.4 Oversight

2.4.4.1 Following the issue of a Heliport Certificate, the Certificate Holder will be subject to the CAMA continuous oversight process.

2.4.4.2 The CAMA retains also the right to inspect the heliport at any time.

2.4.4.3 If conditions or operations are found to be unsafe, the CAMA also retains the right to place restrictions on the use of the heliport or withdraw or suspend the Heliport Certificate.

2.4.5 Movement Data

When requested by the CAMA, the Heliport Certificate holder and the Landing Area Acceptance holder shall provide details on the number of helicopter movements occurring at the heliport.

Note: A movement is either a take-off or a landing.

2.5 LANDING AREA ACCEPTANCE PROCESS

Note: For new heliports the operator should apply for a Design Acceptance prior to commencing construction of the heliport. For details refer to Appendix G.

2.5.1 Landing Area Acceptance Requirements

2.5.1.1 The CAMA will conduct an on-site inspection to determine the level of compliance with CAMA Regulations.

2.5.1.2 A Landing Area Acceptance will only be granted by the CAMA when it is satisfied that:

a) remedial action for any safety critical deficiencies is complete; and
b) the facilities, services and equipment, including the emergency response, comply with the regulations or agreed conditions.

2.5.2 Oversight

2.5.2.1 Following the issue of a Landing Area Acceptance, the Acceptance Holder will be subject to the CAMA continuous oversight process.

2.5.2.2 The CAMA retains also the right to inspect the heliport at any time.

2.5.2.3 If conditions or operations are found to be unsafe, the CAMA also retains the right to place

restrictions on the use of the heliport or withdraw or suspend the Landing Area Acceptance.

2.5.3 Movement Data

When requested by the CAMA, the Landing Area Acceptance holder shall provide details on the number of helicopter movements occurring at the heliport.

Note: A movement is either a take-off or a landing.

CHAPTER 3 – HELIPORT DATA

3.1 AERONAUTICAL INFORMATION SERVICE

3.1.2 If regular operations are to take place, it is advisable to publish the relevant information on your heliport and ensure that your activities are coordinated with other nearby civil and military aviation activity.

3.1.1 If the heliport is to be published then the following shall be complied with. Reference should also be made to YCAR Part IX.

Table 3-1 – Document References

Aeronautical Information Service	Reference documents
Content of the AIP information	Annex 15, Chapter 4: Aeronautical Information Publications (AIP) Annex 15, Appendix 1: Contents of the AIP ICAO DOC 8126 – Specimen AIP
Electronic Data Provision	CAAP 56: Electronic Data Provision in AIM

3.2 NAMING OF HELIPORTS

In aviation safety terms, the name of a heliport is directly connected with aeronautical communications and flight safety information. It is therefore important that the heliport name is representative of its location (the nearest city, town or village) and should not have the potential to be confused with another aerodrome or heliport.

3.3 COMMON REFERENCE SYSTEM

Reference should be made to YCAR Part IX.

3.4 AERONAUTICAL DATA

Heliport related aeronautical data should be in accordance with the accuracy and integrity requirements as listed in YCAR Part IX.

3.5 HELIPORT REFERENCE POINT

3.5.1 A heliport reference point shall be established for a heliport or a landing location not co-located with an aerodrome.

3.5.2 The heliport reference point shall be located near the initial or planned geometric centre of the heliport or landing location and shall normally remain where first established.

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

Note — When the heliport or landing location is collocated with an aerodrome, the established aerodrome reference point serves both aerodrome and heliport or landing location.

3.6 HELIPORT ELEVATION

3.6.1 The heliport elevation and geoid undulation at the heliport elevation position shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre.

3.6.2 The elevation of the TLOF and/or the elevation and geoid undulation of each threshold of the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority to the accuracy of one-half metre.

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

3.7 HELIPORT DIMENSIONS AND RELATED INFORMATION

3.7.1 The following data shall be measured or described, as appropriate, for each facility provided on a heliport:

a) heliport type — surface-level, elevated or helideck;
b) TLOF — dimensions to the nearest metre, slope, surface type, bearing strength in tonnes (1000 kg);
c) FATO — type of FATO, true bearing to one-hundredth of a degree, designation number (where appropriate), length and width to the nearest metre, slope, surface type;
d) safety area — length, width and surface type;
e) helicopter ground taxiway, air taxiway and air transit route — designation, width, surface type;
f) apron — surface type, helicopter stands;
g) clearway — length, ground profile;
h) visual aids for approach procedures, marking and lighting of FATO, TLOF, helicopter ground taxiways, helicopter air taxiway and helicopter stands.

3.7.2 Geographical coordinates shall meet the accuracy requirements of YCAR Part IX.

3.8 DECLARED DISTANCES

3.8.1 The following distances to the nearest metre shall be declared, where relevant, for a heliport:

a) take-off distance available;
b) rejected take-off distance available; and
c) landing distance available.

CHAPTER 4 – PHYSICAL CHARACTERISTICS: SURFACE LEVEL HELIPORTS

Note 1 — The provisions given in this section are based on the design assumption that no more than one helicopter will be in the FATO at the same time.

Note 2 — The design provisions given in this section assume when conducting operations to a FATO in proximity to another FATO, these operations will not be simultaneous. If simultaneous helicopter operations are required, appropriate separation distances between FATOs need to be determined, giving due regard to such issues as rotor downwash and airspace, and ensuring the flight paths for each FATO, defined in Chapter 6, do not overlap.

Note 3 — The specifications for ground taxi-routes and air taxi-routes are intended for the safety of simultaneous operations during the manoeuvring of helicopters. However, the wind velocity induced by the rotor downwash might have to be considered.

4.1 FINAL APPROACH AND TAKE-OFF AREAS

4.1.1 A surface-level heliport shall be provided with at least one final approach and take-off area (FATO).

Note — A FATO may be located on or near a runway strip or taxiway strip.

4.1.2 A FATO shall be obstacle free.

4.1.3 The dimensions of a FATO shall be:

a) where intended to be used by helicopters operated in performance class 1, as prescribed in the Helicopter Flight Manual (HFM) except that, in the absence of width specifications, the width shall be not less than the greatest overall dimension (D) of the largest helicopter the FATO is intended to serve;

b) where intended to be used by helicopters operated in performance class 2 or 3, of sufficient size and shape to contain an area within which can be drawn a circle of diameter not less than:

i. 1 D of the largest helicopter when the maximum take-off mass (MTOM) of helicopters the FATO is intended to serve is more than 3 175 kg;

ii. 0.83 D of the largest helicopter when the MTOM of helicopters the FATO is intended to serve is 3175 kg or less.

Note — The term FATO is not used in the Helicopter Flight Manual (HFM). The minimum landing/take-off area specified in the HFM for the appropriate performance class 1 flight profile is necessary to determine the size of the FATO. However, for vertical take-off procedures in performance class 1, the required rejected take-off area is not normally quoted in the HFM and it will be necessary to obtain information which includes complete containment – this figure will always be greater than 1D.

4.1.4 *Recommendation* - Where intended to be used by helicopters operated in performance class 2 or 3 with MTOM of 3 175 kg or less, the FATO should be of sufficient size and shape to contain an area within which can be drawn a circle of diameter not less than 1 D.

Note — Local conditions, such as elevation and temperature, may need to be considered when determining the size of a FATO. Guidance is given in the Heliport Manual (Doc 9261).

4.1.5 The FATO shall provide rapid drainage but the mean slope in any direction shall not exceed 3 per cent. No portion of a FATO shall have a local slope exceeding:

a) 5 per cent where the heliport is intended to be used by helicopters operated in performance class 1; and

b) 7 per cent where the heliport is intended to be used by helicopters operated in performance class 2 or 3.

4.1.6 The surface of the FATO shall:

a) be resistant to the effects of rotor downwash;

b) be free of irregularities that would adversely affect the take-off or landing of helicopters; and

c) have a bearing strength sufficient to accommodate a rejected take-off by helicopters operated in performance class 1.

4.1.7 The surface of a FATO surrounding a touchdown and lift-off area (TLOF) intended for use by helicopters operated in performance classes 2 and 3 shall be static load-bearing.

4.1.8 *Recommendation* - The FATO should provide ground effect.

4.1.9 *Recommendation* - The FATO should be located so as to minimize the influence of the surrounding environment, including turbulence, which could have an adverse impact on helicopter operations.

Note — Guidance on determining the influence of turbulence is given in the Heliport Manual (Doc 9261). If turbulence mitigating design measures are warranted but not practical, operational limitations may need to be considered under certain wind conditions.

4.2 HELICOPTER CLEARWAYS

Note — A helicopter clearway would need to be considered when the heliport is intended to be used by helicopters operating in performance class 1. See Heliport Manual (Doc 9261).

4.2.1 When a helicopter clearway is provided, it shall be located beyond the end of the FATO.

4.2.2 *Recommendation* - The width of a helicopter clearway should not be less than that of the associated safety area. (See Figure 4-1).

4.2.3 *Recommendation* - The ground in a helicopter clearway should not project above a plane having an upward slope of 3 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.

4.2.4 *Recommendation* - An object situated in a helicopter clearway which may endanger helicopters in the air should be regarded as an obstacle and should be removed.

4.3 TOUCHDOWN AND LIFT-OFF AREAS

4.3.1 At least one TLOF shall be provided at a heliport.

4.3.2 One TLOF shall be located within the FATO or one or more TLOFs shall be collocated with helicopter stands. For runway-type FATOs, additional TLOFs located in the FATO are acceptable.

Note – For further guidance see Heliport Manual (Doc 9261).

4.3.3 The TLOF shall be of sufficient size to contain a circle of diameter of at least 0.83 D of the largest helicopter the area is intended to serve.

Note — A TLOF may be any shape.

4.3.4 Slopes on a TLOF shall be sufficient to prevent accumulation of water on the surface of the area, but shall not exceed 2 per cent in any direction.

4.3.5 Where the TLOF is within the FATO, the TLOF shall be dynamic load-bearing.

4.3.6 Where a TLOF is collocated with a helicopter stand, the TLOF shall be static load-bearing and be capable of withstanding the traffic of helicopters that the area is intended to serve.

4.3.7 Where the TLOF is within the FATO, the centre of the TLOF shall be located not less than 0.5 D from the edge of the FATO.

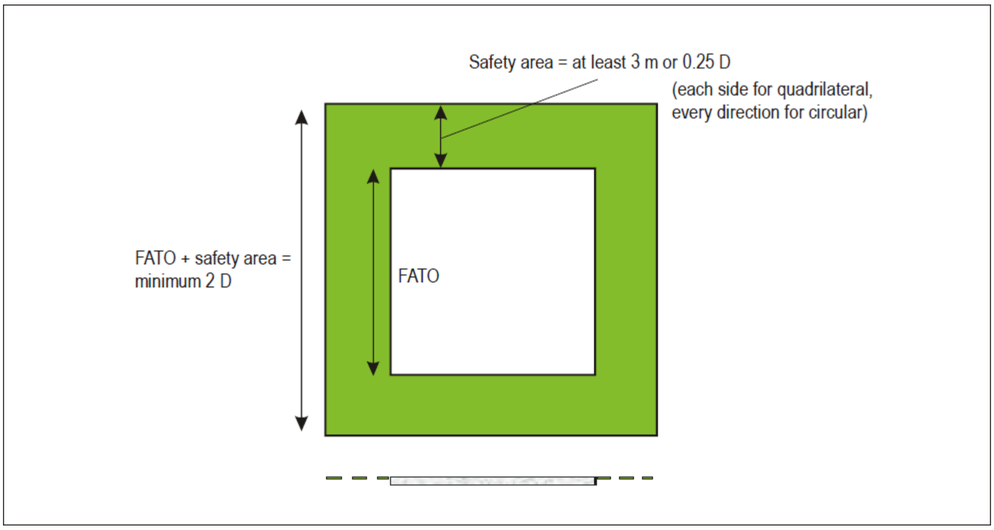


Figure 4-1 – FATO and Associated Safety Area

4.4 SAFETY AREAS

4.4.1 A FATO shall be surrounded by a safety area which need not be solid.

4.4.2 A safety area surrounding a FATO shall extend outwards from the periphery of the FATO for a distance of at least 3 m or 0.25 D, whichever is greater, of the largest helicopter the FATO is intended to serve and:

a) each external side of the safety area shall be at least 2 D where the FATO is quadrilateral; or

b) the outer diameter of the safety area shall be at least 2 D where the FATO is circular. (See Figure 4-1)

4.4.3 There shall be a protected side slope rising at 45 degrees from the edge of the safety area to a distance of 10 m, whose surface shall not be penetrated by obstacles, except that when obstacles are located to one side of the FATO only, they may be permitted to penetrate the side slope surface.

Note — When only a single approach and take-off climb surface is provided, the need for specific protected side slopes would be addressed in the aeronautical study required in Chapter 6 paragraph 6.2.7.

4.4.4 No fixed object shall be permitted above the plane of the FATO on a safety area, except for frangible objects, which, because of their function, must be located on the area. No mobile object shall be permitted on a safety area during helicopter operations.

4.4.5 Objects whose function requires them to be located on the safety area shall not:

a) if located at a distance of less than 0.75 D from the centre of the FATO, penetrate a plane at a height of 5 cm above the plane of the FATO; and

b) if located at a distance of 0.75 D or more from the centre of the FATO, penetrate a plane originating at a height of 25 cm above the plane of the FATO and sloping upwards and outwards at a gradient of 5 per cent.

4.4.6 The surface of the safety area, when solid, shall not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

4.4.7 Where applicable, the surface of the safety area shall be treated to prevent flying debris caused by rotor downwash.

4.4.8 When solid, the surface of the safety area abutting the FATO shall be continuous with the FATO.

4.5 HELICOPTER GROUND TAXIWAYS AND HELICOPTER GROUND TAXI-ROUTES

Note 1 — A helicopter ground taxiway is intended to permit the surface movement of a wheeled helicopter under its own power.

Note 2 — When a taxiway is intended for use by aeroplanes and helicopters, the provisions for taxiways for aeroplanes and helicopter ground taxiways will be taken into consideration and the more stringent requirements will be applied.

4.5.1 The width of a helicopter ground taxiway shall not be less than 1.5 times the largest width of the undercarriage (UCW) of the helicopters the ground taxiway is intended to serve. (See Figure 4-2).

4.5.2 The longitudinal slope of a helicopter ground taxiway shall not exceed 3 per cent.

4.5.3 A helicopter ground taxiway shall be static load-bearing and be capable of withstanding the traffic of the helicopters the helicopter ground taxiway is intended to serve.

4.5.4 A helicopter ground taxiway shall be centered on a ground taxi-route.

4.5.6 A helicopter ground taxi-route shall extend symmetrically on each side of the centre line for at least 0.75 times the largest overall width of the helicopters it is intended to serve.

Note – The part of the helicopter ground taxi-route that extends symmetrically on each side of the centre line from 0.5 times the largest overall width of the helicopters it is intended to serve to the outermost limit of the helicopter ground taxi-route is its protection area.

4.5.7 No fixed objects shall be permitted above the surface of the ground on a helicopter ground taxi-route, except for frangible objects, which, because of their function, must be located thereon. No mobile object shall be permitted on a ground taxi-route during helicopter movements.

4.5.8 Objects whose function requires them to be located on a helicopter ground taxi-route shall not:

a) be located at a distance of less than 50 cm from the edge of the helicopter ground taxiway; and
b) penetrate a plane originating at a height of 25 cm above the plane of the helicopter ground taxiway, at a distance of 50 cm from the edge of the helicopter ground taxiway and sloping upwards and outwards at a gradient of 5 per cent.

4.5.9 The helicopter ground taxiway and the helicopter ground taxi-route shall provide rapid drainage but the helicopter ground taxiway transverse slope shall not exceed 2 per cent (1:50).

4.5.10 The surface of a helicopter ground taxi-route shall be resistant to the effect of rotor downwash.

4.5.11 For simultaneous operations, the helicopter ground taxi-routes shall not overlap.

4.6 HELICOPTER AIR TAXIWAYS AND HELICOPTER AIR TAXI-ROUTES

Note — A helicopter air taxiway is intended to permit the movement of a helicopter above the surface at a height normally associated with ground effect and at ground speed less than 37km/h (20 kt).

4.6.1 The width of a helicopter air taxiway shall be at least two times the largest width of the undercarriage (UCW) of the helicopters that the air taxiway is intended to serve. (See Figure 4-3).

4.6.2 *Recommendation* - The surface of a helicopter air taxiway should be static load-bearing.

4.6.3 *Recommendation* - The slopes of the surface of a helicopter air taxiway should not exceed the slope landing limitations of the helicopters the helicopter air taxiway is intended to serve. In any event the transverse slope should not exceed 10 per cent and the longitudinal slope should not exceed 7 per cent.

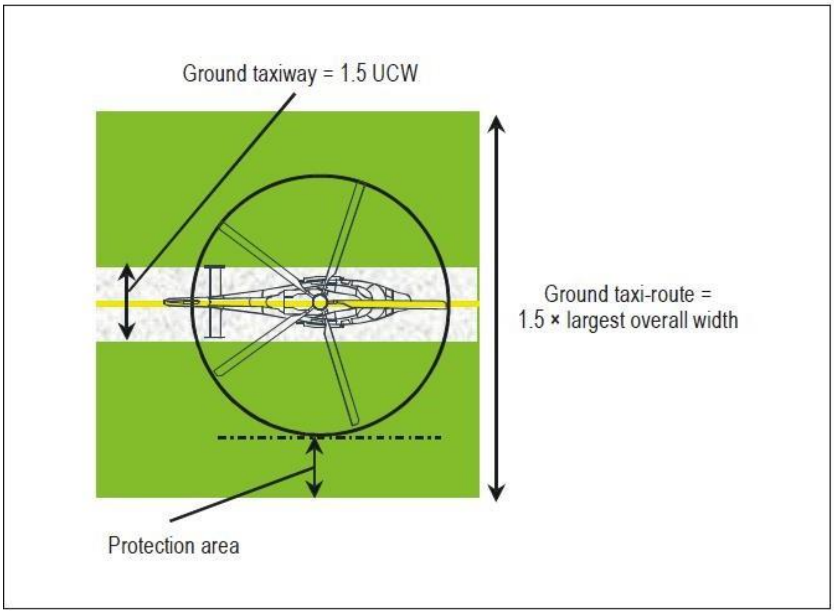


Figure 4-2 – Helicopter Ground Taxi-Route / Taxiway

4.6.4 A helicopter air taxiway shall be centered on an air taxi-route.

4.6.5 A helicopter air taxi-route shall extend symmetrically on each side of the centre line for a distance at least equal to the largest overall width of the helicopters it is intended to serve.

Note – The part of the helicopter air taxi-route that extends symmetrically on each side of the centre line from 0.5 times the largest overall width of the helicopters it is intended to serve to the outermost limit of the helicopter air taxi-route is its protection area.

4.6.6 No fixed objects shall be permitted above the surface of the ground on an air taxi-route, except for frangible objects, which, because of their function, must be located thereon. No mobile object shall be permitted on an air taxi-route during helicopter movements.

4.6.7 Objects above ground level whose function requires them to be located on a helicopter air taxi-route shall not:

a) be located at a distance of less than 1 m from the edge of the helicopter air taxiway; and
b) penetrate a plane originating at a height of 25 cm above the plane of the helicopter air taxiway, at a distance of 1 m from the edge of the helicopter air taxiway and sloping upwards and outwards at a gradient of 5 per cent.

4.6.8 Objects above ground level whose function requires them to be located on a helicopter air taxi-route should not:

a) be located at a distance of less than 0.5 times the largest overall width of the helicopter for which the helicopter air taxi-route is designed from the centre line of the helicopter air taxiway; and
b) penetrate a plane originating at a height of 25 cm above the plane of the helicopter air taxiway, at a distance of 0.5 times the largest overall width of the helicopter for which the helicopter air taxi-route is designed from the centre line of the helicopter air taxiway, and sloping upwards and outwards at a gradient of 5 per cent.

4.6.9 The surface of a helicopter air taxi-route shall be resistant to the effect of rotor downwash.

4.6.10 The surface of a helicopter air taxi-route shall provide ground effect.

4.6.11 For simultaneous operations, the helicopter air taxi-routes shall not overlap.

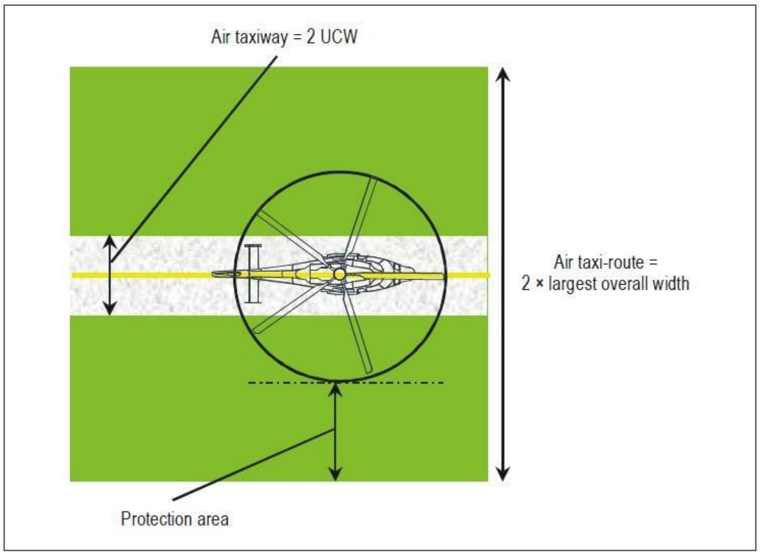


Figure 4-3 – Helicopter Air Taxi-Route / Taxiway

4.7 HELICOPTER STANDS

Note — The provisions of this section do not specify the location for helicopter stands but allow a high degree of flexibility in the overall design of the heliport. However, it is not considered good practice to locate helicopter stands under a flight path. See Heliport Manual (Doc 9261) for further guidance.

4.7.1 When a TLOF is collocated with a helicopter stand, the protection area of the stand shall not overlap the protection area of any other helicopter stand or associated taxi route.

4.7.2 The helicopter stand shall provide rapid drainage but the slope in any direction on a helicopter stand shall not exceed 2 per cent.

Note — The requirements on the dimensions of helicopter stands assume the helicopter will turn in a hover when operating over a stand.

4.7.3 A helicopter stand intended to be used by helicopters turning in a hover shall be of sufficient size to contain a circle of diameter of at least 1.2D of the largest helicopter the stand is intended to serve (see Figure 4-4).

4.7.4 Where a helicopter stand is intended to be used for taxi-through and where the helicopter using the stand is not required to turn, the minimum width of the stand and associated protection area shall be that of the taxi-route.

4.7.5 Where a helicopter stand is intended to be used for turning, the minimum dimension of the stand and protection area shall be not less than 2D.

4.7.6 Where a helicopter stand is intended to be used for turning, it shall be surrounded by a protection area which extends for a distance of 0.4D from the edge of the helicopter stand.

4.7.7 For simultaneous operations, the protection areas of helicopter stands and their associated taxi-routes shall not overlap (see Figure 4-5).

Note — Where non-simultaneous operations are envisaged, the protection area of helicopter stands and their associated taxi-routes may overlap (see Figure 4-6).

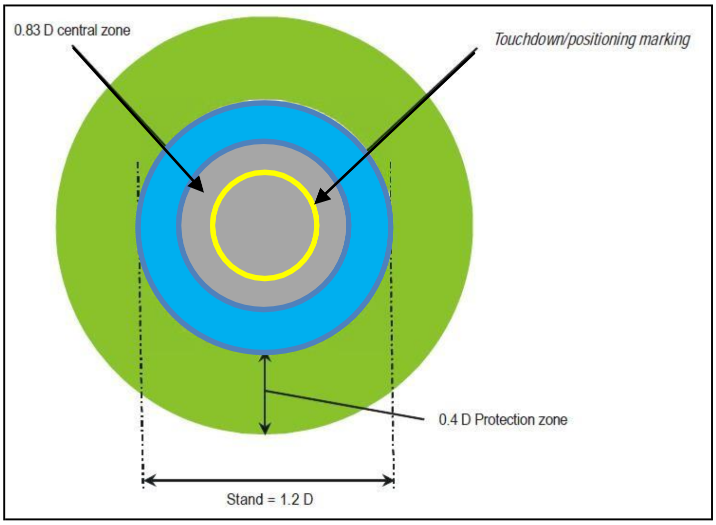


Figure 4-4 – Helicopter Stand and Associated Protection Area

4.7.8 A helicopter stand and associated protection area intended to be used for air taxiing shall provide ground effect.

4.7.9 No fixed objects shall be permitted above the surface of the ground on a helicopter stand.

4.7.10 No fixed object shall be permitted above the surface of the ground in the protection area around a helicopter stand except for frangible objects, which because of their function, must be located there.

4.7.11 No mobile object shall be permitted on a helicopter stand and the associated protection area during helicopter movements.

4.7.12 Objects whose function requires them to be located in the protection area shall not:

a) if located at a distance of less than 0.75 D from the centre of the helicopter stand, penetrate a plane at a height of 5 cm above the plane of the central zone; and

b) if located at distance of 0.75 D or more from the centre of the helicopter stand, penetrate a plane at a height of 25 cm above the plane of the central zone and sloping upwards and outwards at a gradient of 5 per cent.

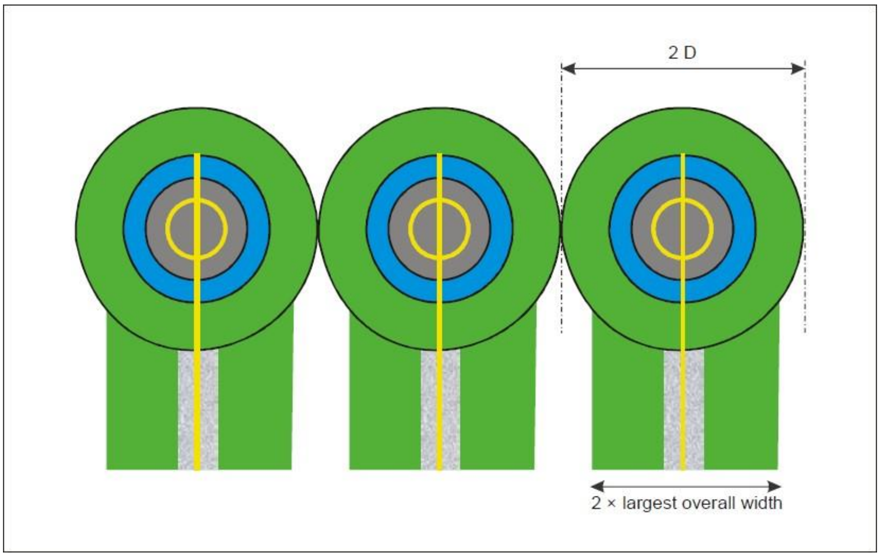


Figure 4-5 – Helicopter stands – simultaneous operations designed for hover turns with air taxi-routes/taxiways

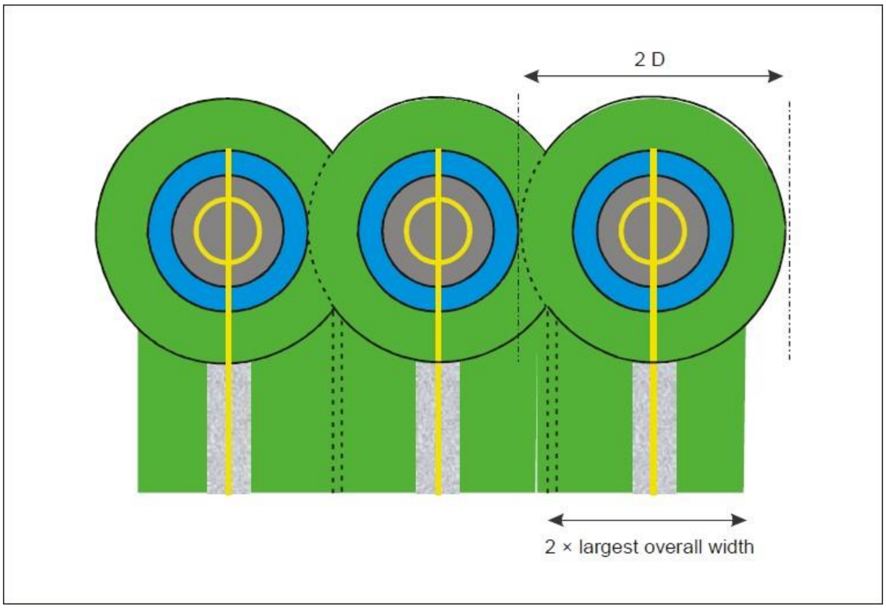


Figure 4-6 – Helicopter stands – non-simultaneous operations designed for hover turns with air taxi-routes/taxiways

4.7.13 The central zone of a helicopter stand shall be capable of withstanding the traffic of helicopters it is intended to serve and have a static load-bearing area:

a) of diameter not less than 0.83 D of the largest helicopter it is intended to serve; or

b) for a helicopter stand intended to be used for taxi-through, and where the helicopter using the stand is not required to turn, the same width as the helicopter taxiway.

Note — For a helicopter stand intended to be used for turning on the ground by wheeled helicopters, the dimension of the helicopter stand, including the dimension of the central zone, would need to be significantly increased. See Heliport Manual (Doc 9261) for further guidance.

4.8 LOCATION OF A FATO IN RELATION TO A RUNWAY OR TAXIWAY

4.8.1 Where a FATO is located near a runway or taxiway, and where simultaneous operations are planned, the separation distance between the edge of a runway or taxiway and the edge of a FATO shall not be less than the appropriate dimension in Table 4-1.

4.8.2 *Recommendation* - A FATO should not be located:

a) near taxiway intersections or holding points where jet engine efflux is likely to cause high turbulence; or

b) near areas where aeroplane vortex wake generation is likely to exist.

Table 4-1 – FATO Minimum Separation Distances

If aeroplane mass and/or helicopter mass are:	Distance between FATO edge and runway edge or taxiway edge (m)
up to but not including 3 175 kg	60
3 175 kg up to but not including 5 760 kg	120
5 760 kg up to but not including 100 000 kg	180
100 000 kg and over	250

CHAPTER 5 – PHYSICAL CHARACTERISTICS: ELEVATED HELIPORTS

Note 1 — The dimensions of the taxi-routes and helicopter stands include a protection area.

Note 2 — Guidance on structural design for elevated heliports is given in the Heliport Manual (Doc 9261).

Note 3 — In the case of elevated heliports, design considerations of the different elements of the heliport shall take into account additional loading resulting from the presence of personnel, freight, refueling, firefighting equipment, etc.

5.1 FINAL APPROACH AND TAKE-OFF AREAS AND TOUCHDOWN AND LIFT-OFF AREAS

Note — On elevated heliports it is presumed that the FATO and one TLOF will be coincidental.

5.1.1 An elevated heliport, shall be provided with one FATO.

5.1.2 A FATO shall be obstacle free.

5.1.3 The dimensions of a FATO shall be:

a) where intended to be used by helicopters operated in performance class 1, as prescribed in the helicopter flight manual (HFM) except that, in the absence of width specifications, the width shall be not less than 1 D of the largest helicopter the FATO is intended to serve;

b) where intended to be used by helicopters operated in performance class 2 or 3, of sufficient size and shape to contain an area within which can be drawn a circle of diameter not less than:

I. 1 D of the largest helicopter when the maximum take-off mass (MTOM) of helicopters the FATO is intended to serve is more than 3 175 kg;

II. 0.83 D of the largest helicopter when the MTOM of helicopters the FATO is intended to serve is 3 175 kg or less.

5.1.4 *Recommendation* – Where intended to be used by helicopters operated in performance class 2 or 3 with MTOM of 3 175 kg or less, the FATO should be of sufficient size and shape to contain an area within which can be drawn a circle of diameter not less than 1 D.

Note — Local conditions, such as elevation and temperature, may need to be considered when determining the size of a FATO. Guidance is given in the Heliport Manual (Doc 9261).

5.1.5 Slopes on a FATO at an elevated heliport shall be sufficient to prevent accumulation of water on the surface of the area, but shall not exceed 2 per cent in any direction.

5.1.6 The FATO shall be dynamic load-bearing.

5.1.7 The surface of the FATO shall be:

a) resistant to the effects of rotor downwash; and

b) free of irregularities that would adversely affect the take-off or landing of helicopters.

5.1.8 *Recommendation* - The surface of the FATO should be prepared so as to be skid-resistant to both helicopters and personnel using the landing area. This entails that all essential markings on the surface should be marked using a non-slip paint or material.

5.1.9 *Recommendation* - Whenever possible the surface of the FATO should be rendered to meet a minimum friction coefficient of typically not less than 0.65mu.

5.1.10 *Recommendation* - The FATO should provide ground effect.

5.2 HELICOPTER CLEARWAYS

5.2.1 When a helicopter clearway is provided, it shall be located beyond the end of the rejected take-off area available.

5.2.2 The width of a helicopter clearway should not be less than that of the associated safety area.

5.2.3 When solid, the surface of the helicopter clearway should not project above a plane having an upward slope of 3 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.

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

5.3 TOUCHDOWN AND LIFT-OFF AREAS

5.3.1 One TLOF shall be coincidental with the FATO.

Note — Additional TLOFs may be collocated with helicopter stands.

5.3.2 For a TLOF coincidental with the FATO, the dimensions and the characteristics of the TLOF shall be the same as those of the FATO.

5.3.3 When the TLOF is collocated with a helicopter stand, the TLOF shall be of sufficient size to contain a circle of diameter of at least 0.83 D of the largest helicopter the area is intended to serve.

5.3.4 Slopes on a TLOF collocated with a helicopter stand shall be sufficient to prevent accumulation of water on the surface of the area, but shall not exceed 2 per cent in any direction.

5.3.5 When the TLOF is collocated with a helicopter stand and intended to be used by ground taxiing helicopters only, the TLOF shall at least be static load-bearing and be capable of withstanding the traffic of the helicopters the area is intended to serve.

5.3.6 When the TLOF is collocated with a helicopter stand and intended to be used by air taxiing helicopters, the TLOF shall have a dynamic load-bearing area.

5.4 SAFETY AREAS

5.4.1 The FATO shall be surrounded by a safety area which need not be solid.

5.4.2 A safety area surrounding a FATO intended to be used by helicopters operated in visual meteorological conditions (VMC) shall extend outwards from the periphery of the FATO for a distance of at least 3 m or 0.25 D, whichever is greater, of the largest helicopter the FATO is intended to serve and:

a) each external side of the safety area shall be at least 2 D where the FATO is quadrilateral; or
b) the outer diameter of the safety area shall be at least 2 D where the FATO is circular.

5.4.3 There shall be a protected side slope rising at 45 degrees from the edge of the safety area to a distance of 10 m, whose surface shall not be penetrated by obstacles, except that when obstacles are located to one side of the FATO only, they may be permitted to penetrate the side slope surface.

5.4.4 No fixed object shall be permitted on a safety area, except for frangible objects, which, because of their function, must be located on the area. No mobile object shall be permitted on a safety area during helicopter operations.

5.4.5 Objects whose function require them to be located on the safety area shall not exceed a height of 25 cm when located along the edge of the FATO nor penetrate a plane originating at a height of 25 cm above the edge of the FATO and sloping upwards and outwards from the edge of the FATO at a gradient of 5 per cent.

5.4.5 In the case of a FATO of diameter less than 1 D, the maximum height of the objects whose functions require them to be located on the safety area should not exceed a height of 5 cm.

5.4.6 The surface of the safety area, when solid, shall not exceed an upward slope of 4 per cent outwards from the edge of the FATO.

5.4.7 Where applicable, the surface of the safety area shall be prepared in a manner to prevent flying

debris caused by rotor downwash.

5.4.8 The surface of the safety area abutting the FATO shall be continuous with the FATO.

5.5 HELICOPTER GROUND TAXIWAYS AND GROUND TAXI-ROUTES

Note — The following specifications are intended for the safety of simultaneous operations during the manoeuvring of helicopters. However, the wind velocity induced by the rotor downwash might have to be considered.

5.5.1 The width of a helicopter ground taxiway shall not be less than 2 times the largest width of the undercarriage (UCW) of the helicopters the ground taxiway is intended to serve.

5.5.2 The longitudinal slope of a helicopter ground taxiway shall not exceed 3 per cent.

5.5.3 A helicopter ground taxiway shall be static load-bearing and be capable of withstanding the traffic of the helicopters the helicopter ground taxiway is intended to serve.

5.5.4 A helicopter ground taxiway shall be centred on a ground taxi-route.

5.5.5 A helicopter ground taxi-route shall extend symmetrically on each side of the centre line to a distance not less than the largest overall width of the helicopters it is intended to serve.

5.5.6 No objects shall be permitted on a helicopter ground taxi-route, except for frangible objects, which, because of their function, must be located there.

5.5.7 The helicopter ground taxiway and the ground taxi-route shall provide rapid drainage but the helicopter ground taxiway transverse slope shall not exceed 2 per cent.

5.5.8 The surface of a helicopter ground taxi-route shall be resistant to the effect of rotor downwash.

5.6 HELICOPTER AIR TAXIWAYS AND AIR TAXI-ROUTES

Note — A helicopter air taxiway is intended to permit the movement of a helicopter above the surface at a height normally associated with ground effect and at ground speed less than 37 km/h (20 kt).

5.6.1 The width of a helicopter air taxiway shall be at least three times the largest width of the undercarriage (UCW) of the helicopters the air taxiway is intended to serve.

5.6.2 The surface of a helicopter air taxiway shall be dynamic load-bearing.

5.6.3 The transverse slope of the surface of a helicopter air taxiway shall not exceed 2 per cent and the longitudinal slope shall not exceed 7 per cent. In any event, the slopes shall not exceed the slope landing limitations of the helicopters the air taxiway is intended to serve.

5.6.4 A helicopter air taxiway shall be centred on an air taxi-route.

5.6.5 A helicopter air taxi-route shall extend symmetrically on each side of the centre line to a distance not less than the largest overall width of the helicopters it is intended to serve.

5.6.6 No objects shall be permitted on an air taxi-route, except for frangible objects, which, because of their function, must be located thereon.

5.6.7 The surface of an air taxi-route shall be resistant to the effect of rotor downwash.

5.6.8 The surface of an air taxi-route shall provide ground effect.

5.7 APRONS

5.7.1 The slope in any direction on a helicopter stand shall not exceed 2 per cent.

5.7.2 A helicopter stand shall be of sufficient size to contain a circle of diameter of at least 1.2 D of the largest helicopters the stand is intended to serve.

5.7.3 If a helicopter stand is used for taxi-through, the minimum width of the stand and associated protection area shall be that of the taxi-route.

5.7.4 When a helicopter stand is used for turning, the minimum dimension of the stand and protection area shall be not less than 2 D.

5.7.5 When a helicopter stand is used for turning, it shall be surrounded by a protection area which extends for a distance of 0.4 D from the edge of the helicopter stand.

5.7.6 For simultaneous operations, the protection area of helicopter stands and their associated taxi-routes shall not overlap.

Note.— Where non-simultaneous operations are envisaged, the protection area of helicopter stands and their associated taxi-routes may overlap.

5.7.7 When intended to be used for ground taxi operations by wheeled helicopters, the dimensions of a helicopter stand shall take into account the minimum turn radius of the wheeled helicopters the stand is intended to serve.

5.7.8 A helicopter stand and associated protection area intended to be used for air taxiing shall provide ground effect.

5.7.9 No fixed objects shall be permitted on a helicopter stand and the associated protection area.

5.7.10 The central zone of the helicopter stand shall be capable of withstanding the traffic of the helicopters it is intended to serve and have a static load-bearing area:

a) of diameter not less than 0.83 D of the largest helicopter it is intended to serve; or
b) for a helicopter stand intended to be used for ground taxi-through, the same width as the ground taxiway.

5.7.11 The central zone of a helicopter stand intended to be used for ground taxiing only shall be static load-bearing.

5.7.12 The central zone of a helicopter stand intended to be used for air taxiing shall be dynamic load-bearing.

Note — For a helicopter stand intended to be used for turning on the ground, the dimension of the central zone might have to be increased.

5.8 SAFETY NET

5.8.1 Where there is a sheer drop from the edges of the heliport and the free movement of passengers and heliport personnel cannot be made without some risk, a safety net should be installed.

5.8.2 The net should extend outwards to at least 1.5 m from the edges of the heliport and be capable of withstanding, without damage, a minimum of 75 kg mass being dropped from a height of 1m. It should be so manufactured that it provides a hammock effect for a person falling into it rather than the trampoline effect produced by rigid materials.

5.9 STRUCTURAL DESIGN

5.9.1 Elevated heliports may be designed for a specific helicopter type though greater operational flexibility will be obtained from a classification system of design. The FAT0 should be designed for the largest or heaviest type of helicopter that it is anticipated will use the heliport, and account taken of other types of loading such as personnel, freight, refueling equipment, etc.

5.9.2 Guidance on the structural design for helicopters on landing and helicopters at rest are summarised in Appendix C.

5.10 MEANS OF EGRESS

5.10.1 At least two means of egress from the heliport shall be provided and shall be remotely located from each other.

CHAPTER 6 – OBSTACLE ENVIRONMENT

Note — The objectives of the specifications in this chapter are to describe the airspace around heliports so as to permit intended helicopter operations to be conducted safely and to prevent, heliports from becoming unusable by the growth of obstacles around them. This is achieved by establishing a series of obstacle limitation surfaces that define the limits to which objects may project into the airspace.

6.1 OBSTACLE LIMITATION SURFACES AND SECTORS

Approach Surface

6.1.1 Description. An inclined plane or a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

Note — See Figure 6-1, 6-2, 6-3 and 6-4 for depiction of surfaces. See Table 6-1 for dimensions and slopes of surfaces.

6.1.2 Characteristics. The limits of an approach surface shall comprise:

a) an inner edge horizontal and equal in length to the minimum specified width/diameter of the FATO plus the safety area, perpendicular to the centre line of the approach surface and located at the outer edge of the safety area;

b) two side edges originating at the ends of the inner edge diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and:

c) an outer edge horizontal and perpendicular to the centre line of the approach surface and at a specified height of 152 m (500 feet) above the elevation of the FATO.

6.1.3 The elevation of the inner edge shall be the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the approach surface. For heliports intended to be used by helicopters operated in performance class 1 and when approved by an appropriate authority, the origin of the inclined plane may be raised directly above the FATO.

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

6.1.5 In the case of an approach surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line and the slope of the centre line shall be the same as that for a straight approach surface.

Note — See Figure 6-5

6.1.6 In the case of an approach surface involving a turn, the surface shall not contain more than one curved portion.

6.1.7 Where a curved portion of an approach surface is provided the sum of the radius of arc defining the centre line of the approach surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

6.1.8 Any variation in the direction of the centre line of an approach surface shall be designed so as not to necessitate a turn radius less than 270 m.

Note — For heliports intended to be used by performance class 2 and 3 helicopters, it is intended good practice for the approach paths to be selected so as to permit safe forced landing or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimized. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.

Transitional surface

Note – For a FATO at a heliport without a PinS approach incorporating a visual segment surface (VSS) there is no requirement to provide transitional surfaces.

6.1.9 Description. A complex surface along the side of the safety area and part of the side of the approach/take-off climb surface, that slopes upwards and outwards to a predetermined height of 45 m (150 feet).

Note – See Figure 6-3 Transitional Surfaces. See Table 6-1 for dimensions and slopes of surfaces.

6.1.10 Characteristics. The limits of a transitional surface shall comprise:

a) a lower edge beginning at a point on the side of the approach/take-off climb surface at a specified height above the lower edge extending down the side of the approach/take-off climb surface to the inner edge of the approach/take-off climb surface and from there along the length of the side of the safety area parallel to the centre line of the FATO; and

b) an upper edge located at a specified height above the lower edge as set out in Table 6-1.

6.1.11 The elevation of a point on the lower edge shall be:

a) along the side of the approach/take-off climb surface — equal to the elevation of the approach/take-off climb surface at that point; and

b) along the safety area — equal to the elevation of the inner edge of the approach/take-off climb surface.

Note 1 - If the origin of the inclined plane of the approach/take-off climb surface is raised as approved by the CAMA, the elevation of the origin of the transitional surface will be raised accordingly.

Note 2 — As a result of b) the transitional surface along the safety area will be curved if the profile of the FATO is curved, or a plane if the profile is a straight line.

6.1.12 The slope of the transitional surface shall be measured in a vertical plane at right angles to the centre line of the FATO.

Take-Off Climb Surface

6.1.13 Description. An inclined plane, a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centred on a line passing through the centre of the FATO.

Note - See Figure 6-1, 6-2, 6-3 and 6-4 for depiction of surfaces. See Table 6-1 for dimensions and slopes of surfaces.

6.1.14 Characteristics. The limits of a take-off climb surface shall comprise:

a) an inner edge horizontal and equal in length to the minimum specified width/diameter of the FATO plus the safety area, perpendicular to the centre line of the take-off climb surface and located at the outer edge of the safety area;

b) two side edges originating at the ends of the inner edge and diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO; and

c) an outer edge horizontal and perpendicular to the centre line of the take-off climb surface and at a specified height of 152 m (500 feet) above the elevation of the FATO.

6.1.15 The elevation of the inner edge shall be the elevation of the FATO at the point on the inner edge that is intersected by the centre line of the take-off climb surface. For heliports intended to be used by helicopters operated in performance class 1 and when approved by an appropriate authority, the origin of the inclined plane may be raised directly above the FATO.

6.1.16 Where a clearway is provided the elevation of the inner edge of the take-off climb surface shall be located at the outer edge of the clearway at the highest point on the ground based on the centre line of the clearway.

6.1.17 In the case of a straight take-off climb surface, the slope shall be measured in the vertical plane containing the centre line of the surface.

6.1.18 In the case of a take-off climb surface involving a turn, the surface shall be a complex surface containing the horizontal normals to its centre line, and the slope of the centre line shall be the same as that for a straight take-off climb surface. See Figure 6-5.

6.1.19 In the case of a take-off climb surface involving a turn, the surface shall not contain more than one curved portion.

6.1.20 Where a curved portion of a take-off climb surface is provided the sum of the radius of arc defining the centre line of the take-off climb surface and the length of the straight portion originating at the inner edge shall not be less than 575 m.

6.1.21 Any variation in the direction of the centre line of a take-off climb surface shall be designed so as not to necessitate a turn of radius less than 270 m.

Note 1 – Helicopter take-off performance is reduced in a curve and as such a straight portion along the take-off climb surface prior to the start of the curve allows for acceleration.

Note 2 — For heliports intended to be used by performance class 2 and 3 it is good practice for the departure paths to be selected so as to permit safe forced landings or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimized. The most critical helicopter type for which the heliport is intended and the ambient conditions may be factors in determining the suitability of such areas.

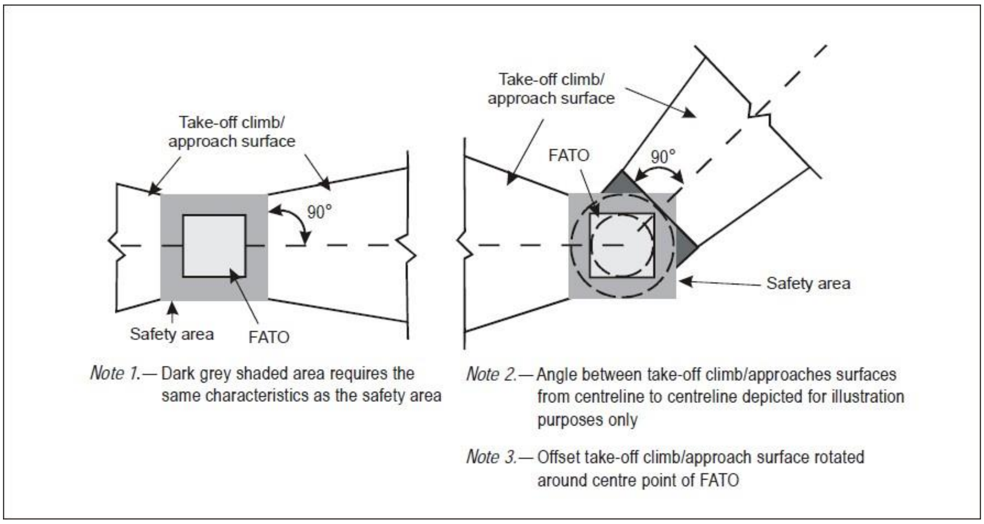


Figure 6-1 – Obstacle Limitation Surface – Take-Off Climb and Approach Surface

Note 1 — Dark grey shaded area requires the same characteristics as the safety area

Note 2 — Angle between take-off climb/approaches surfaces from centreline to centreline depicted for illustration purposes only

Note 3 — Offset take-off climb/approach surface rotated around centre point of FATO

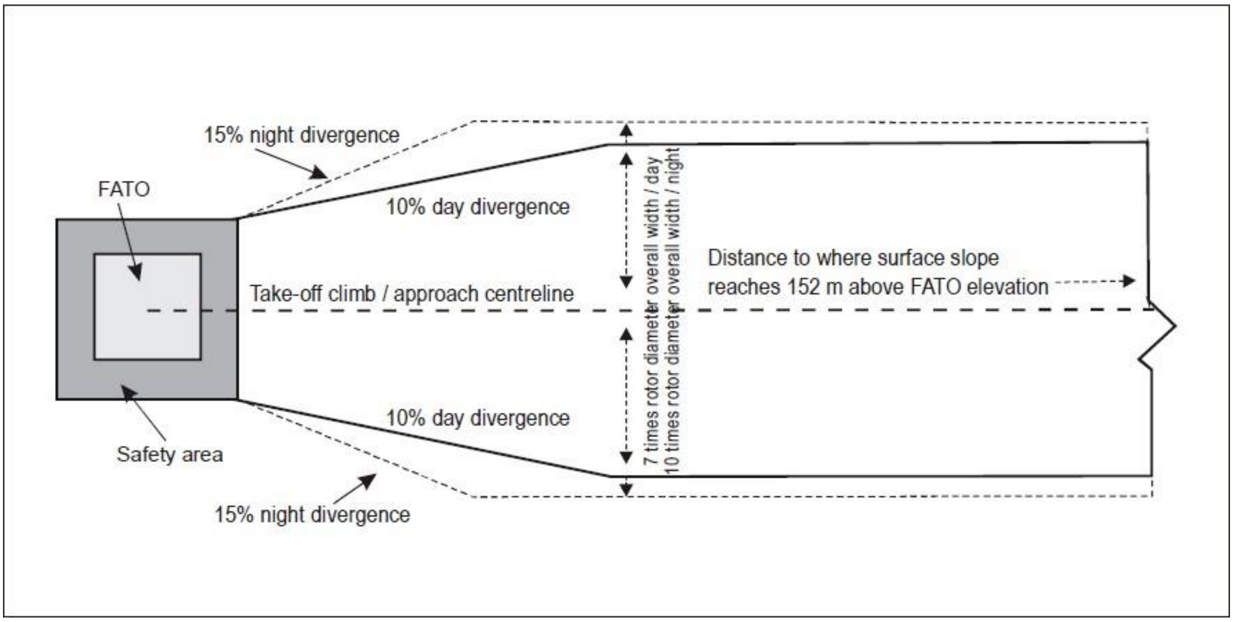


Figure 6-2 – Take-Off Climb / Approach Surface Width

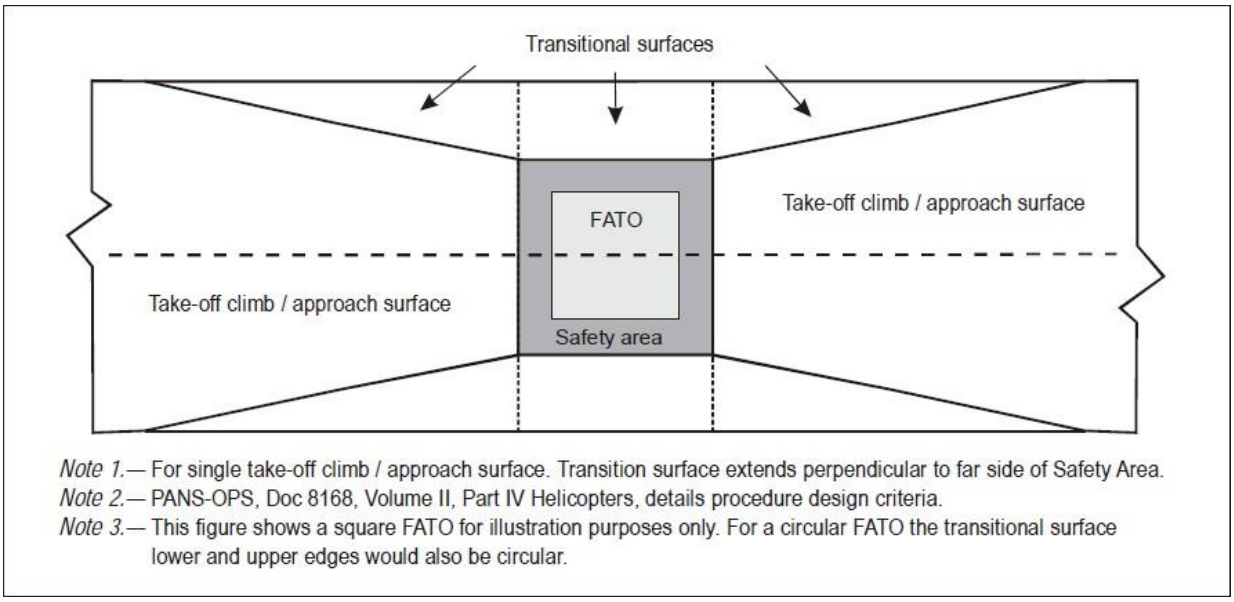


Figure 6-3 – Transitional surface for a FATO with a PinS approach procedure with a VSS

Note 1 — For single take-off climb / approach surface. Transition surface extends perpendicular to far side of Safety Area.

Note 2 - PANS-OPS, Doc 8168, Volume II, Part IV Helicopters, details procedure design criteria.

Note 3 - This figure shows a square FATO for illustration purposes only. For a circular FATO the transitional surface lower and upper edges would also be circular.

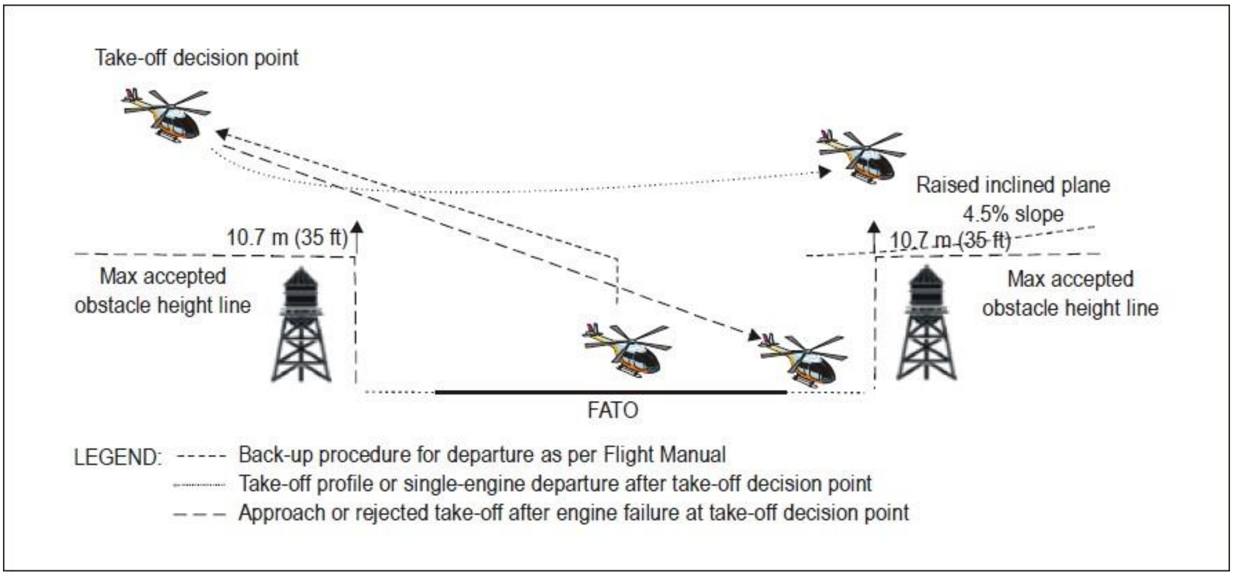


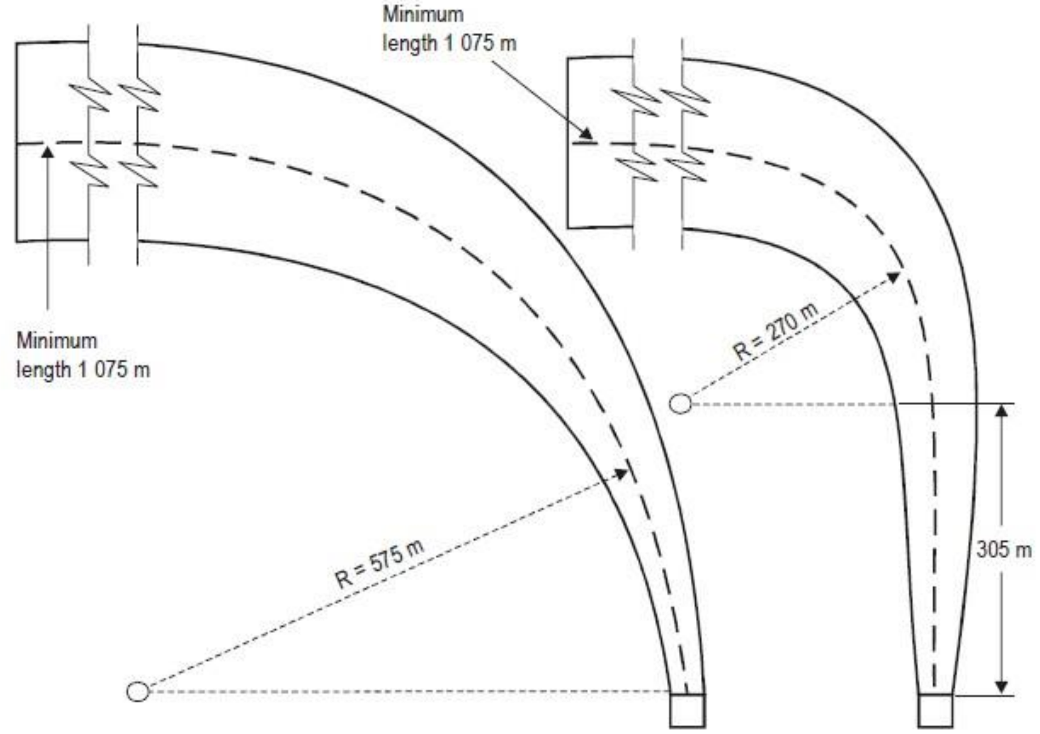
Figure 6-4 – Example of raised inclined plane during operations in Performance Class 1

Note 1 — This example diagram does not represent any specific profile, technique or helicopter type and is intended to show a generic example. An approach profile and a back-up procedure for departure profile are depicted. Specific manufacturers operations in performance class 1 may be represented differently in the specific Helicopter Flight Manual.

Note 2 -- Annex 6, Part 3, Attachment A provides back-up procedures that may be useful for operations in performance class 1.

Note 3 — The approach/landing profile may not be the reverse of the take-off profile.

Note 4 — Additional obstacle assessment might be required in the area that a back-up procedure is intended. Helicopter performance and the Helicopter Flight Manual limitations will determine the extent of the assessment required.



Note 1.— Any combination of curve and straight portion may be established using the following formula: $S+R \geq 575$ m and $R \geq 270$ m where S = 305 m, where S is the length of the straight portion and R is the radius of turn. Note any combination $\geq$ 575 m will work.

Note 2.— The minimum length of the centre line of the curve and straight portion is 1 075 m but may be longer depending upon the slope used. See Table 4-1 for longer lengths.

Note 3.— Helicopter take-off performance is reduced in a curve and as such a straight portion along the take-off climb surface prior to the start of the curve should be considered to allow for acceleration.

Figure 6-5 – Curved approach and take-off climb surface for all FATOs

Table 6-1 – Dimensions and slopes of obstacle limitation surfaces for all visual FATOs

Surface and Dimensions	*Slope Design Categories*		
	A	**B**	**C**
Approach and Take-off Climb Surface			
Length of inner edge	Width of Safety Area	Width of Safety Area	Width of Safety Area
Location of Inner Edge	Safety Area Boundary (Clearway boundary if provided)	Safety Area Boundary	Safety Area Boundary
Divergence: (1st and 2nd section			
Day use only	10%	10%	10%
Night use	15%	15%	15%
First Section			
Length	3386 m	245 m	1220 m
Slope	4.5% (1:22.2)	8% (1:12.5)	12.5% (1:8)
Outer Width	(b)	N/A	(b)
Second Section			
Length	N/A	830 m	N/A
Slope	N/A	16% (1:6.25)	N/A
Outer Width	N/A	(b)	N/A
Total length from inner edge (a)	3386 m	1075 m	1220 m
Transitional Surface (FATO's with PinS approach procedure with a VSS)			
Slope	50% (1:2)	50% (1:2)	50% (1:2)
Height	45 m	45 m	45 m

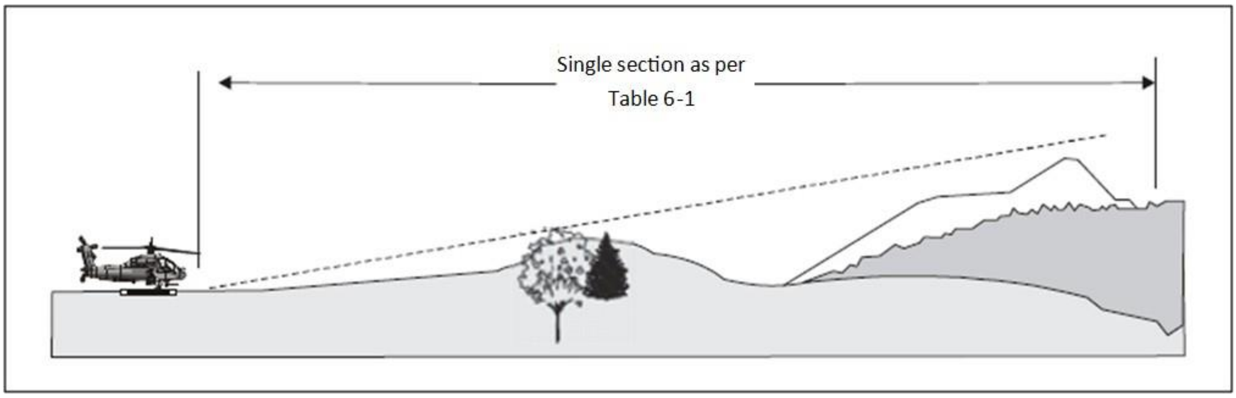
(a) The approach and take-off climb surface lengths of 3 386 m, 1 075 m and 1 220 m associated with the respective slopes, brings the helicopter to 152 m (500 ft) above FATO elevation.

(b) Seven rotor diameters overall width for day operations or 10 rotor diameters overall width for night operations.

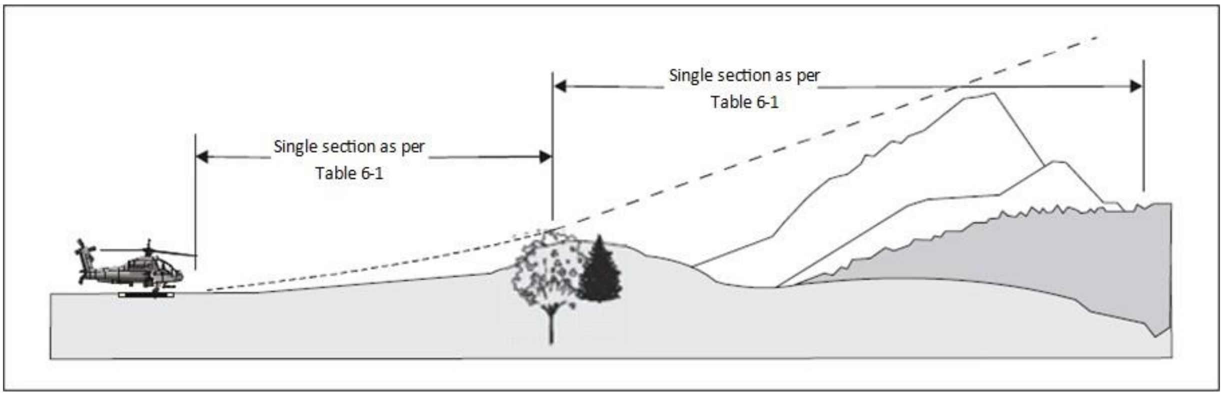
Note — The slope design categories in Table 6-1 may not be restricted to a specific performance class of operation and may be applicable to more than one performance class of operation. The slope design categories depicted in Table 6-1 represent minimum design slope angles and not operational slopes. Slope category "A" generally corresponds with helicopters operated in performance class 1; slope category "B" generally corresponds with helicopters operated in performance class 3; and slope category "C" generally corresponds

with helicopters operated in performance class 2.

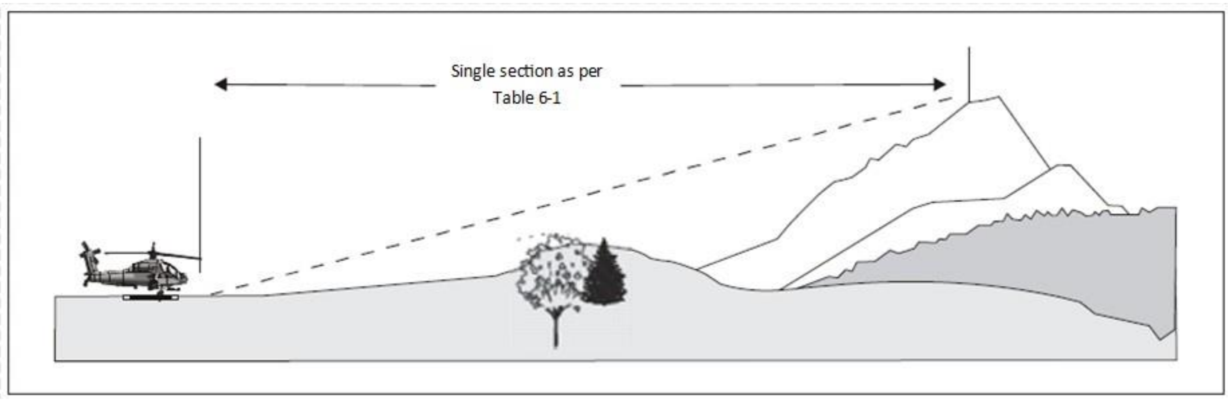
6.1.22 Consultation with helicopter operators will help to determine the appropriate slope category to apply according to the heliport environment and the most critical helicopter type for which the heliport is intended.



a) Approach and take-off climb surfaces - “A” slope profile - 4.5% design



b) Approach and take-off climb surfaces - “B” slope profile - 8% and 16% design



c) Approach and take-off climb surfaces - “C” slope profile - 12.5% design

Figure 6-6 – Approach and take-off climb surfaces with different slope design categories

6.2 OBSTACLE LIMITATION REQUIREMENTS

Note 1 — The requirements for obstacle limitation surfaces are specified on the basis of the intended use of a FATO, i.e. approach manoeuvre to hover or landing, or take-off manoeuvre and type of approach, and are intended to be applied when such use is made of the FATO. In cases where operations are conducted to or from both directions of a FATO, then the function of certain surfaces may be nullified because of more stringent requirements of another lower surface.

Note 2 – If a Visual approach slope indicator (VASI) is installed, there are additional obstacle protection surfaces, detailed in Chapter 7, that need to be considered and may be more demanding than the obstacle limitation surfaces prescribed in Table 6-1.

Surface-Level Heliports

6.2.1 The following obstacle limitation surfaces shall be established for a precision approach FATO:

a) take-off climb surface;
b) approach surface; and
c) transitional surfaces.

Note 1 - See Figure 6-3 – Transitional Surfaces.

Note 2 - Doc 8168, Volume II, Part IV – Helicopters, details procedure design criteria.

6.2.2 The following obstacle limitation surfaces shall be established for a FATO at heliports, other than specified in 6.2.1, including heliports with a PinS approach procedure where a visual segment surface is not provided:

a) take-off climb surface; and
b) approach surface.

6.2.3 The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than those specified in Table 6-1 and shall be located as shown in Figures 6-1, 6-2 and 6-6.

6.2.4 For heliports that have an approach/take-off climb surface with a 4.5% slope design, objects shall be permitted to penetrate the obstacle limitation surface, if the results of an aeronautical study approved by an appropriate authority have reviewed the associated risks and mitigation measures.

Note 1 - The identified objects may limit the heliport operation.

Note 2 - Annex 6, Part 3 provides procedures that may be useful in determining the extent of obstacle penetration.

6.2.5 New objects or extensions of existing objects shall not be permitted above any of the surfaces in paragraphs 6.2.1 to 6.2.2 except when shielded by an existing immovable object or after an aeronautical study approved by an appropriate authority, determines that the object will not adversely affect the safety or significantly affect the regularity of operations of helicopters.

Note — Circumstances in which the shielding principle may reasonably be applied are described in the Airport Services Manual, Part 6 (Doc 9137).

6.2.6 *Recommendation* - Existing objects above any of the surfaces in 6.2.1 to 6.2.2 should, as far as practicable, be removed except when the object is shielded by an existing immovable object, or after an aeronautical study approved by the Authority determines that the object will not adversely affect the safety or significantly affect the regularity of operations of helicopters.

Note — The application of curved approach or take-off climb surfaces as specified in 6.1.5 and 6.1.18 may alleviate the problems created by objects infringing these surfaces.

6.2.7 A surface-level heliport shall have at least one approach and take-off climb surface. An aeronautical study shall be undertaken when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

a) the area/terrain over which the flight is being conducted;
b) the obstacle environment surrounding the heliport;
c) the performance and operating limitations of helicopters intending to use the heliport; and
d) the local meteorological conditions including the prevailing winds.

6.2.8 *Recommendation* - A surface level heliport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimize crosswind conditions and permit for a balked landing.

Note - See Heliport Manual (Doc 9261) for guidance.

Elevated Heliports

6.2.9 The obstacle limitation surfaces for elevated heliports shall conform to the requirements for surface-level heliports specified in paragraphs 6.2.1 to 6.2.6.

6.2.10 An elevated heliport shall have at least one approach and take-off climb surface. An aeronautical study shall be undertaken when only a single approach and take-off climb surface is provided considering as a minimum, the following factors:

a) the area/terrain over which the flight is being conducted;
b) the obstacle environment surrounding the heliport;
c) the performance and operating limitations of helicopters intending to use the heliport; and
d) the local meteorological conditions including the prevailing winds.

6.2.11 *Recommendation* - An elevated heliport should have at least two approach and take-off climb surfaces to avoid downwind conditions, minimize crosswind conditions and permit for a balked landing.

Note - See Heliport Manual (Doc 9261) for guidance.

CHAPTER 7 – VISUAL AIDS

Note 1 — The procedures used by some helicopters require that they utilise a FATO having characteristics similar in shape to a runway for fixed wing aircraft. For the purpose of this chapter a FATO having characteristics similar in shape to a runway is considered as satisfying the concept for a "runway-type FATO". For such arrangements it is sometimes necessary to provide specific markings to enable a pilot to distinguish a runway-type FATO during an approach. Appropriate markings are contained within sub-sections entitled "Runway-type FATOs". The requirements applicable to all other types of FATOs are given within sub-sections entitled "All FATOs except runway-type FATOs.

Note 2 — It has been found that, on surfaces of light colour, the conspicuity of white and yellow markings can be improved by outlining them in black.

7.1 WIND DIRECTION INDICATOR

Application

7.1.1 A heliport shall be equipped with at least one wind direction indicator.

Location

7.1.2 A wind direction indicator shall be located so as to indicate the wind conditions over the FATO and in such a way as to be free from the effects of airflow disturbances caused by nearby objects or rotor downwash. It shall be visible from a helicopter in flight, in a hover or on the movement area.

7.1.3 Where a TLOF may be subject to a disturbed airflow, then additional wind direction indicators located close to the area should be provided to indicate the surface wind on the area.

Note — Guidance on the location of wind direction indicators is given in the Heliport Manual (Doc 9261).

Characteristics

7.1.4 A wind direction indicator shall be constructed so that it gives a clear indication of the direction of the wind and a general indication of the wind speed. See Figure 7-1.

7.1.5 An indicator should be a truncated cone made of lightweight fabric and should have the following minimum dimensions:

	Surface-level Heliports (m)	Elevated heliports and helidecks (m)
Length	2.4	1.2
Diameter (large end)	0.6	0.3
Diameter (small end)	0.3	0.15

7.1.6 The colour of the wind direction indicator should be so selected as to make it clearly visible and understandable from a height of at least 200 m (650 ft) above the heliport, having regard to background. Where practicable, a single colour, preferably white or orange, should be used. Where a combination of two colours is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands the first and last band being the darker colour.

7.1.7 A wind direction indicator at a heliport intended for use at night shall be illuminated.

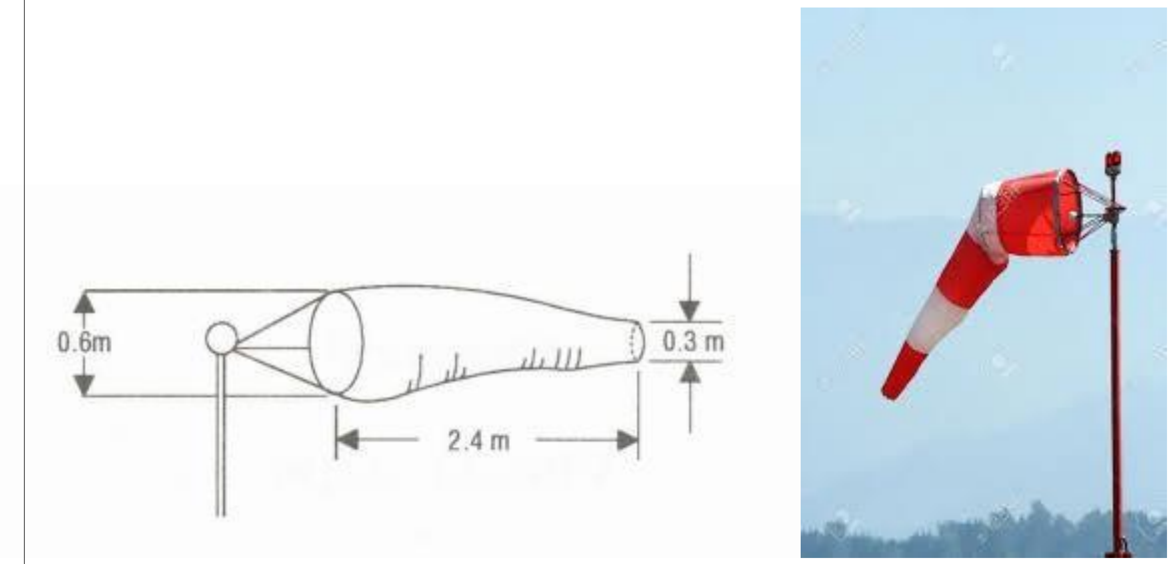


Figure 7-1 – Wind Direction Indicator – Surface Level

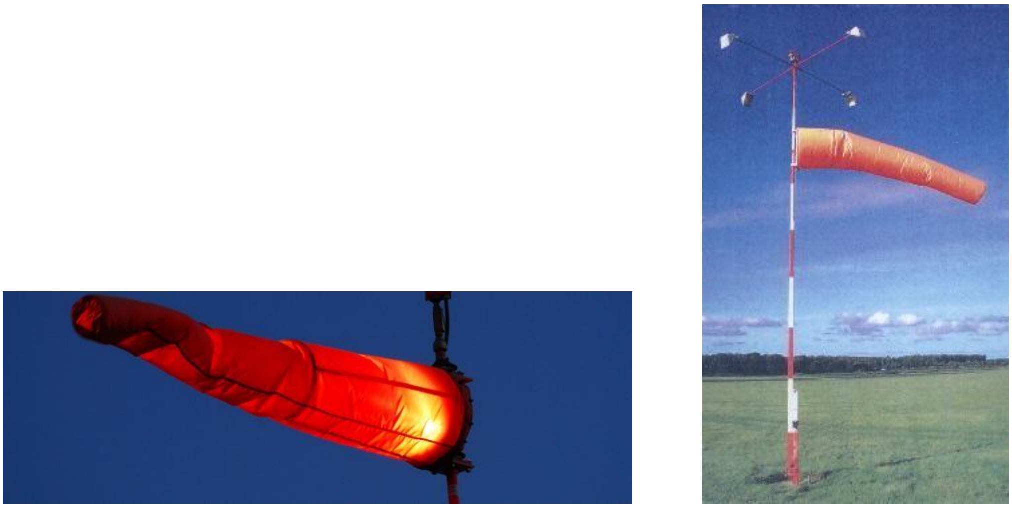


Figure 7-2 –Wind Direction Indicator – Illuminated

7.2 HELIPORT IDENTIFICATION MARKING

Application

7.2.1 A heliport identification marking shall be provided at a heliport.

Location - All FATOs except runway-type FATOs

7.2.2 A heliport identification marking shall be located at or near the centre of the FATO

Note 1 - If the Touchdown/positioning marking is offset on a helideck, the heliport identification marking is established in the centre of the Touchdown/positioning marking.

Note 2 - On a FATO, which does not contain a TLOF and which is marked with an aiming point marking, except for a heliport at a hospital, the heliport identification marking is established in the centre of the aiming point marking.

7.2.3 On a FATO which contains a TLOF, a heliport identification marking shall be located in the FATO so the position of it coincides with the centre of the TLOF.

Location - Runway-type FATOs

7.2.4 A heliport identification marking shall be located in the FATO and when used in conjunction with FATO designation markings, shall be displayed at each end of the FATO as shown in Figure 7-4.

Characteristics

7.2.5 A heliport identification marking, except for a heliport at a hospital, shall consist of a letter H, white in colour. For a hospital heliport the heliport identification marking shall be red in colour on a white cross.

7.2.6 The dimensions of the H marking and the white cross (where applicable) shall be no less than those shown in Figure 7-3 and where the marking is used for a runway-type FATO, its dimensions shall be increased by a factor of 3 as shown in Figure 7-4.

7.2.7 A heliport identification marking shall be oriented with the cross arm of the H at right angles to the preferred final approach direction.

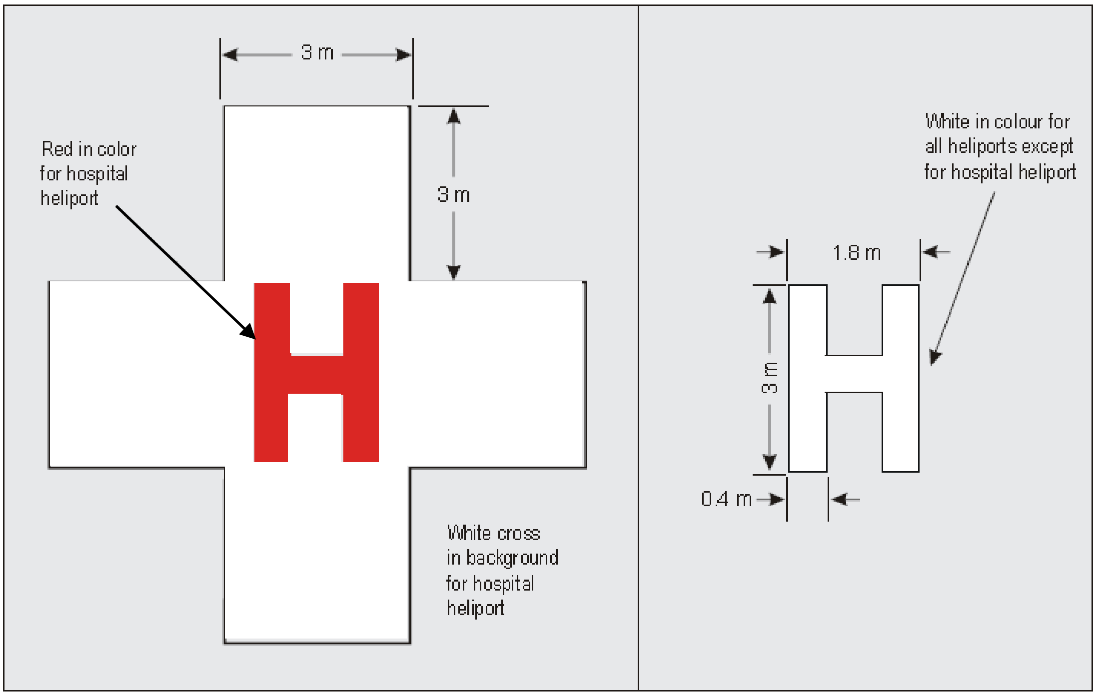


Figure 7-3 – Heliport identification marking

7.3 MAXIMUM ALLOWABLE MASS MARKING

Application

7.3.1 A maximum allowable mass marking shall be displayed at an elevated heliport.

7.3.2 A maximum allowable mass marking should be displayed at a surface-level heliport.

Characteristics

7.3.4 A maximum allowable mass marking shall consist of a one-, two- or three-digit number.

7.3.5 The marking shall be expressed in tonnes (1 000 kg) rounded to the nearest 1000 kg followed by a letter “t”.

7.3.6 The maximum allowable mass marking should be expressed to the nearest 100 kg. The marking

should be presented to one decimal place and rounded to the nearest 100 kg followed by the letter "t".

7.3.7 When the maximum allowable mass is expressed to 100 kg, the decimal place should be preceded with a decimal point marked with a 30 cm square.

All FATOs except runway-type FATOs

7.3.8 The numbers and the letter of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 7-3, for a FATO with a dimension of more than 30 m. For a FATO with a dimension of between 15 m to 30 m the height of the numbers and the letter of the marking should be a minimum of 90 cm, and for a FATO with a dimension of less than 15 m the height of the numbers and the letter of the marking should be a minimum of 60 cm, each with a proportional reduction in width and thickness.

Runway-type FATOs

7.3.9 The numbers and the letter of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 7-4.

Figure 7-4 – Designation marking and heliport identification marking for a runway-type FATO

7.4 D-VALUE MARKING

Application

7.4.1 *Recommendation* - The D-value marking should be displayed at surface-level and elevated heliports designed for helicopters operated in performance class 2 or 3.

Note —The D-value is not required to be marked on a heliport with a runway-type FATO.

Location

7.4.2 A D-value marking shall be located within the TLOF or FATO and so arranged as to be readable from the preferred final approach direction.

7.4.3 Where there is more than one approach direction, additional D-value markings should be provided such that at least one D-value marking is readable from the final approach directions.

Characteristics

7.4.4 The D-value marking shall be white. The D-value marking shall be rounded to the nearest whole metre with 0.5 rounded down.

7.4.5 The numbers of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 7-3 for a FATO with a dimension of more than 30 m. For a FATO with a dimension of between 15 m to 30 m the height of the numbers of the marking should be a minimum of 90 cm, and for a FATO with a dimension of less than 15 m the height of the numbers of the marking should be a minimum of 60 cm, each with a proportional reduction in width and thickness.

7.5 FATO DIMENSION MARKING

Application

7.5.1 The actual dimension(s) of the FATO intended to be used by helicopters operated in performance class 1 should be marked on the FATO.

7.5.2 If the actual dimension(s) of the FATO to be used by helicopters operated in performance class 2 or 3 is less than 1D, the dimension(s) should be marked on the FATO.

Location

7.5.3 A FATO dimension marking shall be located within the FATO and so arranged as to be readable from the preferred final approach direction.

Characteristics

7.5.4 The dimension(s) shall be rounded to the nearest metre.

Note — If the FATO is rectangular both the length and width of the FATO relative to the preferred final approach direction is indicated.

All FATOs except runway-type FATOs

7.5.5 The numbers of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 7-3 for a FATO with a dimension of more than 30 m. For a FATO with a dimension between 15 m to 30 m the height of the numbers of the marking should be a minimum of 90 cm, and for a FATO with a dimension of less than 15 m the height of the numbers of the marking should be a minimum of 60 cm, each with a proportional reduction in width and thickness.

Runway-type FATOs

7.5.6 The numbers of the marking should have a colour contrasting with the background and should be in the form and proportion shown in Figure 7-4.

7.6 FATO PERIMETER MARKING OR MARKERS FOR SURFACE LEVEL HELIPORTS

Application

7.6.1 FATO perimeter marking or markers shall be provided at a surface-level heliport where the extent of the FATO is not self-evident.

Location

7.6.2 The FATO perimeter marking or markers shall be located on the edge of the FATO.

Characteristics - Runway-type FATOs

7.6.3 The perimeter of the FATO shall be defined with markings or markers spaced at equal intervals of not more than 50 m with at least three markings or markers on each side including a marking or marker at each corner.

7.6.4 A FATO perimeter marking shall be a rectangular stripe with a length of 9 m or one-fifth of the side of the FATO which it defines and a width of 1 m.

7.6.5 FATO perimeter markings shall be white.

7.6.6 A FATO perimeter marker shall have dimensional characteristics as shown in Figure 7-5.

7.6.7 FATO perimeter markers shall be of colour(s) that contrast effectively against the operating background.

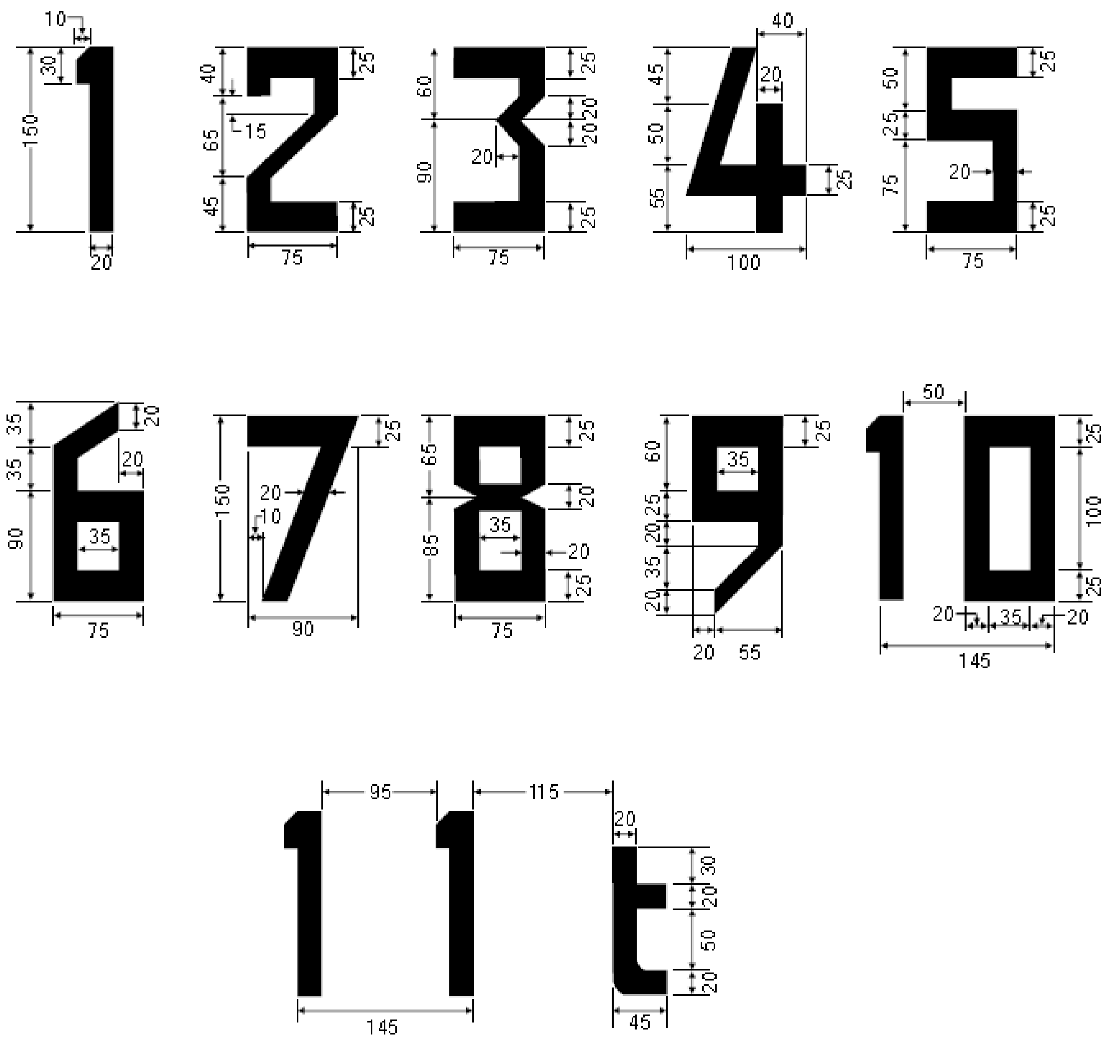
7.6.8 FATO perimeter markers should be a single colour, orange or red, or two contrasting colours, orange and white or alternatively red and white should be used except where such colours would merge with the background.

Characteristics – All FATOs except runway-type FATOs

7.6.9 For an unpaved FATO the perimeter shall be defined with flush in-ground markers. The FATO perimeter markers shall be 30 cm in width, 1.5 m in length, and with end-to-end spacing of not less than 1.5 m and not more than 2 m. The corners of a square or rectangular FATO shall be defined.

7.6.10 For a paved FATO the perimeter shall be defined with a dashed line. The FATO perimeter marking segments shall be 30 cm in width, 1.5 m in length, and with end-to-end spacing of not less than 1.5 m and not more than 2 m. The corners of the square or rectangular FATO shall be defined.

7.6.11 FATO perimeter markings and flush in-ground markers shall be white.



Note.— All units are expressed in centimetres.

Figure 7-5 – Form and Proportions of Numbers and Letters

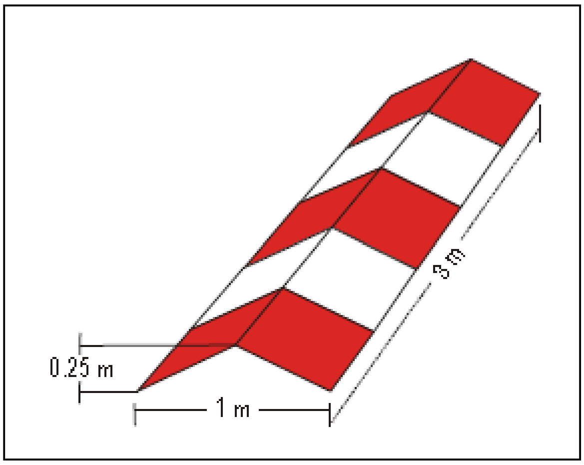


Figure 7-6 – Runway-type FATO edge marker

7.7 FATO DESIGNATION MARKINGS FOR RUNWAY-TYPE FATO'S

Application

7.7.1 A FATO designation marking should be provided where it is necessary to designate the FATO to the pilot.

Location

7.7.2 A FATO designation marking shall be located at the beginning of the FATO as shown in Figure 7-3.

Characteristics

7.7.3 A FATO designation marking shall consist of a two-digit number. The two-digit number shall be the whole number nearest the one-tenth of the magnetic North when viewed from the direction of approach. When the above rule would give a single digit number, it shall be preceded by a zero. The marking as shown in Figure 7-3, shall be supplemented by the heliport identification marking.

7.8 AIMING POINT MARKING

Application

7.8.1 An aiming point marking should be provided at a heliport where it is necessary for a pilot to make an approach to a particular point above a FATO before proceeding to a TLOF.

Location- Runway-type FATOs

7.8.2 The aiming point marking shall be located within the FATO.

Location - All FATOs except runway-type FATOs

7.8.3 The aiming point marking shall be located at the centre of the FATO.

Characteristics

7.8.4 The aiming point marking shall be an equilateral triangle with the bisector of one of the angles aligned with the preferred approach direction. The marking shall consist of continuous white lines, and the dimensions of the marking shall conform to those shown in Figure 7-6.

Note: The aiming point, heliport identification and FATO perimeter markings are white and may be edged with a 10 cm black border to improve contrast.

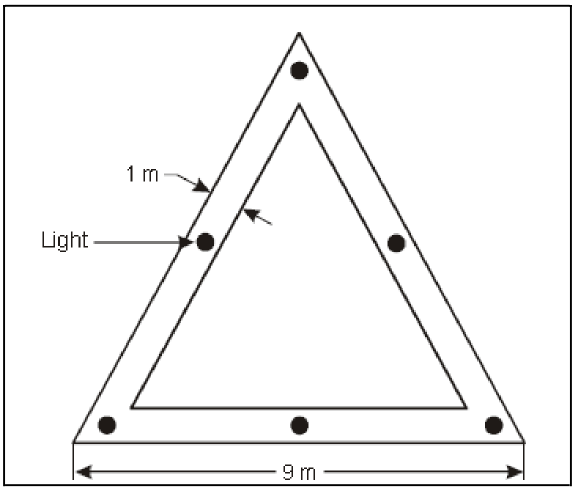


Figure 7-7 – Aiming point marking and lighting

7.9 TLOF PERIMETER MARKING

Application

7.9.1 A TLOF perimeter marking shall be displayed on a TLOF located in a FATO at a surface-level heliport if the perimeter of the TLOF is not self-evident.

7.9.2 A TLOF perimeter marking shall be displayed on an elevated heliport.

7.9.3 A TLOF perimeter marking should be provided on each TLOF collocated with a helicopter stand at a surface-level heliport.

Location

7.9.4 The TLOF perimeter marking shall be located along the edge of the TLOF.

Characteristics

7.9.5 A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

7.10 TOUCHDOWN / POSITIONING MARKING

Application

7.10.1 A touchdown/positioning marking shall be provided where it is necessary for a helicopter to touchdown and/or be accurately positioned by the pilot. A touchdown/positioning marking shall be provided on a helicopter stand designed for turning.

Location

7.10.2 A touchdown/positioning marking shall be located so that when the pilot's seat is over the marking, the whole of the undercarriage will be within the TLOF and all parts of the helicopter will be clear of any obstacle by a safe margin.

7.10.3 On a heliport the centre of the touchdown/positioning marking shall be located at the centre of the TLOF, except the centre of the touchdown/positioning marking may be offset away from the centre of the TLOF where an aeronautical study indicates such offsetting to be necessary and providing that a marking so offset would not adversely affect safety. For a helicopter stand designed for hover turning, the touchdown/positioning marking shall be located in the centre of the central zone (see Figure 4-4 and Figure 7-9).

Note - See Heliport Manual (Doc 9261) for guidance.

Characteristics

7.10.4 A touchdown/positioning marking shall be a yellow circle and have a line width of at least 0.5 m.

7.10.5 The inner diameter of the circle shall be 0.5 D of the largest helicopter the TLOF is intended to serve.

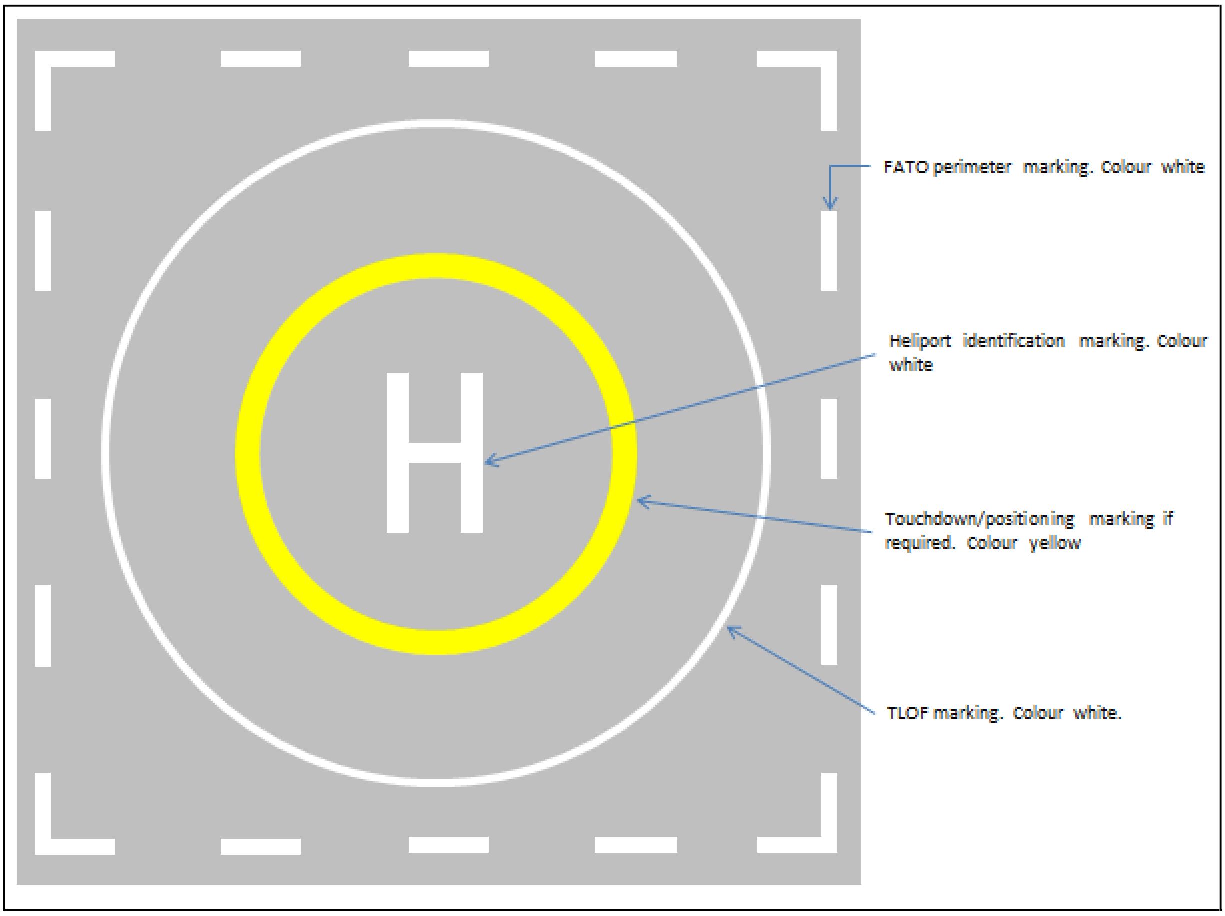


Figure 7-8 – Combined heliport identification, FATO, TLOF and touchdown/positioning markings

7.11 HELIPORT NAME MARKING

Application

7.11.1 A heliport name marking should be provided at a heliport where there is insufficient alternative means of visual identification.

Location

7.11.2 The heliport name marking should be displayed on the heliport so as to be visible, as far as practicable, at all angles above the horizontal.

Characteristics

7.11.3 A heliport name marking shall consist of the name or the alphanumeric designator of the heliport as used in the radio (R/T) communications.

7.11.4 A heliport name marking intended for use at night or during conditions of poor visibility should be illuminated, either internally or externally.

Runway-type FATOs

7.11.5 The characters of the marking should be not less than 3 m in height.

All FATOs except runway-type FATOs

7.11.6 The characters of the marking should be not less than 1.5 m in height at surface level heliports and not less than 1.2 m on elevated heliports. The colour of the marking should contrast with the background and preferably be white.

7.12 HELICOPTER GROUND TAXIWAY MARKINGS AND MARKERS

Note 1 -The specifications for taxi-holding position markings in YCAR Part IX are equally applicable to taxiways intended for ground taxiing of helicopters.

Note 2 - Ground taxi-routes are not required to be marked.

Application

7.12.1 The centre line of a helicopter ground taxiway should be identified with a marking and the edges of a helicopter ground taxiway, if not self-evident, should be identified with markers or markings.

Location

7.12.2 Helicopter ground taxiway markings shall be along the centre line and, if required, along the edges of a helicopter ground taxiway.

7.12.3 Helicopter ground taxiway edge markers shall be located at a distance of 0.5 m to 3 m beyond the edge of the helicopter ground taxiway.

7.12.4 Helicopter ground taxiway edge markers, where provided, shall be spaced at intervals of not more than 15 m on each side of straight sections and 7.5 m on each side of curved sections with a minimum of four equally spaced markers per section.

Characteristics

7.12.5 A helicopter ground taxiway centre line marking shall be a continuous yellow line 15 cm in width.

7.12.6 Helicopter ground taxiway edge markings shall be a continuous double yellow line, each 15 cm in width, and spaced 15 cm apart (nearest edge to nearest edge).

Note - Signage may be required on an aerodrome where it is necessary to indicate that a helicopter ground taxiway is suitable only for the use of helicopters.

7.12.7 A helicopter ground taxiway edge marker shall be frangible.

7.12.8 A helicopter ground taxiway edge marker shall not exceed a plane originating at a height of 25 cm above the plane of the helicopter ground taxiway, at a distance of 0.5 m from the edge of the helicopter ground taxiway and sloping upwards and outwards at a gradient of 5 per cent to a distance of 3 m beyond the edge of the helicopter ground taxiway.

7.12.9 A helicopter ground taxiway edge marker shall be blue.

Note 1 - Guidance on suitable edge markers is given in the Heliport Manual (Doc 9261).

Note 2 - If blue markers are used on an aerodrome, signage may be required to indicate that the helicopter ground taxiway is suitable only for helicopters.

7.12.10 If the helicopter ground taxiway is to be used at night, the edge markers shall be internally illuminated or retro-reflective.

7.13 HELICOPTER AIR TAXIWAY MARKINGS AND MARKERS

Note - Air taxi-routes are not required to be marked.

Application

7.13.1 The centre line of a helicopter air taxiway or, if not self-evident, the edges of a helicopter air taxiway should be identified with markers or markings

Location

7.13.2 A helicopter air taxiway centre line marking or flush in-ground centre line marker shall be located along the centre line of the helicopter air taxiway.

7.13.3 Helicopter air taxiway edge markings shall be located along the edges of a helicopter air taxiway.

7.13.4 Helicopter air taxiway edge markers shall be located at a distance of 1 m to 3 m beyond the edge of the helicopter air taxiway.

7.13.5 Helicopter air taxiway edge markers should not be located at a distance of less than 0.5 times the largest overall width of the helicopter for which designed from the centre line of the helicopter air taxiway.

Characteristics

7.13.6 A helicopter air taxiway centre line, when on a paved surface, shall be marked with a continuous yellow line 15 cm in width.

7.13.7 The edges of a helicopter air taxiway, when on a paved surface, shall be marked with continuous double yellow lines each 15 cm in width, and spaced 15 cm apart (nearest edge to nearest edge).

Note - Where there is potential for a helicopter air taxiway to be confused with a helicopter ground taxiway, signage may be required to indicate the mode of taxi operations that are permitted.

7.13.8 A helicopter air taxiway centre line, when on an unpaved surface that will not accommodate painted markings, shall be marked with flush in-ground 15 cm wide and approximately 1.5 m in length yellow markers, spaced at intervals of not more than 30 m on straight sections and not more than 15 m on curves, with a minimum of four equally spaced markers per section.

7.13.9 Helicopter air taxiway edge markers, where provided, shall be spaced at intervals of not more than 30 m on each side of straight sections and not more than 15 m on each side of curves, with a minimum of four equally spaced markers per section.

7.13.10 Helicopter air taxiway edge markers shall be frangible.

7.13.11 Helicopter air taxiway edge markers shall not penetrate a plane originating at a height of 25 cm above the plane of the helicopter air taxiway, at a distance of 1 m from the edge of the helicopter air taxiway and sloping upwards and outwards at a gradient of 5 per cent to a distance of 3 m beyond the edge of the helicopter air taxiway.

7.13.12 Helicopter air taxiway edge markers should not penetrate a plane originating at a height of 25 cm above the plane of the helicopter air taxiway, at a distance of 0.5 times the largest overall width of the helicopter for which designed from the centre line of the helicopter air taxiway, and sloping upwards and outwards at a gradient of 5 per cent.

7.13.13 A helicopter air taxiway edge marker shall be of colour(s) that contrast effectively against the operating background. The colour red shall not be used for markers.

Note - Guidance for suitable edge markers is given in the Heliport Manual (Doc 9261).

7.13.14 If the helicopter air taxiway is to be used at night, helicopter air taxiway edge markers shall be either internally illuminated or retro-reflective.

7.14 HELICOPTER STAND MARKINGS

Note: For helicopter stands intended to be used only be wheeled helicopters not operating in the hover, standard markings as for fixed wing aircraft should be used taking into account the protection area requirements for ground taxiways in Chapter 4.5.

Application

7.14.1 A helicopter stand perimeter marking and a TLOF marking shall be provided on a helicopter stand designed for helicopters in the hover and for turning as shown on Figure 7-8, except that a touchdown/positioning marking shall be provided if the helicopter stand perimeter marking is not practicable.

7.14.2 A TLOF marking and a stop line shall be provided on a helicopter stand intended to be used by helicopters in the hover and which does not allow the helicopter to turn.

7.14.3 *Recommendation* - Alignment lines and lead-in/lead-out lines should be provided on a helicopter stand.

Note 1 - Helicopter stand identification markings may be provided where there is a need to identify individual stands.

Note 2 - Additional markings relating to stand size may be provided. See Heliport Manual (Doc 9261).

Location

7.14.4 A helicopter stand perimeter marking shall be concentric with the central zone of the stand.

7.14.5 A stop line shall be located on the helicopter stand at right angles to the centre line.

7.14.6 Alignment lines and lead-in/lead-out lines shall be located as shown in Figure 7-8.

Characteristics

7.14.7 A helicopter stand perimeter marking shall be a yellow circle and have a line width of 15 cm. The outer diameter of the circle shall be 1.2 D of the largest helicopter the helicopter stand is intended to serve.

7.14.8 A TLOF marking shall be a white circle and have a line width of 15 cm. The outer diameter of the circle shall be 0.83 D of the largest helicopter the helicopter stand is intended to serve.

7.14.9 A touchdown/positioning marking shall be a yellow circle and have a line width of at least 50 cm. The inner diameter of the circle shall be 0.5 D of the largest helicopter the helicopter stand is intended to serve.

7.14.10 Alignment lines, lead-in/lead-out lines and stop lines shall be continuous yellow lines and have a width of 15 cm.

7.14.11 Curved portions of alignment lines and lead-in/lead-out lines shall have radii appropriate to the most demanding helicopter type the helicopter stand is intended to serve.

7.14.12 Stand identification markings shall be marked in a contrasting colour so as to be easily readable.

Note - Where it is intended that helicopters proceed in one direction only, arrows indicating the direction to be followed may be added as part of the alignment lines.

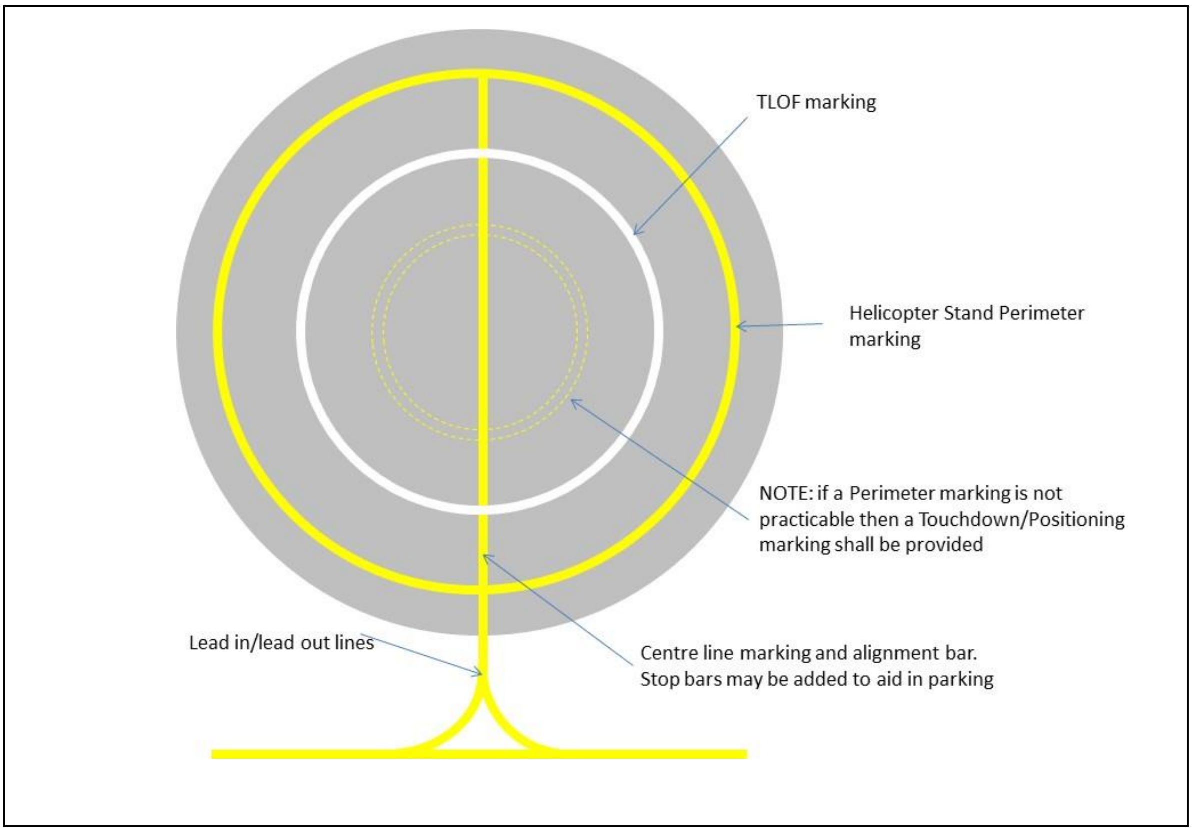


Figure 7-9 – Helicopter stand markings helicopters in the hover and turning

7.15 FLIGHT PATH ALIGNMENT GUIDANCE MARKING

Application

7.15.1 Flight path alignment guidance marking(s) should be provided at a heliport where it is desirable and practicable to indicate available approach and/or departure path direction(s).

Note — The flight path alignment guidance marking can be combined with a flight path alignment guidance lighting system described in Chapter 8, section 3.

Location

7.15.2 The flight path alignment guidance marking shall be located in a straight line along the direction of approach and/or departure path on one or more of the TLOF, FATO, safety area or any suitable surface in the immediate vicinity of the FATO or safety area.

Characteristics

7.15.3 A flight path alignment guidance marking shall consist of one or more arrows marked on the TLOF, FATO and/or safety area surface as shown in Figure 7-8. The stroke of the arrow(s) shall be 50 cm in width and at least 3 m in length. When combined with a flight path alignment guidance lighting system it shall take the form shown in Figure 7-10 which includes scheme for marking 'heads of the arrows' which are constant regardless of stroke length.

Note — In the case of a flight path limited to a single approach direction or single departure direction, the arrow marking may be uni-directional. In the case of a heliport with only a single approach/departure path available, one bi-directional arrow is marked.

7.15.4 The markings should be in a colour which provides good contrast against the background colour of the surface on which they are marked, preferably white.

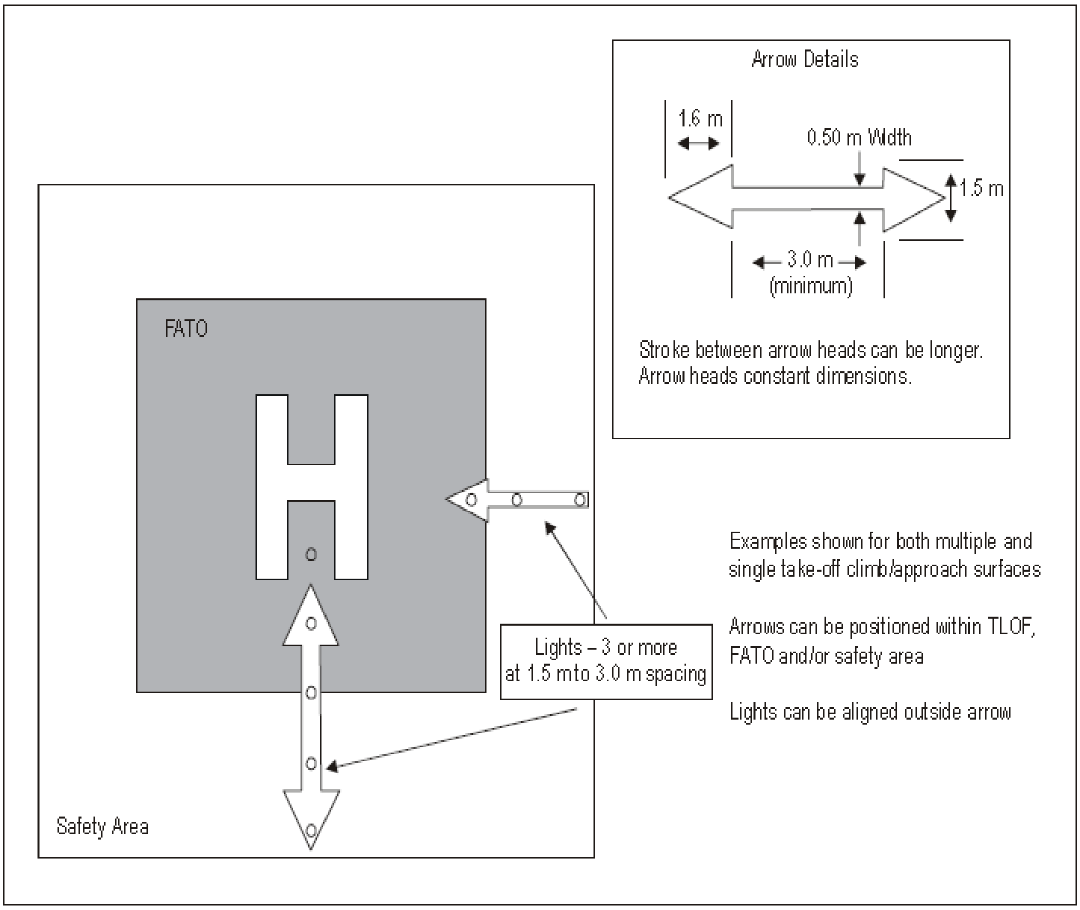


Figure 7-10 – Flight path alignment guidance markings and lights

7.16 CLOSED MARKING

Application

7.16.1 When a FATO or TLOF is to be permanently closed to all helicopter operations, all markings associated with the FATO or TLOF shall be removed or a closed marking shall be displayed on the FATO or TLOF.

7.16.2 A closed marking should be displayed on a temporarily closed FATO or TLOF except that such marking may be omitted when the closing is of short duration (>6 hrs) and adequate warning to helicopter operators is provided.

7.16.3 Lighting on a closed FATO or TLOF shall not be operated, except as required for maintenance purposes.

Location

A closed marking shall be placed in the centre of the closed FATO or TLOF.

Characteristics

The closed marking shall follow the form and proportions as detailed in Figure 7-11.

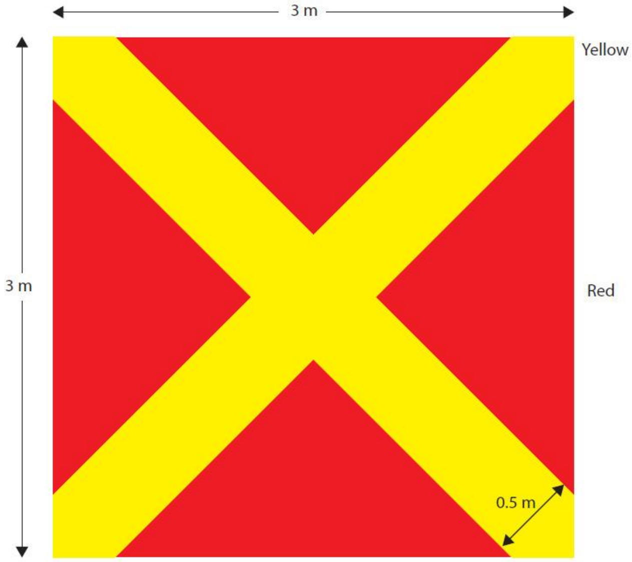


Figure 7-11 – Closed Marking

CHAPTER 8 – AERONAUTICAL LIGHTS

Note 1 — See YCAR Part IX, concerning specifications on screening of non-aeronautical ground lights, and design of elevated and inset lights.

Note 2 — In the case of heliports located near navigable waters, consideration needs to be given to ensuring that aeronautical ground lights do not cause confusion to mariners.

Note 3 — As helicopters will generally come very close to extraneous light sources, it is particularly important to ensure that, unless such lights are navigation lights exhibited in accordance with international regulations, they are screened or located so as to avoid direct and reflected glare.

Note 4 — Specifications in sections 8.3, 8.5, 8.6 and 8.7 of this Chapter are designed to provide effective lighting systems based on night conditions. Where lights are to be used in conditions other than night (i.e. - day or twilight) it may be necessary to increase the intensity of the lighting to maintain effective visual cues by use of a suitable brilliancy control. Guidance is provided in the Aerodrome Design Manual (Doc 9157), Part 4 Visual Aids, Chapter 5 Light Intensity Settings.

8.1 HELIPORT BEACON

Application

8.1.1 A heliport beacon should be provided at a heliport where:

a) long-range visual guidance is considered necessary and is not provided by other visual means; or

b) identification of the heliport is difficult due to surrounding lights.

Location

8.1.2 The heliport beacon shall be located on or adjacent to the heliport preferably at an elevated position and so that it does not dazzle a pilot at short range.

Note — Where a heliport beacon is likely to dazzle pilots at short range, it may be switched off during the final stages of the approach and landing.

Characteristics

8.1.3 The heliport beacon shall emit repeated series of equi-spaced short duration white flashes in the format in Figure 8-2.

8.1.4 The light from the beacon shall show at all angles of azimuth.

8.1.5 The effective light intensity distribution of each flash should be as shown in Figure 8-1, Illustration 1.

Note — Where brilliancy control is desired, settings of 10 per cent and 3 per cent have been found to be satisfactory. In addition, shielding may be necessary to ensure that pilots are not dazzled during the final stages of the approach and landing.

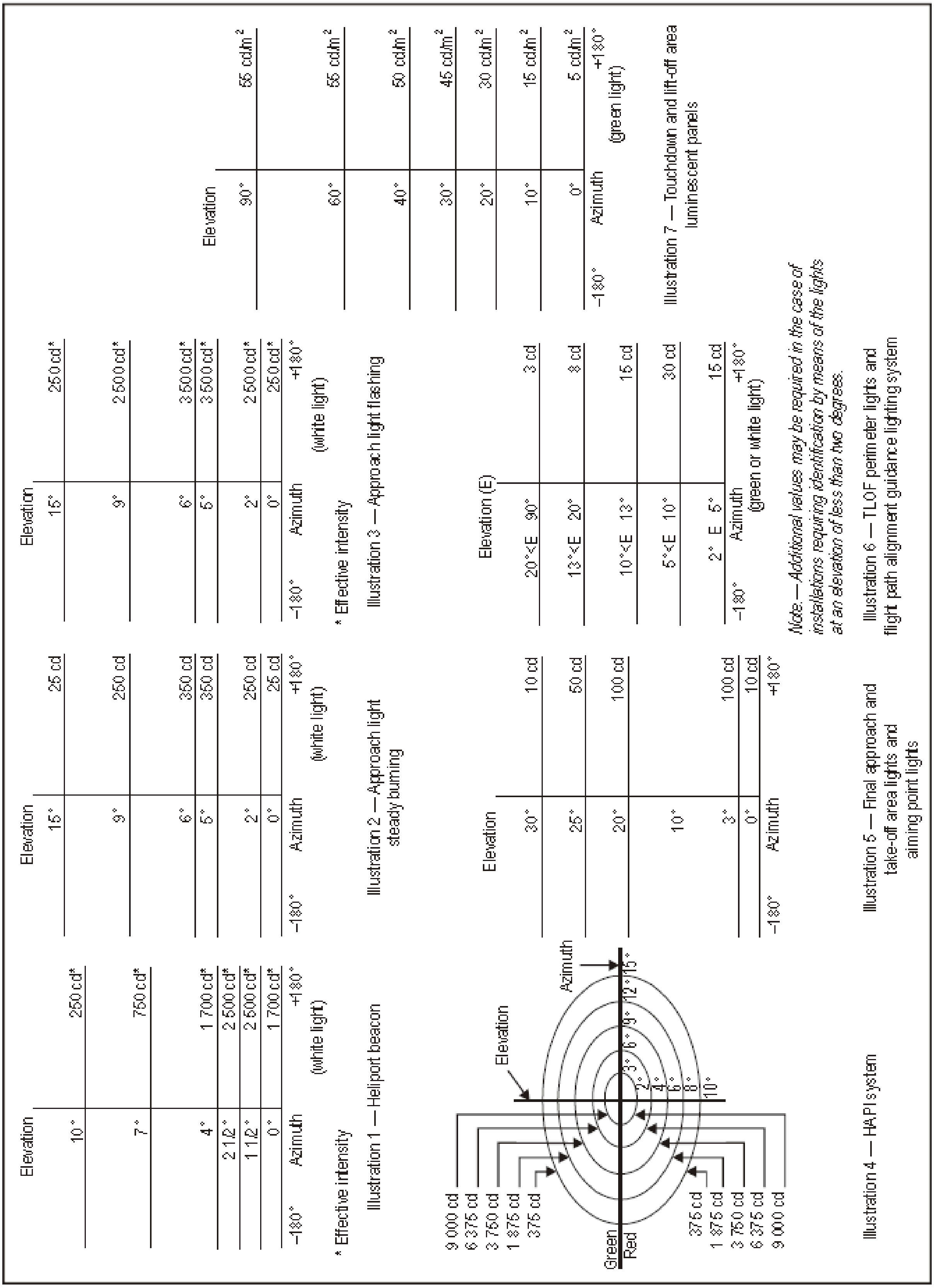


Figure 8-1 – Isocandela diagrams

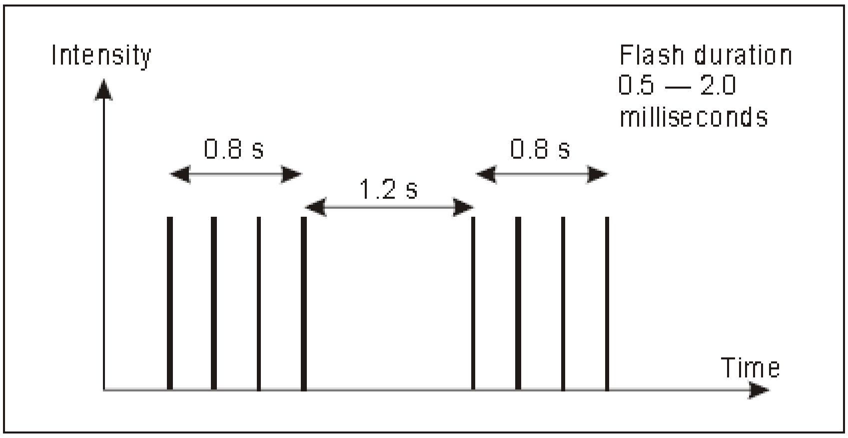


Figure 8-2 – Heliport beacon flash characteristics

8.2 APPROACH LIGHTING SYSTEM

Application

8.2.1 An approach lighting system should be provided at a heliport where it is desirable and practicable to indicate a preferred approach direction.

Location

8.2.2 The approach lighting system shall be located in a straight line along the preferred direction of approach.

Characteristics

8.2.3 An approach lighting system should consist of a row of three lights spaced uniformly at 30 m intervals and of a crossbar 18 m in length at a distance of 90 m from the perimeter of the FATO as shown in Figure 8-3. The lights forming the crossbar should be as nearly as practicable in a horizontal straight line at right angles to, and bisected by, the line of the centre line lights and spaced at 4.5 m intervals. Where there is the need to make the final approach course more conspicuous additional lights spaced uniformly at 30 m intervals should be added beyond the crossbar. The lights beyond the crossbar may be steady or sequenced flashing, depending upon the environment.

Note — Sequenced flashing lights may be useful where identification of the approach lighting system is difficult due to surrounding lights.

8.2.4 The steady lights shall be omni-directional white lights.

8.2.5 Sequenced flashing lights shall be omni-directional white lights.

8.2.6 The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure 8-1, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar.

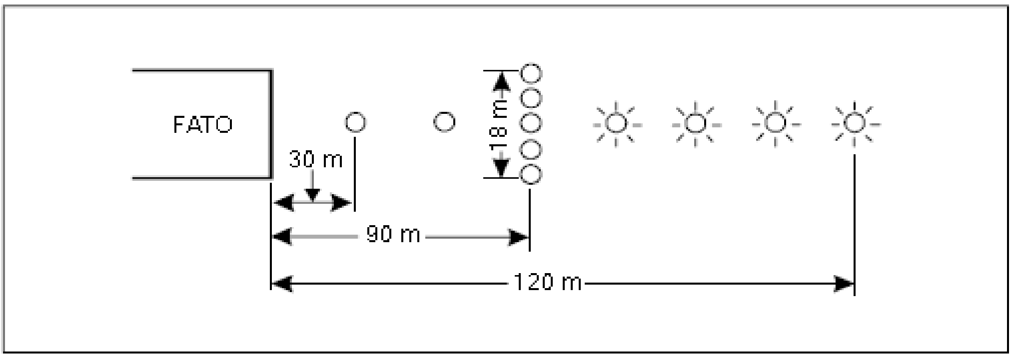


Figure 8-3 – Approach lighting system

8.2.7 A suitable brilliancy control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions.

Note — The following intensity settings have been found suitable:

- *steady lights — 100 per cent, 30 per cent and 10 per cent; and*
- *flashing lights — 100 per cent, 10 per cent and 3 per cent.*

8.3 FLIGHT PATH ALIGNMENT GUIDANCE LIGHTING SYSTEM

Application

8.3.1 Flight path alignment guidance lighting system(s) should be provided at a heliport where it is desirable and practicable to indicate available approach and/or departure path direction(s).

Note — The flight path alignment guidance lighting can be combined with a flight path alignment guidance marking(s) described in Chapter 7.

Location

8.3.2 The flight path alignment guidance lighting system shall be in a straight line along the direction(s) of approach and/or departure path on one or more of the TLOF, FATO, safety area or any suitable surface in the immediate vicinity of the FATO, TLOF or safety area.

8.3.3 If combined with a flight path alignment guidance marking, as far as is practicable the lights should be located inside the "arrow" markings.

Characteristics

8.3.4 *Recommendation*.— A flight path alignment guidance lighting system should consist of a row of three or more lights spaced uniformly a total minimum distance of 6 m. Intervals between lights should not be less than 1.5 m and should not exceed 3 m. Where space permits there should be 5 lights. (See Figure 7-10)

Note — The number of lights and spacing between these lights may be adjusted to reflect the space available. If more than one flight path alignment system is used to indicate available approach and/or departure path direction(s), the characteristics for each system are typically kept the same. (See Figure 7-10)

8.3.5 The lights shall be steady omnidirectional inset white lights.

8.3.6 The distribution of the lights should be as indicated in Figure 8-1, Illustration 6.

8.3.7 A suitable control should be incorporated to allow for adjustment of light intensity to meet the prevailing conditions and to balance the flight path alignment guidance lighting system with other heliport lights and general lighting that may be present around the heliport.

8.4 VISUAL ALIGNMENT GUIDANCE SYSTEM

Application

8.4.1 A visual alignment guidance system should be provided to serve the approach to a heliport where one or more of the following conditions exist especially at night:

a) obstacle clearance, noise abatement or traffic control procedures require a particular direction to be flown;

b) the environment of the heliport provides few visual surface cues; and

c) it is physically impracticable to install an approach lighting system.

Location

8.4.2 The visual alignment guidance system shall be located such that a helicopter is guided along the prescribed track towards the FATO.

8.4.3 The system should be located at the downwind edge of the FATO and aligned along the preferred approach direction.

8.4.4 The light units shall be frangible and mounted as low as possible.

8.4.5 Where the lights of the system need to be seen as discrete sources, light units shall be located such that at the extremes of system coverage the angle subtended between units as seen by the pilot shall not be less than 3 minutes of arc.

8.4.6 The angles subtended between light units of the system and other units of comparable or greater intensities shall also be not less than 3 minutes of arc.

Note — Requirements of paragraphs 8.4.5 and 8.4.6 can be met for lights on a line normal to the line of sight if the light units are separated by 1 m for every kilometre of viewing range.

Signal Format

8.4.7 The signal format of the alignment guidance system shall include a minimum of three discrete signal sectors providing “offset to the right”, “on track” and “offset to the left” signals.

8.4.8 The divergence of the “on track” sector of the system shall be as shown in Figure 8-4.

8.4.9 The signal format shall be such that there is no possibility of confusion between the system and any associated visual approach slope indicator or other visual aids.

8.4.10 The system shall avoid the use of the same coding as any associated visual approach slope indicator.

8.4.11 The signal format shall be such that the system is unique and conspicuous in all operational environments.

8.4.12 The system shall not significantly increase the pilot workload.

Light Distribution

8.4.13 The usable coverage of the visual alignment guidance system shall be equal to or better than that of the visual approach slope indicator system with which it is associated.

8.4.14 A suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

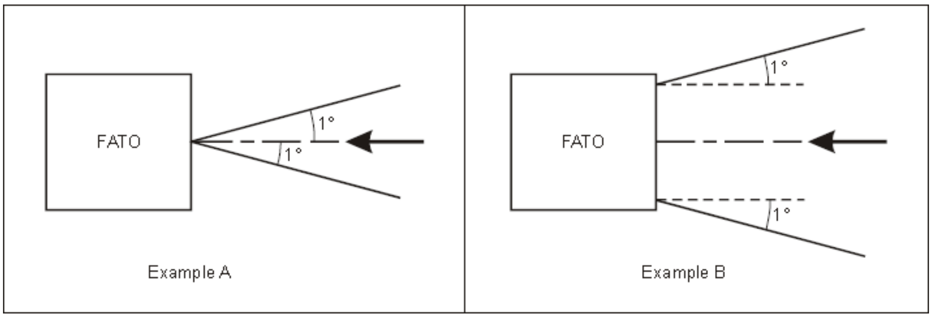


Figure 8-4 – Divergence of the "on track" sector

Approach track and azimuth setting

8.4.15 A visual alignment guidance system shall be capable of adjustment in azimuth to within ±5 minutes of arc of the desired approach path.

8.4.16 The angle of the azimuth guidance system shall be such that during an approach the pilot of a helicopter at the boundary of the "on track" signal will clear all objects in the approach area by a safe margin.

8.4.17 The characteristics of the obstacle protection surface specified in paragraph 8.5.23, Table 8.1 and Figure 8-5 shall equally apply to the system.

Characteristics of the visual alignment guidance system

8.4.18 In the event of the failure of any component affecting the signal format the system shall be automatically switched off.

8.4.19 The light units shall be so designed that deposits of condensation, dirt, etc., on optically transmitting or reflecting surfaces will interfere to the least possible extent with the light signal and will not cause spurious or false signals to be generated.

8.5 VISUAL APPROACH SLOPE INDICATOR

Application

8.5.1 A visual approach slope indicator should be provided to serve the approach to a heliport, whether or not the heliport is served by other visual approach aids or by non-visual aids, where one or more of the following conditions exist especially at night:

a) obstacle clearance, noise abatement or traffic control procedures require a particular slope to be flown;
b) the environment of the heliport provides few visual surface cues; and
c) the characteristics of the helicopter require a stabilized approach.

8.5.2 The standard visual approach slope indicator systems for helicopter operations shall consist of the following:

a) PAPI and APAPI systems conforming to the specifications contained in YCAR Part IX, except that the angular size of the on-slope sector of the systems shall be increased to 45 minutes; or
b) helicopter approach path indicator (HAPI) system conforming to the specifications in paragraphs 8.5.6 to 8.5.21 inclusive.

Location

8.5.3 A visual approach slope indicator shall be located such that a helicopter is guided to the desired position within the FATO and so as to avoid dazzling the pilot during final approach and landing.

8.5.4 A visual approach slope indicator should be located adjacent to the nominal aiming point and aligned in azimuth with the preferred approach direction.

8.5.5 The light unit(s) shall be frangible and mounted as low as possible.

Table 8-1 – Dimensions and slopes of the obstacle protection surface

Surface and Dimensions	FATO	
Length of inner edge	Width of safety area	
Distance from end of FATO	3m minimum	
Divergence	10%	
Total length	2500 m	
Slope	PAPI	A[a] – 0.57°
	HAPI	A[b] – 0.65°
	APAPI	A[a] – 0.9°

[a] As indicated in YCAR Part IX

[b] The angle of the upper boundary of the “below slope” signal

HAPI signal format

8.5.6 The signal format of the HAPI shall include four discrete signal sectors, providing an “above slope”, an “on slope”, a “slightly below” and a “below slope” signal.

8.5.7 The signal format of the HAPI shall be as shown in Figure 8-6, Illustrations A and B.

Note — Care is required in the design of the unit to minimize spurious signals between the signal sectors and at the azimuth coverage limits.

8.5.8 The signal repetition rate of the flashing sector of the HAPI shall be at least 2 Hz.

8.5.9 The on-to-off ratio of pulsing signals of the HAPI should be 1 to 1 and the modulation depth should be at least 80 per cent.

8.5.10 The angular size of the “on-slope” sector of the HAPI shall be 45 minutes.

8.5.11 The angular size of the “slightly below” sector of the HAPI shall be 15 minutes.

Light distribution

8.5.12 The light intensity distribution of the HAPI in red and green colours should be as shown in Figure 8-1, Illustration 4.

Note — A larger azimuth coverage can be obtained by installing the HAPI system on a turntable.

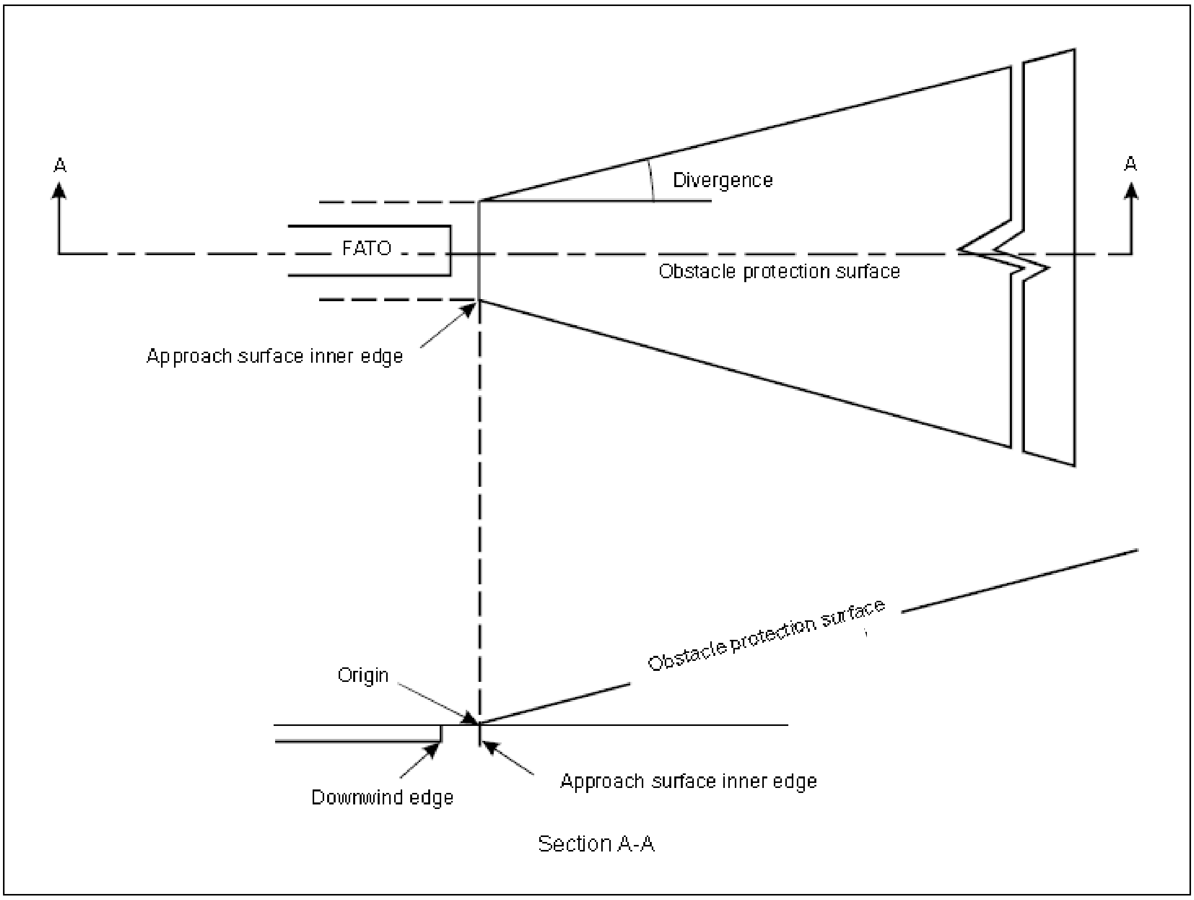


Figure 8-5 – Obstacle protection surface for Visual Approach Slope Indicator Systems

Sector	Format
Above	Flashing green
On slope	Green
Slightly below	Red
Below	Flashing red

Illustration A

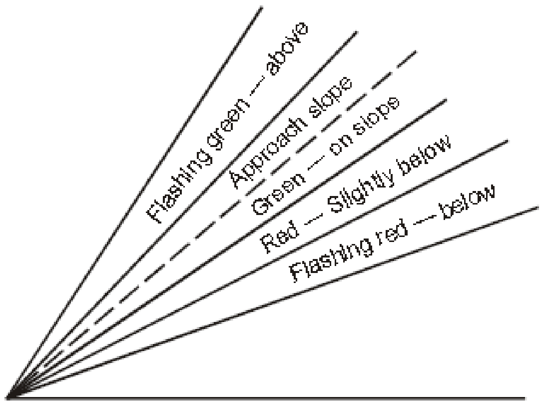


Illustration B

Figure 8-6 – HAPI signal format

8.5.13 Colour transition of the HAPI in the vertical plane shall be such as to appear to an observer at a distance of not less than 300 m to occur within a vertical angle of not more than three minutes.

8.5.14 The transmission factor of a red or green filter shall be not less than 15 per cent at the maximum intensity setting.

8.5.15 At full intensity the red light of the HAPI shall have a Y-coordinate not exceeding 0.320, and the green light shall be within the boundaries specified in YCAR Part IX, Appendix 6.

8.5.16 A suitable intensity control shall be provided so as to allow adjustment to meet the prevailing conditions and to avoid dazzling the pilot during approach and landing.

Approach slope and elevation setting

8.5.17 A HAPI system shall be capable of adjustment in elevation at any desired angle between 1 degree and 12 degrees above the horizontal with an accuracy of ±5 minutes of arc.

8.5.18 The angle of elevation setting of HAPI shall be such that during an approach, the pilot of a helicopter observing the upper boundary of the "below slope" signal will clear all objects in the approach area by a safe margin.

Characteristics of the light unit

8.5.19 The system shall be so designed that:

a) in the event the vertical misalignment of a unit exceeds ±0.5 degrees (±30 minutes), the system will switch off automatically; and
b) if the flashing mechanism fails, no light will be emitted in the failed flashing sector(s).

8.5.20 The light unit of the HAPI shall be so designed that deposits of condensation, dirt, etc., on optically transmitting or reflecting surfaces will interfere to the least possible extent with the light signal and will not cause spurious or false signals to be generated.

8.5.21 A HAPI system intended for installation on a floating helideck should afford a stabilization of the beam to an accuracy of ±1/4 degree within ± 3-degree pitch and roll movement of the heliport.

Obstacle Protection Surface

Note — The following specifications apply to PAPI, APAPI and HAPI.

8.5.22 An obstacle protection surface shall be established when it is intended to provide a visual approach slope indicator system.

8.5.23 The characteristics of the obstacle protection surface, i.e. origin, divergence, length and slope, shall correspond to those specified in the relevant column of Table 8-1 and in Figure 8-5.

8.5.24 New objects or extensions of existing objects shall not be permitted above an obstacle protection surface except when, in the opinion of the appropriate authority, the new object or extension would be shielded by an existing immovable object.

Note — Circumstances in which the shielding principle may reasonably be applied are described in the ICAO Airport Services Manual, Part 6 (Doc 9137).

8.5.25 Existing objects above an obstacle protection surface shall be removed except when, in the opinion of the appropriate authority, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the safety of operations of helicopters.

8.5.26 Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the safety of operations of helicopters, one or more of the following measures shall be taken:

a) suitably raise the approach slope of the system;
b) reduce the azimuth spread of the system so that the object is outside the confines of the beam;
c) displace the axis of the system and its associated obstacle protection surface by no more

than 5 degrees;

d) suitably displace the FATO; and

e) install a visual alignment guidance system specified in 8.4.

Note — Guidance on this issue is contained in the ICAO Heliport Manual (Doc 9261).

8.6 FATO AREA LIGHTING SYSTEMS FOR SURFACE-LEVEL HELIPORTS

Application

8.6.1 Where a FATO is established at a surface-level heliport on ground intended for use at night, FATO lights shall be provided except that they may be omitted where the FATO and the TLOF are nearly coincidental or the extent of the FATO is self-evident.

Location

8.6.2 FATO lights shall be placed along the edges of the FATO. The lights shall be uniformly spaced as follows:

a) for an area in the form of a square or rectangle, at intervals of not more than 50 m with a minimum of four lights on each side including a light at each corner; and

b) for any other shaped area, including a circular area, at intervals of not more than 5 m with a minimum of ten lights.

Characteristics

8.6.3 FATO lights shall be fixed omni-directional lights showing white. Where the intensity of the lights is to be varied the lights shall show variable white.

8.6.4 The light distribution of FATO lights should be as shown in Figure 8-1, Illustration 5.

8.6.5 The lights should not exceed a height of 25 cm and should be inset when a light extending above the surface would endanger helicopter operations. Where a FATO is not meant for lift-off or touchdown, the lights should not exceed a height of 25 cm above ground.

8.7 AIMING POINT LIGHTS

Application

8.7.1 Where an aiming point marking is provided at a heliport intended for use at night, aiming point lights should be provided.

Location

8.7.2 Aiming point lights shall be collocated with the aiming point marking.

Characteristics

8.7.3 Aiming point lights shall form a pattern of at least six omni-directional white lights as shown in Figure 7-7. The lights shall be inset when a light extending above the surface could endanger helicopter operations.

8.7.4 The light distribution of aiming point lights should be as shown in Figure 8-1, Illustration 5.

8.8 TOUCHDOWN AND LIFT-OFF AREA LIGHTING SYSTEM

Application

8.8.1 A TLOF lighting system shall be provided at a heliport intended for use at night.

8.8.2 The TLOF lighting system for a surface-level heliport shall consist of one or more of the following:

a) perimeter lights; or

b) floodlighting; or

c) arrays of segmented point source lighting (ASPSL) or luminescent panel (LP) lighting to identify the TLOF when a) and b) are not practicable and FATO lights are available.

8.8.3 The TLOF lighting system for an elevated heliport or helideck shall consist of:

a) perimeter lights; and

b) ASPSL and/or LPs to identify the touchdown marking where it is provided and/or floodlighting to illuminate the TLOF.

Note — At elevated heliports and helidecks, surface texture cues within the TLOF are essential for helicopter positioning during the final approach and landing. Such cues can be provided using various forms of lighting (ASPSL, LP, floodlights or a combination of these lights, etc.) in addition to perimeter lights. Best results have been demonstrated by the combination of perimeter lights and ASPSL in the form of encapsulated strips of light emitting diodes (LEDs) to identify the touchdown and heliport identification markings.

8.8.4 TLOF ASPSL and/or LPs to identify the touchdown marking and/ or floodlighting should be provided at a surface-level heliport intended for use at night when enhanced surface texture cues are required.

Location

8.8.5 TLOF perimeter lights shall be placed along the edge of the area designated for use as the TLOF or within a distance of 1.5 m from the edge. Where the TLOF is a circle the lights shall be:

a) located on straight lines in a pattern which will provide information to pilots on drift displacement; and

b) where a) is not practicable, evenly spaced around the perimeter of the TLOF at the appropriate interval, except that over a sector of 45 degrees the lights shall be spaced at half spacing.

8.8.6 TLOF perimeter lights shall be uniformly spaced at intervals of not more than 3 m for elevated heliports and helidecks and not more than 5 m for surface-level heliports. There shall be a minimum number of four lights on each side including a light at each corner. For a circular TLOF, where lights are installed in accordance with paragraph 8.8.5 b) there shall be a minimum of fourteen lights.

Note — Guidance on this issue is contained in the Heliport Manual (Doc 9261).

8.8.7 The TLOF perimeter lights shall be installed at an elevated heliport or fixed helideck such that the pattern cannot be seen by the pilot from below the elevation of the TLOF.

8.8.8 The TLOF perimeter lights shall be installed at a floating helideck, such that the pattern cannot be seen by the pilot from below the elevation of the TLOF when the helideck is level.

8.8.9 On surface-level heliports, ASPSL or LPs, if provided to identify the TLOF, shall be placed along the marking designating the edge of the TLOF. Where the TLOF is a circle, they shall be located on straight lines circumscribing the area.

8.8.10 On surface-level heliports the minimum number of LPs on a TLOF shall be nine. The total length of

LPs in a pattern shall not be less than 50 per cent of the length of the pattern. There shall be an odd number with a minimum number of three panels on each side of the TLOF including a panel at each corner. LPs shall be uniformly spaced with a distance between adjacent panel ends of not more than 5 m on each side of the TLOF.

8.8.11 When LPs are used on an elevated heliport or helideck to enhance surface texture cues, the panels should not be placed adjacent to the perimeter lights. They should be placed around a touchdown marking where it is provided or coincident with heliport identification marking.

8.8.12 TLOF floodlights shall be located so as to avoid glare to pilots in flight or to personnel working on the area. The arrangement and aiming of floodlights shall be such that shadows are kept to a minimum.

Note — ASPSL and LPs used to designate the touchdown and/or heliport identification marking have been shown to provide enhanced surface texture cues when compared to low-level floodlights. Due to the risk of misalignment, if floodlights are used, there will be a need for them to be checked periodically to ensure they remain within the specifications contained within 8.8.

Characteristics

8.8.13 The TLOF perimeter lights shall be fixed omni-directional lights showing green.

8.8.14 At a surface-level heliport, ASPSL or LPs shall emit green light when used to define the perimeter of the TLOF.

8.8.15 The chromaticity and luminance of colours of LPs should conform to YCAR Part IX.

8.8.16 An LP shall have a minimum width of 6 cm. The panel housing shall be the same colour as the marking it defines.

8.8.17 The perimeter lights should not exceed a height of 25 cm and should be inset when a light extending above the surface could endanger helicopter operations.

8.8.18 When located within the safety area of a heliport or within the obstacle-free sector of a helideck, the TLOF floodlights should not exceed a height of 25 cm.

8.8.19 The LPs shall not extend above the surface by more than 2.5 cm.

8.8.20 The light distribution of the perimeter lights should be as shown in Figure 8-1, Illustration 6.

8.8.21 The light distribution of the LPs should be as shown in Figure 8-1, Illustration 7.

8.8.22 The spectral distribution of TLOF area floodlights shall be such that the surface and obstacle marking can be correctly identified.

8.8.23 The average horizontal illuminance of the floodlighting should be at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:1 measured on the surface of the TLOF.

8.8.24 Lighting used to identify the touchdown marking should comprise a segmented circle of omn-idirectional ASPSL strips showing yellow. The segments should consist of ASPSL strips, and the total length of the ASPSL strips should not be less than 50 per cent of the circumference of the circle.

8.8.25 If utilized, the heliport identification marking lighting should be omni-directional showing green.

8.9 TAXIWAY LIGHTS

Note — The specifications for taxiway centre line lights and taxiway edge lights in YCAR Part IX, are equally applicable to taxiways intended for ground taxiing of helicopters.

8.10 VISUAL AIDS FOR DENOTING OBSTACLES

Note — The specifications for marking and lighting of obstacles included in YCAR Part IX, are equally applicable to heliports and winching areas.

8.11 FLOODLIGHTING OF OBSTACLES

Application

8.11.1 At a heliport intended for use at night, obstacles shall be floodlighted if it is not possible to display obstacle lights on them.

Location

8.11.2 Obstacle floodlights shall be arranged so as to illuminate the entire obstacle and as far as practicable in a manner so as not to dazzle the helicopter pilots.

Characteristics

8.11.3 Obstacle floodlighting should be such as to produce a luminance of at least 10cd/m2.

CHAPTER 9 – EMERGENCY RESPONSE AND HELIPORT OPERATIONS

9.1 PERSONNEL REQUIREMENTS

9.1.1 Fundamental to safe heliport operations is the provision of providing a safe location for helicopter operations. This requires heliport operators to provide staffing, procedures and processes to ensure safety is maintained.

9.1.2 Personnel shall be available to inspect and prepare the heliport for incoming helicopter flights. Personnel should be trained in Emergency Response Procedures and be available to safely respond and operate fire extinguisher equipment and assist with evacuation of persons directly affected in any incident/accident to a place of safety before civil defense arrives.

9.1.3 The primary object is to insure that the landing area facility is clear and safe for helicopter operations and to respond to any emergency situation at a level commensurate with the facilities and equipment provided.

9.1.4 The heliport operator shall ensure that a competent person is appointed to be in control of heliport operations and is present and in control throughout such operations. Procedures are to be established and equipment provided to ensure as far as is reasonably practicable, heliport operations, including landing/take-off, are without risk to helicopters and persons.

9.1.5 Sufficient competent personnel shall be readily available to respond and operate the heliport operations equipment and emergency facilitates at maximum capacity.

9.1.6 To establish the optimum number of heliport personnel for a particular heliport operation at a Certificated Heliport, the heliport operator should carry out a thorough assessment (Task & Resource Analysis – YCAR Part XI), of the level of staff required to facilitate safe operations.

9.1.7 The heliport operator shall provide a Heliport Landing Officer (HLO),

9.1.8 A Heliport Landing Officer (HLO) is a responsible person responsible for ensuring that the physical aspect of the heliport is safe for helicopter operations.

9.1.9 The HLO shall ensure that:

a) All necessary steps are taken to deny unauthorised persons access to the heliport landing area prior to take-off and landing;
b) the heliport is cleared of loose objects, people, vehicles etc.;
c) the heliport is clear of any birds or other wildlife;
d) all necessary personnel are present and at a state of readiness; and
e) passengers are held in a safe zone during the landing or take off of helicopters and are under supervision while on the heliport operational area.

9.1.10 The HLO should wear identification clearly showing he is the responsible person during heliport operations. A tabard should be marked on the front and back with the letters HLO in a reflective material, and should be clearly visible from a distance.

9.1.11 As the HLO is required to be present on the heliport during helicopter arrivals and departures, the heliport operator should appoint ‘Heliport Assistants ' to assist the HLO with the administration of passengers and freight.

9.1.12 For a surface level heliport, the heliport operator should, as a minimum, provide for 3 Heliport Assistants (HPA’s) and for an elevated heliport, the heliport operator should provide for 4 Heliport Assistants (HPA’s).

9.1.13 The provision of a minimum of 3 Heliport Assistants (HPAs) for a surface level heliport and 4 for an elevated heliport, is to provide operational support to helicopter operations and if required provide fire-fighting action and assist in evacuation in the event of any heliport/helicopter fire situation.

Guidance Material: Personnel are required to be available. The term available does not mean that personnel have to be positioned on the elevated heliport itself, but should be positioned to respond quickly to any emergency.

9.1.14 The responsibilities of HPAs should include but not be limited to:

a) Assisting the HLO in the operation of the heliport;
b) Directing passengers to and from the helicopter;
c) Loading and unloading freight and baggage from the helicopter; and
d) Operation of firefighting and equipment under the direction of the HLO and assisting the HLO in checking, operational, firefighting and rescue equipment

9.1.15 During helicopter operations both the HLO and HPAs should be standing by in the immediate location of the helicopter landing area. The HPAs should be dressed in fire-fighting protective clothing to enable them to respond to any incident as quickly as possible.

9.2 TRAINING AND DEVELOPMENT

9.2.1 General

9.2.1.1 If they are to effectively utilise the equipment provided, all personnel assigned as an HLO or HPA duties on the heliport should be fully trained to carry out their duties to ensure competence in role and task.

9.2.1.2 In addition, regular training in the use of all emergency response equipment, helicopter familiarization and rescue tactics and techniques should be carried out and all such training should be formally recorded.

9.2.2 Structured Learning Program (SLP)

9.2.2.1 The aim of Structured Learning Program is to provide heliport personnel with the knowledge, skill and attitudes which will enable them to perform their tasks commensurate with their role within the organization efficiently, safely and competently.

9.2.2.2 All heliport personnel should commence the process of acquiring competence through a Structured Learning Programme (SLP).

9.2.2.3 SLPs will provide Heliport personnel with the initial acquisition of knowledge and skills in a controlled training/development environment. They should also have a development plan to refresh, enhance or attain additional skills to enable them to be fully competent in their current role.

9.2.2.4 The full list of heliport duties and the environment in which they are to be carried out should be considered in detail. To be acceptable, heliport personnel selected for a given operation should be able to clearly demonstrate safety in all operations.

9.2.2.5 The following Table provides guidance on the elements and assessment methods that should be considered for the basis of a Structured Learning Programme for HLO's and HPA's. Not all elements will be applicable to all heliports.

Table 9-1 – Structured Learning Programme

Practical Elements	Practical Elements where the candidate participates in practical elements as an individual or team member.
Technical Elements	Technical Elements where the main focus is for the candidate to understand the technical elements of the function.
Safety Critical Functions	Individual tasks that collectively or individually contribute to safe operations. These critical tasks need to be formally assessed.
Assessment Method	Formal methods and process of making judgments about performance. The means by which evidence of performance is collected and compared with the required competency standard and a judgment about performance is made and also fully recorded.
Practical Assessment	Practical Demonstration of operational skills & use of equipment
Technically Assessment	Technical Written Examination Paper to assess fully the knowledge and understanding of training objectives
Oral Assessment	Oral Technical Spoken Word Assessment to support the technical assessment in the knowledge and understanding of training objectives

Heliports	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
Heliport physical characteristics, to include: 'D value'	Technical Oral		100%	YES
Access and Escape routes	Technical Oral		100%	YES
Heliport visual aids, marking and lights	Technical Oral		100%	YES
Power supplies emergency power back-up systems	Technical Oral		100%	YES
Obstacle-protected surfaces, to include:	Technical Oral		100%	YES
Heliport perimeter safety nets	Technical Oral		100%	YES
Safety Working practices on Heliports	Technical Oral		100%	YES

Heliport equipment and systems	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
Plant and equipment for routine and non-emergency response operations	Technical Oral	20%	80%	YES
Fire Fighting Equipment – guidance on when and where to use various media	Technical Oral	20%	80%	YES
Primary Media requirements: foam type, delivery and testing	Technical Oral	20%	80%	YES
Complimentary media requirements	Technical Oral	20%	80%	YES
Deck Integrated Fire-Fighting System (DIFFS):	Technical Oral	20%	80%	YES
Testing & Inspecting heliport systems Daily – Monthly – Annual Checks.	Technical Oral	20%	80%	YES
Reporting heliport and systems defects	Technical Oral	20%	80%	YES
Heliport Operational Hazards	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
Poor visibility effect on heliport operations	Technical Oral		100%	YES
Rotors running – personnel contact with main or tail rotors	Technical Oral		100%	YES
Excessive wind turbulence.	Technical Oral		100%	YES
Obstacles on heliport	Technical Oral		100%	YES
Noise hazard	Technical Oral		100%	YES
Loose items (baggage, freight, netting etc.) being sucked air intake.	Technical Oral		100%	YES
Passenger Transfer	Technical Oral		100%	YES
Baggage and cargo goods transfer	Technical Oral		100%	YES

Responsibilities during Helicopter Landing and Departure	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
The role of the Heliport Landing Officer	Technical Oral		100%	
The key responsibilities of the HLO	Technical Oral		100%	
How the HLO is identifiable to the helicopter crew.	Technical Oral		100%	
Heliport procedures prior to landing	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
Helicopter type identification.	Technical Oral		100%	
30 minutes before helicopter ETA	Technical Oral		100%	YES
10 minutes before helicopter ETA	Technical Oral		100%	YES
Immediately before landing	Technical Oral		100%	YES
After landing - rotors running turnaround	Technical Oral		100%	YES
After landing - engines shut down and rotors not running	Technical Oral		100%	YES
Helicopter tie-down	Technical Oral		100%	YES
Helicopter start-up.	Technical Oral		100%	YES
Communications with all relevant personnel . heli-admin. personnel, pilot, fire crews, HPAs, loaders and passengers (simulated)	Technical Oral		100%	
HLO and flight crew radio transmissions restricted to essential dialogue.	Technical Oral		100%	
How to ensure that the correct and agreed protocol for “clear to lift” signal to the pilot is understood	Technical Oral		100%	YES
HLO-to-pilot coms protocols are conducted correctly, to include ‘heliport available’ or ‘do not land’ call to pilot.	Technical Oral		100%	YES
Limitation of radio coms and correct use of hand signals	Technical Oral		100%	YES

Monitoring of environmental conditions and change in conditions	Technical Oral		100%	YES
Checking heliport equipment availability.	Practicable Oral	80%	20%	YES
Checking and testing radio equipment	Practicable Oral	80%	20%	YES
HLO to ensure that the heliport surface is free from any contamination, debris or damage after take-off.	Practicable Oral	80%	20%	YES
HLO ensuring that the HPA duties and responsibilities are clearly understood during helicopter landing and departure.	Practicable Oral	80%	20%	YES
Briefing the HPAs prior to heliport operations, to include a 'tool-box-talk'.	Practicable Oral	80%	20%	YES
Ensuring HPAs are in the correct location	Practicable Oral	80%	20%	YES
Ensuring the HPAs are prepared for helicopter emergencies	Practicable Oral	80%	20%	YES
Ensuring and HPAs are equipped with appropriate PPE.	Practicable Oral	80%	20%	YES
Heliport protocols	Assessment Method	Practicabl e Elements	Technical Element	Safety Critical Function
Safe-to-approach, Helicopter agreed with operating company	Practicable Oral	80%	20%	YES
Supervision of Passenger and Cargo Handling	Practicable Oral	80%	20%	YES
Helicopter freight loading limitations and requirements and how these will vary for different types of helicopters.	Practicable Oral	80%	20%	YES
Checking freight manifests (inbound and outbound)	Practicable Oral	80%	20%	YES
Preparing for, and supervising, correct loading and unloading of freight and baggage. (HLOs should not become involved in manual activity, such as carrying bags, at the expense of their supervisory role).	Practicable Oral	80%	20%	YES
Supervising passenger baggage reclamation	Practicable Oral	80%	20%	YES
Supervise passenger handling	Practicable Oral	80%	20%	YES

Checking and interpreting information on passenger manifest and routing plans	Technical Oral		100%	YES
Receiving incoming manifest from pilot and handing over outgoing manifest to pilot.	Technical Oral		100%	YES
Supervising passenger safe access and egress on heliport.	Practicable Oral	80%	20%	YES
Supervising passenger entry into helicopter.	Practicable Oral	80%	20%	YES
Supervising passenger exit from helicopter.	Practicable Oral	80%	20%	YES
Conducting passenger checks, to include: checking that passengers are wearing required PPE for region of operations, ear protection and seat belt harnesses are secure.	Practicable Oral	80%	20%	YES

9.3 EMERGENCY RESPONSE TEAM (HLO AND HPA'S)

9.3.1 General

9.3.1.1 An Emergency Response Team will consist primarily of the HLO and the HPA(s). Additional personnel may be required depending on the heliport operational characteristics and the level of firefighting equipment provided.

9.3.1.2 The principal objective of an Emergency Response Team is to save lives. For this reason, the provision of means for dealing with an accident/incident within the heliport environs provides the greatest opportunity.

9.3.1.3 Helicopter Rescue is defined as actions taken to save persons involved in a helicopter accident/incident, support self-evacuation, and to assist the removal of injured / trapped persons.

9.3.1.4 At all Certificated heliports, a trained Emergency Response Team shall be available to safely respond and operate fire extinguisher equipment to control and extinguish any fire, and assist in any evacuation of persons directly affected in any incident/accident to a place of safety before civil defense arrives.

9.3.1.5 The heliport operator will be required by the CAMA to demonstrate the effectiveness of the Emergency Response

9.3.1.6 The level of Emergency Response that should be provided depends upon the size of helicopter expected to use the heliport.

9.3.1.7 At a Certificated Heliport the heliport operator should assess the medical and fitness suitability of all personnel detailed to respond as part of the Emergency Response Team.

9.3.1.8 Where trained personnel are not available, fixed fire protection system shall be provided (DIFFS/FMS). However, consideration shall be given to support evacuation of the helicopter of those persons on board.

9.3.1.9 If an assessment identifies a more complex operation, or a helicopter of a larger size than used in the assessment subsequently comes into operation, the heliport operator shall seek further guidance from the CAMA.

9.3.2 Emergency Response Team Training

9.3.2.1 An Emergency Response Team should be provided with sufficient training and be competent in the safe and effective use of fire extinguishers, and to apply defined actions to save persons or assist in the removal of persons in a helicopter accident/incident.

9.3.2.2 Equipment and training records should be maintained and retained for future reference.

9.3.2.3 As a guide the training syllabus in Table 9.3 will serve to suit all heliport operations.

9.3.2.4 The training areas listed above cover subjects necessary for initial and on job recurrent competency training with the objective to prepare the Emergency Response Personnel to save life at an aircraft accident / incident with fire.

9.3.2.5 The Certificated heliports should appoint a competent person to establish and oversee all training and development programs.

9.3.2.6 Records of personnel training in rescue, firefighting, first aid and equipment, and facility checks, including maintenance logs, shall be maintained and preserved for 5 years.

9.3.2.7 All personnel who participate in practical activities specified in these regulations should be physically and mentally capable of participating fully. Training provider's should therefore ensure that prior to participating in practical exercises, the candidate deem themselves physically and mentally capable of undertaking all aspects of the training or assessment.

9.3.2.9 Training providers should also make the candidate aware that they should immediately inform their staff if this capability changes – at any time prior to, or during the programme.

9.3.2.10 Candidates should be advised that they are required to declare any current or pre-existing medical conditions which may be exacerbated by, or impair their ability to complete, the training/assessment programme. Should this be the case, the individual may be required to provide an authentic medical certificate issued since any identified medical condition was diagnosed.

9.3.2.11 The training provider should keep a record of the candidate's declaration of fitness in accordance with their document control policy(s) or procedures.

9.3.2.12 The responsibility for declaring any known current or pre-existing medical conditions that could have adverse effects to the individual's state of health while undertaking the training and/or assessment activities lies with the delegate/candidate and/or company sponsoring the candidate.

9.3.2.13 Where doubt exists regarding the fitness of any candidate, the training provider should direct the individual to consult a medical officer familiar with the nature and extent of the training.

9.3.2.14 Those course candidates required to wear breathing apparatus (BA) should maintain the area of the seal free from hair (facial or head). Failure to do so could impair the efficiency of the seal and avoidable safety hazard to the BA wearer.

Table 9-2 – Duration and Frequency of Training

Discipline	Initial Training	Refresher Training
Heliport Landing Officer (HLO)	4 day Structured Learning Programme	3 day Structured Learning Programme every 2 years
	Company On Job Training	Ongoing Competency Assessment
	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment Safety Critical Functions	Ongoing Competency Assessment (SCF)
	Work place Exercises and Drills	Ongoing records to be maintained
Heliport Assistant (HPA)	3 day Structured Learning Programme	2 day Structured Learning Programme every 2 years
	Company On Job Training	Ongoing records to be maintained
	Work place Exercises and Drills	Ongoing records to be maintained
	Competency Assessment Safety Critical Functions	Ongoing records to be maintained
	Work place Exercises and Drills	Ongoing records to be maintained

Note 1 - When developing training programs the above course duration is the minimum expected and has not taken into account Meals and Prayer breaks.
Note 2 - If any candidate fails to complete any course fully they should be not be deemed competent in acquisition, they should complete the course in full before a certificate can be issued

Table 9-3 – Minimum Training Syllabus

First Aid	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
Carryout primary and secondary surveys for life threatening injuries	P/O	80%	20%	
Establish airway	P/O	80%	20%	
Carry out cardiopulmonary resuscitation.	P/O	80%	20%	
Identify and treat internal/external bleeding	P/O	80%	20%	
Identify and treat casualty suffering from shock	P/O	80%	20%	
Identify injuries to skull, spine, chest and extremities	P/O	80%	20%	
Identify internal injuries	P/O	80%	20%	
Place casualties in recovery position	P/O	80%	20%	
Move casualties	P/O	80%	20%	
Treat burns	P/O	80%	20%	
Fire-fighting Equipment & Fire-Fighting Actions	Assessment Method	Practicable Elements	Technical Element	Safety Critical Function
Fire Extinguisher Identification	Practicable Oral	80%	20%	YES
Fire Extinguisher Testing & Inspection	Practicable Oral	80%	20%	
Fire Hose & Branches Identification	Practicable Oral	80%	20%	YES
Fire Hose Reels Identification	Practicable Oral	80%	20%	YES
Fire Monitors Identification	Practicable Oral	80%	20%	YES
Fire Blankets Identification	Practicable Oral	80%	20%	YES
Deck Integrated Fire Suppression Systems - Identification	Practicable Oral	20%	80%	YES
Fire – Emergency Call Points	Practicable Oral	80%	20%	YES
Rescue Equipment Requirements	Practicable Oral	80%	20%	
Rescue Equipment Testing & Inspection	Practicable Oral	80%	20%	YES
Rescue Equipment use	Practicable Oral	80%	20%	YES
Water Fire Extinguisher	Practicable Oral	80%	20%	YES
Foam Fire Extinguisher	Practicable Oral	80%	20%	YES

Dry Powder Fire Extinguisher	Practicable Oral	80%	20%	YES
CO2 Fire Extinguisher	Practicable Oral	80%	20%	YES
Fire-Fighting Practical Exercise 1	Practicable Oral	100%		YES
Fire-Fighting Practical Exercise 2	Practicable Oral	100%		YES
Fire-Fighting Practical Exercise 2	Practicable Oral	100%		YES
Emergency Response Planning (ERP)	**Assessment Method**	**Practicable Elements**	**Technical Element**	**Safety Critical Function**
What is an ERP	Technical Oral		100%	
Elements of an ERP	Technical Oral		100%	
ERP Roles & Responsibilities	Technical Oral		100%	
Types of Emergencies	Technical Oral		100%	
Emergency Orders/Instructions	Technical Oral		100%	
Emergency Exercise Day	Practicable Oral	100%		
Emergency Exercise Night	Practicable Oral	100%		

9.4 RESCUE EQUIPMENT

9.4.1 In some circumstances, lives may be lost if simple ancillary rescue equipment is not readily available.

9.4.2 The provision of at least the following equipment shall be provided at each facility. Sizes of equipment are not detailed but should be appropriate for the types of helicopter expected to use the facility.

9.4.3 A responsible person should be appointed to ensure that the rescue equipment is checked and maintained before the start of flight operations. Rescue equipment should be stored in clearly marked and secure watertight cabinets or chests. An inventory checklist of equipment shall be held inside each equipment cabinet/chest.

9.4.4 Minimum quantity of tools and equipment appropriate to the sizes and types of helicopter shall be provided in accordance with Table 9.4.

Table 9.4 – Tool Box Contents

Contents of a Tool Box		
Axe, aircraft non-wedging	Fire resistant blanket	Ladders/steps access helicopter
Bolt cropper	Flashlights	Set Screwdrivers
Breathing protection	Hacksaw (+ spare blades)	Tin snips
Crowbar	Harness knife (with sheath)	Hook, grab or salving

9.4.5 Minimum quantities of medical equipment resources appropriate to the sizes and types of helicopter should be provided in accordance with Table 9.5. An assessment of the medical equipment to be provided should be undertaken by the heliport operator.

Table 9.5 -- First Aid Box

Contents of the First Aid Box	Numbers
Large Emergency Wound Dressings	3
Extra Large Emergency Wound Dressings	3
Triangular Bandages	3
Scissors – suitable for cutting clothing	1
Eye Dressings	1
Sterile Eyewash (bottle 500 ml)	1
Blankets	

9.4.6 Tools and equipment shall be inspected and tested in accordance with CAMA requirements and records maintained throughout the life of the equipment. (CAAP 35)

9.4.7 All personal shall be given every opportunity to familiarize/train themselves with this equipment. Records of this training shall be retained for each individual.

9.5 PERSONAL PROTECTIVE EQUIPMENT (PPE)

9.5.1 All responding Emergency Response Team personnel shall be provided with appropriate PPE to allow them to carry out their duties in an effective manner.

9.5.2 Sufficient personnel to operate the fire-fighting equipment effectively should be dressed in protective clothing prior to helicopter movements taking place.

9.5.3 For the selection of PPE it shall be suitable and safe for intended use, maintained in a safe condition and inspected to ensure it remains fit for purpose. In addition, equipment should only be used by personnel who have received adequate information, instruction and training.

9.5.4 A responsible person(s) shall be made accountable to ensure that all PPE is installed, stored, used, checked and maintained in accordance with the manufacturer's instructions.

9.5.5 The specifications for PPE should meet one of the standards in Table 9-6.

9.5.6 If breathing apparatus equipment is to be provided the heliport operator should seek further guidance from CAMA Aerodrome Standard Department.

Table 9-6 -- List of PPE Standards

	NFPA	EN	BS
Helmet with Visor	NFPA 1972	EN443	BS3864
Gloves	NFPA 1973	EN659	BS659
Boots (footwear)	NFPA 1974	EN345	BS1870
Tunic and Trousers	NFPA 1971	EN469	BS6249
Flash-Hood	NFPA 1971	EN13911	BS EN13911

Figure 9-1 – Example of correct PPE Storage

9.6 HELIPORT FIRE-FIGHTING CATEGORY

The heliport fire-fighting category to be provided at heliport is based on the dimensions of the longest helicopters planned to use the heliport (refer to Table 9.7 below), irrespective of their frequency of operations.

Table 9.7 – Fire Fighting Category

Category	Helicopter length including tail boom and rotors
H1:	A helicopter with an overall length up to but not including 15 meters
H2:	A helicopter with an overall length from 15 meters up to but not including 24 meters
H3:	A helicopter with an overall length from 24 meters up to but not including 35 meters

Note: The helicopter overall length is measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane or helicopter structure.

9.7 EXTINGUISHING AGENTS AND EQUIPMENT

9.7.1 Surface Level Heliport – Certificated and Hospital Heliports

9.7.1.1 Principal fire-fighting agents: a helicopter accident/incident requires very quick fire suppression therefore foam meeting performance level B, having quicker fire suppression capabilities, is required.

9.7.1.2 The level of firefighting provided at a surface level Certificated or Hospital heliport shall be appropriate to the Heliport Fire Fighting Category determined using the Table 9.7 above, except that, where the number of movements of the helicopter in the highest category using the heliport is less than 100 in the busiest three months, the level of protection provided shall be not less than one category below the determined category. This figure is based on 1 movement per day over a 3-month period. A movement is either a takeoff or landing.

9.7.1.3 The minimum quantities of extinguishing agents for surface level Certificated and hospital heliports shall be as specified in Table 9-8.

Table 9.8 – Minimum Quantities of Extinguishing Agents Certificated and Hospital Heliports

Surface Level Heliports – Certificated and Hospital Heliports						
Category	Water Litres	Discharge Rate Foam Solution (Lpm)	Foam meeting Performance Level B AFFF		Complementary Agents	
			At 3%	At 6%	Dry Chemical Powder	CO2
H1	500	250	15L	30L	23 kg	45 kg
Minimum amount of foam solution 3% Foam = 515 L Minimum amount of foam solution 6% Foam = 530 L						
H2	1000	500	30L	60L	45 kg	90 kg
Minimum amount of foam solution 3% Foam = 1030L Minimum amount of foam solution 6% Foam = 1060L						
H3	1600	800	48L	96L	90 kg	180 kg
Minimum amount of foam solution 3% Foam = 1648L Minimum amount of foam solution 6% Foam = 1696L						

Note 1: At a surface-level heliport it is permissible to replace all or part of the amount of water for foam production by complementary agents. Contact the CAMA Aerodrome – *RFFS Inspector for further guidance.*

Note 2: If firefighting hand lines are connected directly into a water hydrant system, an assessment of the hydrant systems pressure needs to be undertaken to ensure the operator is not placed in any danger due to excessive pressure.

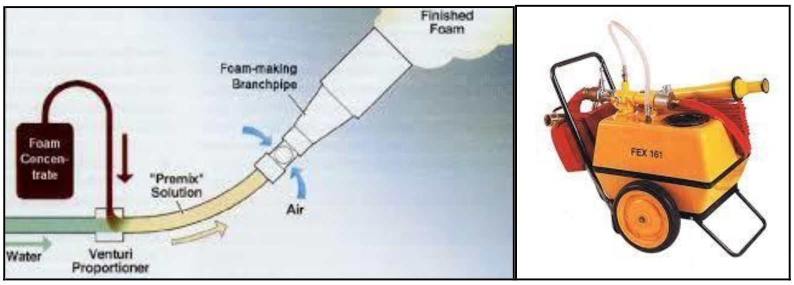


Figure 9-2 – Foam Pickup Tube and Foam Trolley

9.7.2 Surface Level Heliport – Landing Area Acceptance excluding Hospital Heliports

9.7.2.1 The minimum quantities of extinguishing agent provided at a surface level Landing Area Acceptance heliport (excluding Hospital Heliports) shall be the as specified in Table 9.9.

9.7.3 Equipment

9.7.3.1 Various options can be determined from suppliers to provide fire extinguishers specifications to meet requirements of Tables 9.8 and 9.9. Examples of some of the various options are shown in Figure 9-3.

Figure 9-3 – Fire Extinguisher Options

Table 9.9 – Minimum Quantities of Extinguishing Agents LAA

Surface Level Landing Area Acceptance Heliports excluding Hospital Heliports						
	Water Litres	Discharge Rate Foam Solution (Lpm)	Foam meeting Performance Level B AFFF		Complementary Agents	
			At 3%	At 6%	Dry Chemical Powder	CO2
Less than 30 movements in busiest 3 months	250	65	8L	15L	90 kg	45 kg
Minimum amount of foam solution 3% Foam = 258L Minimum amount of foam solution 6% Foam = 265L						
30 or more movements in busiest 3 months	500	250	15L	30L	23 kg	45 kg
Minimum amount of foam solution 3% Foam = 515 L Minimum amount of foam solution 6% Foam = 530 L						

Note 1: At a surface-level heliport it is permissible to replace all or part of the amount of water for foam production by complementary agents. Contact the CAMA Aerodrome – *RFFS Inspector for further guidance.*

Note 2: The above minimum requirements will need to be agreed with the CAMA before the issue of any acceptance.

9.7.3.2 If required, a vehicle that is mechanically reliable, fit for purpose and capable of accommodating Emergency Response personnel and equipment should be provided.

Note: It may be advisable to place fire-fighting extinguishers, a tool box and first aid equipment in a vehicle or on a small trailer and during operations connect the trailer to a vehicle for immediate response to the incident site.

9.7.3.3 Effective communications equipment should be provided and should have a range that will ensure effectiveness within the expected response area and able to summon external emergency services (Civil Defense).

9.7.3.4 Some fire extinguishers should be located close to any helicopter parking and engine start location and clearly identified as a Designated Fire Point.

Figure 9-4 – Designated Fire Point

9.7.3.5 A Designated Fire Point provides clearly identified location of extinguishers for immediate access in

event of an incident/accident.

9.7.3.6 At the start of each initial helicopter operation, the heliport operator should ensure that the appropriate extinguishers are inspected, in position and available for immediate use. All fire- fighting equipment should be tested and inspected at a frequency determined by the manufacture. CAMA Civil Aviation Advisory Publication (CAAP) 35 - Inspection and Testing of Fire Service Equipment, provides further guidance.

9.7.3.7 At heliports where there is more than 1 FATO and simultaneous operations occur, the location of the fire-fighting equipment needs to be assessed so that response times can be achieved at all FATO's. Consideration shall be given in providing fire-fighting equipment adjacent to all FATO's to the quantities defined in these regulations.

9.7.4 Elevated Heliport

9.7.4.1 A foam fire extinguishing system with either a fixed discharge outlet(s) (fixed monitors) or hose line(s) shall be designed and installed to protect the heliport.

9.7.4.2 If monitors are the primary method of delivering foam, at least two (2) monitors shall be provided, each having the capability of producing foam at the required discharge rate. The actual number provided and their locations around the heliport should be such as to ensure the application of foam to any part of the heliport under any weather condition and to minimize the possibility of one or more monitors being impaired by a helicopter accident.

9.7.4.3 Delivery of firefighting foam to the elevated heliport area at the appropriate application rate should be achieved in the quickest possible time. The recommendation is that a delay of 15/30 seconds, measured from the time the system is activated to actual production at the required application rate, should be the objective. The operational objective should ensure that the system is able to bring under control a fire associated with a crashed helicopter within 60/30 seconds, measured from the time the system is producing foam at the required application rate for the range of weather conditions prevalent.

9.7.4.4 Foam making equipment should be located so as to ensure the uniform application of foam to any part of the landing area irrespective of wind strength/direction or accident location. In this respect particular consideration should be given to the loss of foam monitor i.e. remaining monitor(s) should be capable of delivering finished foam to the landing area at or above the minimum application rate.

9.7.4.5 At an elevated heliport, not all fires are capable of being accessed by monitors and on some occasions the use of monitors alone may endanger passengers. Therefore, in addition to fixed foam systems, there should be the ability to deploy at least two deliveries with hand controlled foam branch pipes for the application of aspirated foam at a minimum rate of 250 Lpm through each hose line.

9.7.4.6 A single hose line, capable of delivering aspirated foam at a minimum rate of 250 Lpm may be acceptable where it is demonstrated that the hose line is of sufficient length and the delivery system of sufficient operating pressure, to ensure the uniform application of foam/water to any part of the landing area irrespective of wind strength or direction.

9.7.4.7 The hose line(s) provided should be capable of being fitted with a branch pipe capable of applying water in the form of a jet or spray pattern for cooling, or for specific firefighting tactics.

Note: A fire is deemed "under control" at the point when it becomes possible for the occupants of the helicopter to be effectively rescued by trained firefighters.

9.7.4.8 Consideration should be given to the effects of the weather on static equipment. All equipment forming part of the facility should be designed to withstand protracted exposure to the elements or be protected from them. Where protection is the chosen option, it should not prevent the

equipment being brought into use quickly and effectively.

Figure 9-5 – Hose Line Examples

9.7.4.9 The minimum capacity of the foam production system will depend on the D-valve of the heliport, the foam application rate, discharge rates of installed equipment and the expected durations of application. It is important to ensure that the capacity of the main heliport pump is sufficient to guarantee that finished foam can be applied at the appropriate induction ration and application rate, and for the minimum duration to the whole landing area when all heliport monitors are being discharged simultaneously.

9.7.4.10 Foam components shall be installed in an area of the heliport and shall not penetrate safety area or the approach take-off surfaces.

Table 9-10 – Minimum Quantities of Extinguishing Agents – Elevated Heliports

Elevated Heliports – Certificated and LAA						
Category	Water Litres	Discharge Rate Foam Solution (Lpm)	Foam meeting Performance Level B AFFF		Complementary Agents	
			At 3%	At 6%	Dry Chemical Powder	CO2
H1	2500	250	75L	150L	45 kg	90 kg
Minimum amount of foam solution 3% Foam = 2575L Minimum amount of foam solution 6% Foam = 2650L						
H2	5000	500	150L	300L	45 kg	90 kg
Minimum amount of foam solution 3% Foam = 5150L Minimum amount of foam solution 6% Foam = 5300L						
H3	8000	800	240L	480	45 kg	90 kg
Minimum amount of foam solution 3% Foam = 8240L Minimum amount of foam solution 6% Foam = 8480L						

Note 1: Contact the CAMA RFFS Inspector for further guidance.

Note 2: Sufficient reserve foam stocks to allow for replenishment as a result of operations of the system during an incident or following training or testing will also need to be held.

9.7.5 Deck Integrated Fire Fighting System (DIFFS)

9.7.5.1 An alternative is to consider a Deck Integrated Fire Fighting System (DIFFS). These systems consist of a series of 'pop-up' nozzles designed to provide an effective spray distribution of foam to the whole of the landing area. DIFFS systems should be capable of supplying performance level B foam

solution to bring under control a fire associated with a crashed helicopter within the time constraints as stated and at an application rate and for a duration which at least meets the minimum requirements.

9.7.5.2 The performance specification for DIFFS needs to consider the likelihood that one or more of the pop-up nozzles may be rendered ineffective by the impact of the helicopter on the heliport (design pattern (spacing) of the nozzle arrangement and type of helicopters operating at the heliport). A DIFFS supplier should ensure that the designed system is able to achieve the requirements of Tables 9.8, 9.9 or 9.10 for the purpose of controlling the helideck fire within 30 seconds from the time the system is producing foam.

An example of a Deck Integrated Fire Fighting system / Pop-Up (DIFFS) System for Heliports

Figure 9-6 – Diff System for Heliports

9.7.5.3 DIFFS fitted at manned heliports may, following an operational assessment and acceptance from the CAMA, result in a reduction in Heliport Fire Team staffing levels. If lifesaving opportunities are to be maximized it is essential that all equipment should be ready for immediate use on, or in the immediate vicinity of the heliport operational area whenever helicopter operations are being conducted.

9.7.5.4 All equipment should be located at points having immediate access to the helicopter landing area. The location and storage of facilities should be clearly identified. Where trained personnel are not available, a fixed fire protection system shall be provided.

9.7.5.5 The foam components shall be installed in an area of the heliport and shall not penetrate the approach take-off surface, transitional surfaces, and safety area.

9.7.5.6 At facilities where there is more than one elevated FATO, the supply of foam available shall be sufficient to cover an incident on at least one of the FATO's.

9.7.5.7 Particular problems arise from the operation of helicopters at elevated heliports that require special attention. The average elevated heliport is a confined and restricted space which will impose restrictions on foam monitor positioning and general firefighting tactics. It is feasible that an accident could result in a fuel spill and a fire situation could quickly cut off or reduce the already limited route of escape to a place of safety for the occupants of the helicopter. In addition, the accident or fire may involve Emergency Response personnel facilities located adjacent to the elevated heliport.

9.7.5.8 Therefore, the requirement for the extinguishing agents at elevated heliports is based on a fire fighting action which may be required to last much longer than at surface level heliports. In addition, at an elevated heliport the Emergency Response personnel should be available on or in the immediate vicinity of the heliport whilst helicopter movements are taking place.

Note: Refer to 9.9 for information on the response time guidelines.

9.7.5.9 For Certificated elevated heliports with fire protection, a review in liaison with the CAMA can be

undertaken should DIFFS or Fixed Monitor System be provided.

9.7.5.10 All firefighting monitors, fixed monitors' systems or DIFFS shall be able to be operated manually from two (2) different locations clear of the landing areas and easily accessible.

9.7.5.11 Not all helicopter fires can be extinguished by monitors/DIFF systems, therefore, the heliport operator needs to consider the need to provide extinguishing equipment for helicopter engine, rotor head fires and internal electrical fires, etc.

9.7.6 Testing and Inspection of equipment

All firefighting equipment should be subject to visual inspection by a competent person and containers pressure tested in accordance with manufacturer's recommendations.

9.7.7 Use and Maintenance of Foam Equipment:

9.7.7.1 Foam concentrates should not be mixed and heliport operators should verify requirements with the Material Safety Data Sheet (MSDS). It is important to ensure that foam containers and tanks are correctly labeled and records of compliance are held.

9.7.7.2 Induction equipment ensures that water and foam concentrates is mixed in the correct proportions. Settings of adjustable inductors, if installed, should correspond with the strength of concentration used.

9.7.7.3 All parts of the foam productions system, including finished foam, should be tested by a competent person on commissioning and annually thereafter.

9.8 FIRE PROTECTION

9.8.1 The requirements in respect of fire protection for a surface level certificated heliport or for an elevated structure are the following:

a) above ground flammable liquid storage tanks, compressed gas storage tanks, and liquefied gas storage tanks shall be located at least 30m from the edge of the FATO;

b) the heliport shall have at least one access point that provides rapid access to fire-fighting personnel;

c) the heliport shall be sloped so that drainage flows away from access points and passenger holding areas; and

d) no smoking signs shall be erected at access and egress points of the heliport.

9.8.2 The requirements in respect of fire protection for an elevated heliport are the following:

a) main structural support beams that could be exposed to a fuel spill shall have a fire-resistance rating acceptable to Yemen Building Control Authorities.

b) the FATO/TLOF shall be pitched to provide drainage that flows away from passenger holding areas, access points, stairways, elevator shafts, ramps, hatches, and other openings not designed to collect drainage;

c) the FATO/TLOF surface shall be constructed of non-combustible, non-porous materials;

d) at least two means of egress from the FATO/TLOF shall be provided;

e) the FATO/TLOF shall have at least two access points that provide rapid access to fire-fighting personnel;

f) where buildings are provided with a fire alarm system, a manual pull station shall be provided near each designated means of egress from the roof;

g) no smoking signs shall be erected at access and egress points of the heliport; and

h) flammable liquids, compressed gas and liquefied gas shall not be permitted within the FATO/TLOF and Safety Area.

9.9 PROPERTIES OF FOAM

9.9.1 General

There are numerous types of foam available for dealing with a range of heliport fire scenarios. Below are two examples that could be used for helicopter firefighting.

a) Film forming fluoro protein (FFFP)

b) Aqueous film forming foam (AFFF)

9.9.2 Film Forming Fluoroprotein (FFFP)

9.9.2.1 FFFP foam concentrates are based on Fluoroprotein (FP) foam concentrates with the addition of film-forming fluorinated surface active agents. Under certain conditions, this combination of chemicals can, as a well as producing a foam blanket, allow a very thin vapour sealing film of foam solution to spread over the surface of some liquid hydrocarbons.

9.9.2.2 FFFP foam concentrates are usually available for use at 3% or 6% concentrations. They are primarily intended for the production of low expansion foam although they can also be used non-aspirated.

9.9.3 Aqueous film forming foam (AFFF)

9.9.3.1 AFFF foam concentrates are solutions of fluorocarbon surface active agents and synthetic foaming agents. Under certain conditions, this combination of chemicals can, as well as producing a foam blanket, allow a very thin vapour sealing film of foam solution to spread over the surface of some liquid hydrocarbons.

9.9.3.2 AFFF foam concentrates are usually available for use at 3% or 6% concentrations and versions are available for use with fresh and seawater. They are primarily intended for the production of low expansion foams although they can also be used non-aspirated.

9.9.4 Foam Characteristics (Advantages & Disadvantages)

9.9.4.1 There are many companies manufacturing each of the different foam concentrate types. The quality of foam concentrates produced will vary from manufacture to manufacture and often different quality versions of the same foam type will be available for the same manufacture. Consequently, the following information presents the typical characteristics of foams produced from each of the foam types.

9.9.4.2 FFFPs were designed to exhibit a combination of AFFF and FFFP characteristics. The intention was produce a foam concentrate that had the knockdown and extinction performance of AFFF combined with the good burnback resistance characteristics of fluoroprotein. However, fire tests have indicated that although low expansion FFFP gives similar firefighting and burnback performance is greatly inferior to that achieved by fluoroprotein and is generally not much better than AFFF.

9.9.4.3 Low expansion FFFP finished foams tend to have the following useful characteristics:

a) Usable foam can be produced with minimal working, manufacturers suggest that they can be used aspirated or non-aspirated

b) Flow quicker than FFFP foams over liquid fuel surfaces, quickly reseal breaks in the foam blanket and flow around obstructions. This often results in very quick fire knockdown and extinction. On some liquid hydrocarbon fuels, these characteristics may be enhanced by the film-forming capabilities of FFFP

c) Moderate resistance to fuel contamination

9.9.4.5 And the following disadvantages:

a) Poor at sealing against hot objects
a) Poor foam blanket stability and very quick foam drainage times
b) Poor burnback resistance
c) Poor vapour suppression
d) Unsuitable for use with water-miscible fuels (i.e. Alcohols)

9.9.5 Aqueous film forming foam (AFFF)

9.9.5.1 Low expansion AFFF foams tend to have the following useful characteristics;

9.9.5.2 Usable foam can be produced with minimal working, manufacturers suggest that they can be used aspirated or non-aspirated

9.9.5.3 AFFF flows quicker than FFFP foams over liquid fuel surfaces, quickly reseals breaks in the foam blanket and flows around obstructions. This often results in very quick fire knockdown and extinction. On some liquid hydrocarbon fuels, these characteristics may be enhanced by the film- forming capabilities of AFFF with moderate resistance to fuel contamination

9.9.5.4 AFFF has the following disadvantages;

a) Poor at sealing against hot objects
b) Poor foam blanket stability and very quick foam drainage times
c) Poor burnback resistance
d) Poor vapour suppression
e) Unsuitable for use with water miscible fuels (i.e. alcohol)

9.9.6 Dry Powder

9.9.6.1 As with most extinguishing agents, there are a number of different types of Dry Powder available.

9.9.6.2 Some are for use against specific risks, some that are more general purpose and some that have improved performance characteristics.

9.9.6.3 The main types used by the Airport Fire Service include:

a) Mixed Powders (Monnex/Purple K)
b) ‘D’ Class Powders
c) General Purpose Powder

9.9.6.4 Dry powders, if exposed to the atmospheres, will absorb moisture from the air. This can lead to the powder caking and losing its ability to flow correctly. It is therefore, important to service extinguishers and store supplies of powder in clean, dry surroundings.

9.9.6.5 As well as absorbing moisture, dry powder is capable of absorbing heat. A cloud of fine dry powder particles will offer some protection to surrounding structures and the operator of the extinguisher from the damaging effects of heat radiating from the fire. It should be borne in mind that the cloud that is generated when powder is discharged will reduce the visibility of the operator and, because it is made up of find powder particles, may cause breathing problems.

9.9.7 Extinguishing Properties

When dry powder is correctly applied to a fire it attacks and extinguishes it in two ways;

a) Firstly, by generating a fine powder cloud over the surface of the fire. This excludes the oxygen and so has a smothering effect on the fire.

b) Secondly, dry powder works by interfering with the chemical reaction that causes fuel vapour to combine with oxygen. This in turn stops the combustion process. The combination of these two process leads to very quick knockdown of flames.

Advantages and Disadvantages

To help firefighters make informed judgments about the selection of the best extinguishing media for specific operational circumstances, an understanding of the advantages and disadvantages of each is essential. In respect of dry powder they are;

Advantages

a) Quick knockdown

Dry Powder, when correctly applied and at the required application rate, has the ability to ensure and initial quick knockdown of the fire.

b) Non Conductor of Electricity

Dry Powder can safely be used at incidents where it is known or suspected that 'live' electrical equipment is present

c) Good on Running Fuel Fires

Owing to its fire extinguishing action, dry powder when used in conjunction with water/foam sprays, can be extremely effective when used on running fuel fires.

d) Creates No Thermal Shock

Because the application of dry powder onto hot metal does not cause thermal shock, it is particularly useful for dealing with fires involving undercarriage assemblies.

e) Good Heat Shield

The discharge of dry powder creates an effective shield against radiated heat. In cases where large quantities of powder are discharged, this has the potential to shield surrounding structures and personnel from the damaging effects of the fire.

Disadvantages

a) Poor Post Fire Security

Due to the smothering and chemical interference effect of dry powder, it will only remain effective whilst it is present in the atmosphere above the fuel. Because it is a cloud of fine powder, particles of it can easily be dispersed by the wind, giving a very real danger of rapid re-ignition of fuel.

b) Can Cause Breathing Problems

If dry powder is inhaled it can irritate the respiratory organs. Whilst short term exposure is not considered to be harmful, repeated inhalation should be avoided.

c) Visibility Problems

The application of dry powder and generation of a dense powder cloud will dramatically reduce the visibility of the firefighter so they may not be able to use vision to judge the effectiveness of the powder on the fire.

d) Leaves a Residue

Dry powder is a very messy extinguishing agent that will leave behind a residue that is corrosive to certain materials and because it is a find powder it can also be abrasive. Thoughtless use may lead to the powder causing more damage than the fire itself.

e) Clogs Valves

Poor maintenance or maintenance in damp conditions, can lead to the powder caking. This in turn, can lead to the failure of equipment at a crucial time through clogged valves.

f) Vulnerable to Packing Down

Failure of equipment can also result from the packing down of the powder inside an extinguisher body. This is a particular problem for vehicle mounted equipment because the vehicle vibration will cause the powder to compress under its own weight. Again, sound, regular maintenance routines are essential to prevent failure of equipment at a crucial time.

Application Areas

Dry powder has proved to be very effective in the following areas:

a) Fuel Spillage Fires

Quick knockdown capability makes dry powder very effective when applied correctly to fuel spillage fires. Lack of Post Fire Security means that it must be backed up with an aspirated foam blanket.

b) Running Fuel Fires

Where running fuel is ignited, quick intervention with dry powder either on its own or as part of a dual agent attack, can arrest the spread of fire. The application of media must begin at the lowest level and work upwards. Action must also be taken to stem the flow of fuel and cover pooled fuel with an aspirated foam blanket.

c) Running Fuel Fires

Where running fuel is ignited, quick intervention with dry powder either on its own or as part of a dual agent attack, can arrest the spread of fire. The application of media must begin at the lowest level and work upwards. Action must also be taken to stem the flow or fuel and cover pooled fuel with an aspirated foam blanket.

d) Undercarriage Fires

Because dry powder has very little cooling effect it can be effectively used to deal with undercarriage fires.

e) Engine Fires

Although dry Powder would not normally be the first choice media for dealing with engine fires of a minor nature they should be considered for use on escalating fires where lack of prompt action could result in the involvement of the whole aircraft.

Hazards

Firefighters who use dry powder at incidents or during training sessions, or who are involved with servicing or replenishing equipment, should be aware of the hazards or potential hazards. The main hazards presented by dry powders include:

a) A danger of rapid re-ignition of fuel

A danger of re-ignition exists because dry powder extinguishes a fire by partly smothering and partly interfering with the chemical process of combustion. To overcome this, the application of powder should always be followed by the application of an aspirated foam blanket.

b) Reacts with metal fires

Other than the special ‘D’ Class powders, dry powder will react with fires where certain combustible metals such as Magnesium are involved. The reaction can range from the limited emission of bright sparks to a violent eruption of spitting molten metal. You should be aware of the risk, particularly when dealing with fires involving undercarriage areas and ensure that

you are wearing full PPE with visor down.

c) Affect Visibility

Due to a rapidly expanding dense cloud of powder being generated, the visibility of the firefighter can be quickly obscured. This could lead to the firefighter believing that the fire is fully extinguished when in fact small pockets of flame still exist. This could lead to sudden re-ignition of fuel when the cloud has partially dispersed.

d) Can Cause Breathing Problems

Although most powders are classed as practically non harmful, there are some that are moderately toxic. Firefighters should avoid inhalation and ingestion of powder by remaining upwind during application or by wearing breathing apparatus. When refilling extinguishers, it should be done in a clean, dry, well-ventilated area and appropriate respiratory protective equipment should be worn.

e) Can Be Toxic If Ingested

As previously mentioned, some dry powders contain chemicals that can be moderately toxic if ingested. The dry powders used at individual heliports will have been the subject of a Risk Assessment and a handling procedure developed to eliminate or minimize the risk to firefighters. Individuals should be aware of, and observe this procedure along with good hygiene and housekeeping practices.

f) Manual Handling Risk

Due to the weight and size of some dry powder vessels and delivery containers, there is a risk of injury to firefighters from lifting and transporting such items. Again, a Risk Assessment will have been conducted locally and a procedure developed to protect individuals from injury.

Note:- Potassium Bicarbonate based dry-chemical fire suppression agents is used in some dry powder fire extinguishers. It is the most effective dry chemical in fighting class B (flammable liquid) fires, and can be used against some energized electrical equipment fires (class C fires). It is at least 5 times more effective against class B fires than carbon dioxide and has about twice the effectiveness of Sodium Bicarbonate based powders. This is due to the larger size of the potassium ion. This type of Dry Chemical Powder (DCP) works by directly inhibiting the chemical chain reaction in the combustion zone of flammable liquid fires which forms one of the four sides of the fire tetrahedron (Heat + Oxygen + Fuel + Chemical Chain Reaction = Fire) This chemical reaction produces 'free radicals' which attach themselves to the surface of the powder particles introduced into the combustion zone.

9.10 RESPONSE TIME

9.10.1 Response time is considered to be the time between the initial call to the Emergency Response personnel and the time when the Emergency Response personnel is in position to apply foam at a rate of at least 50% of the discharge rate specified in these regulations.

9.10.2 The operational objective of the Emergency Response personnel shall be to achieve a response time not exceeding two minutes in optimum conditions of visibility and surface conditions. (Optimum visibility and surface conditions are defined as daytime, good visibility, no precipitation with normal response routes free of objects or other helicopters and surface contamination.)

9.10.3 The response area is considered as Final Approach and Take Off area(s) (FATO), designated aiming points and Touchdown and Lift-Off area(s) (TLOF), including all areas used for the manoeuvring, rejected Take-Off, taxiing, air taxiing and parking of helicopters.

9.11 EMERGENCY RESPONSE PLANNING

Introductory Note — Heliport emergency planning is the process of preparing a heliport to cope with an emergency that takes place at the heliport or in its vicinity. Examples of emergencies include crashes on or off the heliport, medical emergencies, dangerous goods occurrences, fires and natural disasters.

The purpose of heliport emergency planning is to minimise the impact of an emergency by saving lives and maintaining helicopter operations.

The heliport emergency plan (ERP) sets out the procedures for coordinating the response of heliport agencies or services (air traffic services unit, firefighting services, heliport administration, helicopter operators and security services) and the response of agencies in the surrounding community (civil defence, police, medical and ambulance services, hospitals, military, and harbor control or coast guard) that could be of assistance in responding to the emergency.

9.11.1 A heliport emergency plan shall be established commensurate with the helicopter operations and other activities conducted at the heliport.

9.11.2 The heliport emergency plan shall identify agencies which could be of assistance in responding to an emergency at the heliport or in its vicinity.

9.11.3 The heliport emergency plan should provide for the coordination of the actions to be taken in the event of an emergency occurring at a heliport or in its vicinity.

9.11.4 Where an approach/departure path at a heliport is located over water, the plan should identify which agency is responsible for coordinating rescue in event of a helicopter ditching, and indicate how to contact that agency.

9.11.5 The heliport emergency plan should include, as a minimum, the following information:

a) the types of emergencies planned for;
b) how to initiate the plan for each emergency specified;
c) the name of agencies on and off the heliport to contact for each type of emergency with telephone numbers or other contact information;
d) the role of each agency for each type of emergency;
e) a list of pertinent on-heliport services available with telephone numbers or other contact information; and
f) copies of any written agreements with other agencies for mutual aid and the provision of emergency services.

9.11.6 The heliport emergency plan should be reviewed and the information updated at least yearly or, if deemed necessary, after an actual emergency, so as to correct any deficiency found during the emergency.

9.11.7 A test of the emergency plan should be carried out at least once every three years.

9.11.8 The following sections provide sample structures for developing procedures for a variety of heliport firefighting, evacuation and rescue scenarios etc. that should be included in the ERP.

9.11.9 The procedures should be written to encourage the full use of available firefighting appliances, rescue equipment and resources to best advantage. The ERP should include all elements for both on and offshore co-ordination and support.

Crash on Heliport

In the event a crash on the helideck, the HLO should:

a) Raise the alarm – call civil defense

b) Direct first response firefighting activities.
c) Contact the operator at the earliest opportunity
d) Establish and maintain contact with the civil defense throughout any subsequent firefighting and rescue operations.
e) Report incident to the CAMA

Crash on Heliport, Major Spillage with No Fire

In the event of a crash on the heliport with a major spillage but no fire, the HLO should:

a) Raise the alarm. Call civil defense
b) Direct Fire Team to lay a foam blanket around and under the helicopter
c) Direct/manage the evacuation of the helicopter.
d) Establish and maintain contact with the civil defense
e) Contact the operator at the earliest opportunity.
f) Ensure fire team safety and support is provided.
g) Report incident to the CAMA

Emergency Evacuation by Helicopter

In the event of evacuation by helicopter, the HLO should:

a) Prepare the heliport to receive incoming aircraft
b) Report incident to the CAMA.

Helicopter Incident on Landing

In the event of a helicopter incident on landing, the HLO should:

a) Hold the helicopter on the heliport and advise the pilot of his observations.
b) Inform the helicopter operator of the nature of the incident.
c) The helicopter operator and pilot will decide if the flight is to proceed.
d) Report incident to the CAMA.

Dangerous Goods Spill/Release

In the event a Dangerous Goods Spill/Release the HLO should:

a) Raise the alarm call civil defense
b) Evacuate the heliport and surrounding area, taking into account wind direction and surface slope.
c) Establish and maintain contact with the radio room, Central Control Room (CCR) or incident room throughout.
d) Seek further information on the hazardous substance
e) Ensure limited contamination.
f) Ensure area is fully cleaned once the spillage/release is contained
g) Ensure all affected personnel are not contaminated, decontamination may be required.
h) Ensure all affected equipment remains/is fit for purpose
i) Report the incident to the CAMA

9.12 EXAMPLE OF EMERGENCY RESPONSE CALL OUT INSTRUCTION

SAMPLE

EMERGENCY CALL OUT INSTRUCTION

IN THE EVENT OF AN **HELICOPTER CRASH / ENGINE FIRE / ACCIDENT**
THE FOLLOWING ACTION IS TO BE UNDERTAKEN IMMEDIATELY

CALL IMMEDIATELY:-

CIVIL DEFENCE FIRE SERVICE	179
AMBULANCE SERVICE	195
POLICE	199
HELIPORT OPERATOR/OWNER	

PROVIDE THE FOLLOWING INFORMATION

NAME OF THE HELIPORT	
LOCATION	
LAND MARKS	
TYPE OF INCIDENT (HELICOPTER CRASH / FIRE)	
NUMBER OF PASSENGERS / PERSONS AFFECTED	

CHAPTER 10 – FUEL MANAGEMENT

10.1 INTRODUCTION

The heliport operator should ensure, either by itself or through formal arrangements with third parties, that organisations involved in storing and dispensing of fuel to aircraft implement procedures to:

a) maintain the installations and equipment for storing and dispensing the fuel in such condition so as not to render unfit for use in aircraft;

b) mark such installations and equipment in a manner appropriate to the grade of the fuel;

c) take fuel samples at appropriate stages during the storing and dispensing of fuel to aircraft, and maintain records of such samples; and

d) use adequately qualified and trained staff in storing, dispensing and otherwise handling fuel on the heliport.

10.2 HELICOPTER REFUELLING

10.2.1 For information regarding refuelling/defuelling with passengers embarking, on board or disembarking, then reference shall be made to YCAR Part IV OPS3.

10.2.2 Operators and fuel companies should be responsible for the observance of safety procedures during the fuelling of aircraft. All personnel working on aprons should, however, be made aware of the major safety precautions and should report any apparent breach to the person in charge of the fuelling operations, (the fuelling overseer). The main points to be observed are:

a) no smoking or naked lights within the fuelling zone;

b) auxiliary power units and ground power units should not be started during the fuelling operation;

c) a clear exit path maintained to and from the aircraft to allow the quick removal of fuelling equipment and persons in an emergency;

d) aircraft and supply sources shall be correctly bonded and the correct earthing procedures employed;

e) fire extinguishers of a suitable type should be readily available; and

f) fuel spillage should be immediately brought to the attention of the fuelling overseer. Detailed instructions should be laid down for dealing with fuel spillage.

10.2.3 When necessary, aircraft fuelling companies should be given instructions with respect to the acceptable positioning of vehicles relative to the aircraft to ensure that taxing clearance limits are not infringed.

10.3 PROCEDURES FOR SAFE HANDLING AND STORAGE OF FUEL

10.3.1 The heliport operator should provide quality control and maintenance procedures for preventing the deterioration or contamination of fuel stored in the fuel installation, procedures for the safe delivery into an aircraft of fuel fit for use, and procedures for the retention of records.

10.3.2 Fuel management procedures should include, but not be limited to, the following:

a) fuel reception, storage, and quality maintenance;
b) the assessment of fuel quality;
c) the safe delivery into an aircraft of fuel fit for the purpose;
d) the taking and storing of fuel samples;
e) the onward distribution of fuel;
f) 'Incident' prevention;
g) 'Incident' management;
h) preventing or minimising electrostatic discharge during the handling of fuel;
i) handling fuel during extremes of weather e.g. electric storms in the heliport vicinity or in high ambient temperatures;
j) the actions to be taken should fuel be found to be contaminated; and
k) regular and periodic maintenance and cleaning of fuel installations and equipment.

10.4 RISK EVALUATION: FIRE RISK

10.4.1 The heliport operator should consider the risks associated with those stages of the fuel handling and distribution process that relate to personnel for example, passengers and crew, apron staff, and fuelling operatives; to fuel installations and fuel equipment; and in so doing should:

a) identify the key responsibilities of individuals involved in the management and distribution of fuel;
b) ensure that all personnel involved in the processes of receiving, storing, and dispensing of fuel are suitably trained or experienced to carry out the associated tasks; and
c) perform periodic audits of all fuel installations on the heliport to ensure compliance with the Heliport Manual and procedures.

10.4.2 The heliport operator should address the fire risk associated with the processes involved in the handling of fuel, taking into account the volatility of the fuels involved, the method of delivery and the potential for a hazardous fuel/air mixture and a heat/ignition source to be present at the same time.

10.4.3 The use of any equipment with the potential to create or induce a source of ignition should be identified and excluded from any fuelling zone/area. Equipment maintenance, repairs, and testing procedures, including the operation of switches, radios and other devices, with the potential to create a source of ignition within the Fuelling Zone, should be deferred until fuelling has finished.

10.4.4 Procedures should be established to prevent fuel ignition from other heat sources for example, aircraft Auxiliary Power Unit exhausts, overheated wheel brakes, jet efflux from other aircraft.

10.4.5 The heliport operator should be aware that a spark of sufficient intensity to ignite fuel vapour may be produced by the discharge of electrostatic energy (static) created either from the movement of the fuel in the aircraft tank during the fuelling process, or its accumulation on the surface of aircraft or vehicles. A description of each type together with the practices used to prevent its occurrence is given below.

Surface accumulation:

10.4.6 A static charge may be accumulated on the surface of the aircraft or fuelling vehicle, when conditions are favourable. Bonding can eliminate this hazard.

Fuel movement accumulation:

10.4.7 A static charge may build up in the fuel during the fuelling operation, and if of sufficiently high potential, it can cause sparking within the aircraft or storage tank. The charge density in the fuel and the possibility of sparks inside the tanks are not affected by bonding. However, the use of static dissipater additives in fuel can contribute materially to reducing the risk involved.

10.4.8 Bonding connections should be made to designated points or to clean unpainted metal surfaces, and should connect the installation delivering the fuel, with the aircraft or installation receiving the fuel. All connections should be made before filler caps are removed i.e. prior to the start of fuelling, and not broken until fuelling is complete and the filler caps have been replaced where applicable. On no account should either the fuelling vehicle (including hydrant dispenser) or the aircraft be bonded to a fuel hydrant pit. All electrical bonding wires, clips and reels should be checked daily for firm attachment and general condition and weekly for electrical continuity (there should be less than 25 ohms resistance).1

10.4.9 Hoses (including so called “conductive” hoses) are not considered to be suitable substitutes for dedicated clips and wires designed to provide effective bonding.

10.4.10 Fuel suppliers should be consulted on whether the fuel being supplied contains a static dissipater additive, and on the adoption of operating procedures and engineering safeguards to minimise the hazards associated with the accumulation of static.

10.4.11 When fuelling with turbine fuels not containing a static dissipater, or where wide-cut fuels are involved, a substantial reduction in fuel flow rate is advisable to avoid fuel ignition in the tank due to electrostatic discharge. Wide-cut fuel is considered to be 'involved' when it is being supplied or when it is already present in the aircraft tanks. It is recommended that when wide-cut fuel has been used the next two uplifts of fuel should be treated as though they too were wide-cut.2

10.4.12 When initially filling a filter separator vessel the fuel flow should be regulated to prevent an excessive build-up of static electricity.

10.4.13 Mixtures of wide-cut and kerosene turbine fuels can result in the air-fuel mixture in the tank being in the combustible range at common ambient temperatures during fuelling.

10.4.14 The means for alerting the heliport fire service should be readily available. The heliport operator should ensure that the circumstances under which the heliport fire service would be required for example fuel fire, fuel spill, over-heated wheel brakes, and the means by which it can be alerted are fully understood by those who work on the apron, or in aircraft fuelling or parking areas.

10.5 RISK EVALUATION: PORTABLE ELECTRONIC DEVICES (PEDS)

10.5.1 There are three primary risks associated with the use of PEDs in the vicinity of aircraft: Fire, Distraction, and Aircraft System Interference.

[1] Joint Inspection Group (JIG) Aviation Fuel Quality Control and Operating Standards

[2] YCAR Part IV OPS 1

10.5.2 Fire: The risk of a PED creating or inducing a spark of sufficient intensity to ignite fuel vapour released during fuelling is extremely remote under normal circumstances. However, licensees should be aware of the proliferation of below-specification mobile telephone batteries that have the potential to fail dangerously. It is not known whether such a failure would be of sufficient magnitude to ignite a fuel/ air mixture, but licensees should be aware that such a possibility exists. It is recommended that they consider the circumstances under which such an event might occur on the apron, and mitigate the associated risks accordingly.

10.5.3 Distraction: The known potential for a PED user to be distracted presents three associated risks:

a) physical contact with the aircraft by the distracted PED user could cause damage or injury;
b) equipment being operated by a distracted PED user could cause damage to an aircraft; and
c) PED users, distracted while performing essential safety related tasks, could leave those tasks incomplete or unattended.

Note - Managers should be aware that the hazards at b) and c) above are associated with actions or inactions by apron staff, and carry the potential for the effect to be concealed until a stage of flight where the safety of the aircraft could be compromised.

10.5.4 Aircraft System Interference: Reports have been received that the use of PEDs close to modern aircraft can interfere with fuel gauges, some navigation equipment, and can cause spurious fire warnings in cargo/baggage holds. Such interference could contribute to the risks associated with any of the following:

a) an overweight take-off due to excessive fuel;
b) a flight with insufficient fuel;
c) navigational errors; and
d) a degradation of confidence in the aircraft fire warning system.

10.5.5 The heliport operator should prohibit the use of PEDs on the apron area, or should restrict their use to clearly defined and promulgated circumstances that mitigate the risks associated with their use. These mitigations should be considered against the volatility of the fuel type involved, the proximity of vehicle and aircraft vents, the circumstances under which they may be operated, the category of the hazard, and the provision of an alternative non-interfering communication system. Passengers boarding or disembarking the aircraft should be discouraged from using PEDs when outside, but in the vicinity of, the aircraft.

10.6 DETECTION AND PREVENTION OF FUEL CONTAMINATION

Sampling Checks

10.6.1 Sampling checks should be made throughout the fuel handling, storage and distribution process to ensure that the fuel is free from water and solid particle contamination, is of the appropriate grade, and is in a state fit for use by aircraft.

10.6.2 When fuel has been delivered into a fuel installation a settling period should be allowed before a sample is taken. If a fuel sample proves to be unsatisfactory then the sampling procedure should be repeated. If a third sample is necessary and proves to be unsatisfactory, then action should be taken to identify the cause of contamination and no fuel should be dispensed to aircraft from the installation concerned. It would, in this case, be advisable to inform and seek advice from the fuel supplier concerned.

10.6.3 Samples should be taken and retained for a minimum of seven days:

a) from fuel on delivery, whether by road tanker, pipeline, or in packages;
b) from fuel stored in a bulk tank, hydrant system, vehicle or packed stock, each day aircraft refueling takes place; and

c) whenever laboratory testing is required e.g. when Jet A-1 has been stored and not added to for a period of six months or when aviation gasoline AVGAS has been stored and not added to for a period of three months.

10.6.4 In addition to when they are required by other processes, fuel samples should be taken at the following times:

a) immediately before receipt into the fuel installation;
b) after receipt of fuel into the fuel installation (after settling time);
c) each day before the first delivery from the fuel installation;
d) after prolonged heavy rainfall;
e) after de-fuelling;
f) after vehicle washing;
g) immediately prior to fuelling an aircraft.

10.6.5 Fuel samples from above ground storage tanks and aircraft fuelling vehicles should be drawn from sampling or drain cocks. A thief pump should be used for obtaining samples from buried tanks and barreled supplies.

10.6.6 All sampling equipment should be kept in a scrupulously clean condition. Clear glass jars with necks and screw caps should be used for sample examination and retention. Prior to a sample being taken, the pipeline should be "flushed" to an extent that will remove residual fuel from within it. Managers should seek the advice of the fuel supplier on the quantity required to achieve a satisfactory check. Fuel that is not to be retained and is found to be free of contamination can be returned to the tank.

10.6.7 Samples of fuel taken should be clearly labelled, and retained as evidence that the fuel stored in the installation is fit for use in aircraft. They will be of particular value as evidence following an accident occurring to an aircraft that had received fuel from the installation.

10.6.8 If samples are taken on occasions other than that shown in paragraph 6.3 above they should be drawn into similar containers. Where fuel is drawn into buckets or other metal containers e.g. for flushing, they should be manufactured from stainless steel, and they should be bonded to the fuel line by cable and clip prior to and during the process.

10.6.9 All retained samples should be kept cool and stored out of daylight and be labeled with the following information:

a) grade of fuel;
b) reason for sample;
c) date and time of sample;
d) place taken;
e) name of sampling person.

10.6.10 It should be noted that the use of equipment for example, tanks, drums, filter systems and hoses intended for substances other than aviation fuels may increase the risk of contamination by water, solid particles or chemical deterioration.

10.6.11 All fuel equipment and fuel installations should be fully segregated from other products. Different grades of fuels should also be segregated and ideally installations should have separate delivery and suction lines.

10.6.12 To identify the grade of fuel they contain, all tanks and pipelines should be labeled and colour coded in accordance with codes of practice promulgated by those organisations referred to in paragraph 10.7.

10.6.13 As an additional measure to avoid fuelling errors at delivery, hoses or pipes should be marked with the appropriate grade markings or painted with a band of the appropriate primary grade indicator colour as close as practicable to the delivery nozzle, but not on the nozzle itself. Only a material that will not flake or separate from the nozzle whilst in general use, for example, a securely attached plastic sleeve or ring should be applied to the delivery nozzle.

10.6.14 A change of fuel grade in storage tanks can pose a risk of contamination of the new grade by residues of the previous fuel stored and therefore, where possible, such changes should be avoided. If this is not practicable, it is recommended that guidance information should be obtained from the fuel supplier concerned or from the organisations referred to in paragraph 10.7.

Visual Examination and Testing for Contamination

10.6.15 Fuel should be considered unfit for use in aircraft if a visual examination shows any of the following:

a) more than a trace of sediment;
b) globules of water;
c) cloudiness;
d) a positive reaction to water-finding paste, paper or a chemical detector.

Colour.

10.6.16 The following should serve as a guide to the visual assessment of fuels:

10.6.17 AVGAS is available in red, blue and green, while Jet A-1 turbine fuel is undyed and can vary in appearance between the colour of clear water to straw yellow. The terms 'clear' and 'bright' are independent of the natural colour of the fuel. 'Clear' refers to the absence of sediment or emulsion. 'Bright' refers to the sparkling appearance of fuel free from cloud or haze.

Turbine fuels

10.6.18 Turbine fuels should be checked using a chemical water detector. The presence of free or suspended water is indicated by a distinct change in the colour of the paste, paper or detector element. When a single, clear, apparently colourless liquid is drawn from a container believed to contain aviation gasoline, visual testing alone is inadequate to determine whether it is pure fuel or pure water. Testing by hydrometer or water detecting paste, paper or detector element is required.

Undissolved water

10.6.19 Undissolved water (free water) will appear as droplets on the sides or as bulk water on the bottom of the sample vessel. Free water will separate quickly from AVGAS. When the fuel has water in suspension the sample will appear hazy or cloudy.

10.6.20 Solid particle contamination generally consists of small amounts of rust, sand, dust, scale etc. suspended in the fuel or settled out on the bottom of the sample vessel.

10.6.21 Water-finding paste applied to the end of a dipstick or dip tape should be used for direct checking of turbine fuel in bulk storage, or barrels, and may be used similarly for AVGAS. Fresh paste should be used for each check and the dipstick should be allowed to rest on the bottom of the container for up to but no longer than 10 seconds.

Record Keeping

10.6.22 Written records should be kept of:

a) all deliveries into fuel installations. These records should include the grade and quantity of the fuel, the delivery date, and should include copies of release notes or certificates of

conformity.

b) the particulars of the maintenance, including any associated rectification, and cleaning of the fuel installation. These should include details of:
   i) inspections and tests;
   ii) pressure, purging, equipment, and filter checks; and
   iii) hose inspections.

c) the particulars of fuel samples taken and the results of tests of those samples.

d) all barrel deliveries, and of the associated decanting and dispensing of fuel, and of sampling checks.

10.6.23 Written records of de-fuelling operations should include details of:

a) the aircraft registration;
b) the date of de-fuelling;
c) the results of sampling checks;
d) the quantity and grade of fuel drawn; and
e) the disposal of the fuel drawn.

10.6.24 The records referred to above should be kept for a minimum of twelve months. They should include details of consequential action where a defect or deficiency has been revealed.

10.7 TECHNICAL SPECIFICATIONS

The technical aspects or specifications of fuel installation construction are covered by codes of practice supported by the petroleum industry including:

a) installation and vehicle manufacturers;
b) Joint Inspection Group (JIG), *www.jointinspectiongroup.org*
c) International Air Transport Association (IATA), www.iata.org

APPENDIX A: CERTIFICATE OR LANDING AREA ACCEPTANCE

All heliports shall hold either a Heliport Certificate or a Landing Area Acceptance in accordance with the following Table.

***NOTE 1**: The categorisation of flights for Public Transport may differ for Flight Crew Licensing, Flight Operations and Airworthiness. Applicable Regulation should therefore apply. The issue of a Heliport Certificate or Landing Area Acceptance, does not constitute an "approval" from Flight Operations Department, with reference to YCAR Part IV-OPS 3.*

NOTE 2: The CAMA may issue a Heliport Certificate or Landing Area Acceptance (whichever is deemed appropriate), once the criteria have been met; however the responsibility for the maintenance and condition of the landing area, the facilities and for obstacle control, remains with the Certificate / Acceptance Holder.

Use of heliport		Certificate or Landing Area Acceptance (LAA)
1	**Public heliport** The heliport is open to the public and served by helicopters performing commercial air transport operations offering services to the public either on demand or to a published schedule.	Certificate
2	**Hospitality and tourism** The heliport is available for use by the public or guests of the hotel, resort, tourist attraction or organized event.	Certificate
3	**Private heliport** The heliport is not open to the public and is available for use only with the prior permission of the heliport operator.	LAA
4	**Flight Training** The heliport is used for providing flight training and the passengers carried are only those involved in the training.	LAA
5	**Hospitals / Clinics / HEMS** The heliport is used for operations associated with Helicopter Emergency Medical Services	LAA
6	**Corporate facility** The heliport is used by a company for the transport of passengers, goods or mail as an aid to the conduct of company business.	LAA
7	**Shipboard heliport** The heliport is used for private operations and located on a ship that is registered in Yemen.	LAA Contact CAMA for details
8	**Oil and gas** The heliport is located on-shore (either on the mainland Yemen or surrounding islands) used for mineral exploitation (for the exploration of oil and gas), research or construction.	LAA
9	**Emergency Evacuation Helipad** A clear area on a roof of a tall building that is not intended to function fully as a heliport, yet is capable of accommodating helicopters engaged in the emergency evacuation of building occupants.	No Certificate or LAA required. Refer Appendix H
10	**Temporary use** A landing location that is not identifiable as a heliport and is only used on a temporary or infrequent basis. Helicopter operations to these locations shall comply with the requirements of YCAR Part IV – OPS 3.	No Certificate or LAA required
11	**Off-Shore Helideck Operations** Dedicated operations to off-shore helideck sites.	Refer CAAP 71

APPENDIX B: HELIPORT OPERATIONS CHECKLIST

The following checklist may be used by the applicant and/or holder of a Heliport Certificate to ensure compliance with the requirement in Chapter 2.4.3 to provide and maintain written policy, procedures and other information on the operation of the heliport. This information should be kept in a single document but where a particular requirement is contained in another document maintained by the heliport operator, then the checklist should make reference to the document and location.

The level of information provided may be determined based on the scope and complexity of the heliport and helicopter operations.

Section	Compliance Status			Manual Page Reference
Part 1 – General Information	Yes	No	N/A	
Purpose and Scope of the Heliport Operations Manual				
Conditions for Use of the Heliport				
Limitations on the Operation of the Heliport				
Name and contact details of responsible person(s)				
Obligations of the heliport operator				
Part 2 - Particulars of the Heliport Site	Yes	No	N/A	
Location Plan				
Heliport Plan showing markings and lighting				
General Information	Yes	No	N/A	
Heliport Name				
Heliport Location				
Heliport Reference Point WGS 84				
Heliport Elevation				
Heliport Dimensions & Related Information	Yes	No	N/A	
FATO, TLOF and Safety Area				
Description of Visual Aids				
Significant Obstacles –Geographic Coordinates				
Description of Pavement Surfaces				
Description of emergency response (refer Part 5)				
Part 3	Yes	No	N/A	
Reserved for Aeronautical Information Publication				
Part 4 – Operating Procedures	Yes	No	N/A	
Access to the Heliport Movement Area	Yes	No	N/A	
Procedures for preventing unauthorised access onto movement area including				
Role of each agency with key responsibility for Heliport security				
Procedures to control access of personnel and contractors				
Procedures to control access of vehicles and equipment				

Heliport Movement Area Inspections	Yes	No	N/A	
Procedures for inspection of movement area including:				
Description of inspections undertaken including frequency				
Inspection checklists				
Description of defect reporting, record keeping and corrective actions				
Heliport Maintenance	Yes	No	N/A	
Description of the procedures for the inspection and maintenance of the visual aids including markings and lighting				
Inspection checklists				
Details of record keeping and tracking of corrective actions				
Procedures for reporting results and for defect rectification				
Description of preventative maintenance program				
Heliport Works Safety	Yes	No	N/A	
Procedures for works on or in the vicinity or the movement area or those that may extend above the OLS including:				
Works notification and work authority permit process				
Procedures for closing off and reopening work areas				
Formal acceptance of work areas prior to return them to service				
Supervisory oversight of works in progress				
Wildlife Hazard Management	Yes	No	N/A	
Description of methods to deal with dangers caused by wildlife on or in the vicinity of the Heliport or in the flight path				
Obstacle Control	Yes	No	N/A	
Description of system to control and remove obstacles both on and off the heliport.				
Frequency of obstacle assessment or confirmation				
Methodology to control new obstacles				
Description of systems to remove existing obstacles				
Process to notify the CAMA of obstacles				
Process to notify the CAMA of removed obstacles				

Refueling	Yes	No	N/A	
Details of special areas set-up for storage of aviation fuel				
Description for method for accepting delivery				
Description for method for storage				
Description for method for dispensing				
Description of system for testing the quality of aviation fuel prior dispensing into aircraft				
Procedures for ensuring apron safety during fuelling operations				
Procedures for ensuring apron safety during defueling operations				
Part 5 – Emergency response	Yes	No	N/A	
Types and amounts of media provided				
Manning levels				
Levels of supervision				
Polices or letters of agreement with third party organisations that provide essential equipment for safe operation of the Heliport (e.g. water rescue)				
Contingency plans if organisations providing essential equipment not available				
Process for ensuring initial and continued competence of Emergency Response Personnel				
Description of available medical equipment including location				
Description of any tool kit provided				
Integrated Emergency Planning	Yes	No	N/A	
Description of arrangements for determining and implementing plans ensuring the integrated management of response to an aircraft incident/accident. These arrangements should take account of the complexity and size of the helicopter operations.				
Policy statement of the distance the Emergency Response Personnel would respond to an off-heliport accident				
Additional information/instructions within the emergency plan based upon the heliport operator's hazard/risk registry				

APPENDIX C: STRUCTURAL DESIGN

C1 INTRODUCTION

Elevated heliports may be designed for a specific helicopter type though greater operational flexibility will be obtained from a classification system of design. The FAT0 should be designed for the largest or heaviest type of helicopter that it is anticipated will use the heliport, and account taken of other types of loading such as personnel, freight, refueling equipment, etc.

For the purpose of design, it is to be assumed that the helicopter will land on two main wheels, irrespective of the actual number of wheels in the undercarriage, or on two skids if they are fitted. The loads imposed on the structure should be taken as point loads at the wheel centres, shown in Table B1.

The FAT0 should be designed for the worse condition derived from consideration of the following.

C2 HELICOPTER ON LANDING

When designing a FAT0 on an elevated heliport, and in order to cover the bending and shear stresses that result from a helicopter touching down, the following should be taken into account:

Dynamic load due to impact on touchdown

This should cover the normal touchdown, with a rate of descent of 1.8 m/s (6 ft/s), which equates to the serviceability limit state. The impact load is then equal to 1.5 times the maximum take-off mass of the helicopter.

The emergency touchdown should also be covered at a rate of descent of 3.6 m/s (12 ft/s), which equates to the ultimate limit state. The partial safety factor in this case should be taken as 1.66. Hence:

the ultimate design load = 1.66 impact load

= (1.66 x 1.5) maximum take-off mass

= 2.5 maximum take-off mass

To this should be added the sympathetic response factor below.

Sympathetic response on the FATO.

The dynamic load should be increased by a structural response factor dependent upon the natural frequency of the platform slab when considering the design of supporting beams and columns. This increase in loading will usually apply only to slabs with one or more freely supported edges. It is recommended that the average structural response factor (R) of 1.3 should be used in determining the ultimate design load.

Over-all superimposed load on the FATO (SHa).

To allow for personnel, freight and equipment loads, etc., in addition to wheel loads, an allowance of 0.5 kN/m^2 should be included in the design.

Lateral load on the platform supports.

The supports of the platform should be designed to resist a horizontal point load equivalent to 0.5 maximum take-off mass of the helicopter, together with the wind loading (see below), applied in the direction which will provide the greater bending moments.

Dead load of structural members.

The partial safety factor to be used for the dead load should be taken as 1.4.

Wind loading.

In making the assessment of wind load, the basic wind speed (V), appropriate to the location of the structure, is the three second gust speed estimated to be exceeded, on the average, once in 50 years. The basic wind speed is then multiplied by three factors- the topography factor (ground roughness), the factor

of building size and height above ground and a statistical factor which takes into account the period of time in years during which there will be exposure to wind. This will give the design wind speed (Vs) which is then converted to dynamic pressure (q) using the relationship $q=kVs^2$ where k is a constant. The dynamic pressure is then multiplied by an appropriate pressure coefficient Cp to give the pressure (p) exerted at any point on the surface of the structure.

Punching shear.

Check for the punching shear of an undercarriage wheel or skid using the ultimate design load with a contact area of 65×10^3 mm^2 •

Note - The above design loads for helicopters on landing are summarized in Table C-2.

C3 HELICOPTER AT REST

When designing a FATO on an elevated heliport, and in order to cover the bending and shear stresses from a helicopter at rest, the following should be taken into account:

Dead load of the helicopter.

Each structural element must be designed to carry the point load, in accordance with Table C-2, from the two main wheels or skids applied simultaneously in any position on the FATO so as to produce the worst effect from both bending and shear.

Over-all superimposed load (Shb).

In addition to wheel loads, an allowance for over-all superimposed load given in Table C-2, over the area of the FATO, should be included in the design.

Dead load on structural members and wind loading.

The same factors should be included in the design for these items as given for a helicopter landing.

Note.- The above design loads for helicopters at rest are summarized in Table C-2.

Normally, the upper load limit of the helicopter category selected should be used for design purposes except as follows:

In order to avoid over-design in the platform the upper limit in any band may be exceeded by 10 per cent should the maximum take-off mass of a helicopter fall just into the next highest category. In such cases, the upper limit of the lower helicopter category should be used in the design.

Table C-1 – Details of point loads and over-all superimposed loads

Helicopter category	Maximum take-off mass		Point load for each wheel	Undercarriage wheel centre	Superimposed load	Superimposed load
	(kg)	(kN)	(kN)	(m)	(SHa)	(SHb)
1	Up tp 2300	Up to 22.6	12.0	1.75	0.5	1.5
2	2301 – 5000	22.6 – 49.2	25.0	2.0	0.5	2.0
3	5001 – 9000	49.2 – 88.5	45.0	2.5	0.5	2.5
4	9001 – 13500	88.5 – 133.0	67.0	3.0	0.5	3.0
5	13501 – 19500	133.0 – 192.0	96.0	3.5	0.5	3.0
6	19501 – 27000	192.0 – 266.0	133.0	4.5	0.5	3.0

Table C-2 – Summary of Design Loads

Design load for helicopter on landing	
Superimposed loads	
Helicopter	2.5 L_HR distributed as two point loads at the wheel centres for the helicopter category in Table 1. Average value for R = 1.3
Lateral load	1.6 L_H/2 applied horizontally in any direction
Overall superimposed load	Load at platform level with the maximum wind loading. 1.4 Sha over the whole area of the platform (Sha given in Table 1)
Dead load	1.4G
Wind loading	1.4W
Punching Shear check	2.5 L_HR load over the tyre or skid contact area or 64.5 x 10^3 mm^2
Design load for helicopter on at rest	
Superimposed loads	
Helicopter	1.6L_H distributed as two point loads at the wheel centres for the helicopter category in Table 1.
Overall superimposed load (personnel, freight etc.)	1.6 SHb over the whole area of the platform. SHb given in Table 1.
Shear check	Check as appropriate

Symbol	Meaning	Partial load factors	
L_H	Maximum take-off mass of helicopter	Dynamic load (ultimate design load)	2.5
G	Dead load of structure	Live load	1.6
W	Wind loading	Dead load	1.4
R	Structural response factor	Wind loading	1.4
SHa	Superimposed load helicopter landing		
SHb	Superimposed load helicopter at rest		

APPENDIX D: INSTRUMENT HELIPORTS WITH NON-PRECISION AND/OR PRECISION APPROACHES AND INSTRUMENT DEPARTURES

D1 INTRODUCTION

This CAAP contains information that prescribes the physical characteristics and obstacle limitation surfaces to be provided for at heliports, and certain facilities and technical services normally provided at a heliport. It is not intended that these specifications limit or regulate the operation of an aircraft.

The specifications in this appendix describe additional conditions beyond those found in the main sections this CAAP, that apply to instrument heliports with non-precision and/or precision approaches. All specifications contained within the main chapters of this CAAP, are equally applicable to instrument heliports, but with reference to further provisions described in this Appendix.

D2 HELIPORT DATA

Heliport elevation

The elevation of the TLOF and/or the elevation and geoid undulation of each threshold of the FATO (where appropriate) shall be measured and reported to the aeronautical information services authority to the accuracy of:

a) one-half metre or foot for non-precision approaches; and

b) one-quarter metre or foot for precision approaches.

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

Heliport dimensions and related information

The following additional data shall be measured or described, as appropriate, for each facility provided on an instrument heliport:

a) distances to the nearest metre or foot of localizer and glide path elements comprising an instrument landing system (ILS) or azimuth; and

b) elevation antenna of a microwave landing system (MLS) in relation to the associated TLOF or FATO extremities.

D3 PHYSICAL CHARACTERISTICS -- SURFACE-LEVEL AND ELEVATED HELIPORTS

Safety areas

A safety area surrounding an instrument FATO shall extend:

a) laterally to a distance of at least 45 m on each side of the centre line; and

b) longitudinally to a distance of at least 60 m beyond the ends of the FATO.

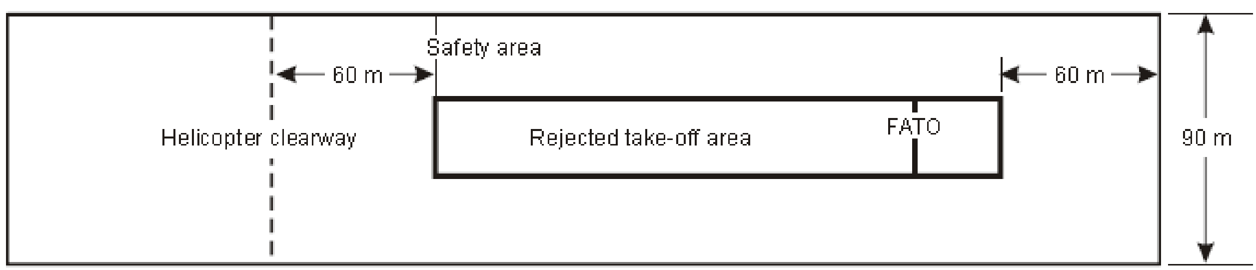


Figure D-1 – Safety Area for instrument FATO

D4 OBSTACLE LIMITATION SURFACES AND SECTORS

Approach surface

The limits of an approach surface shall comprise:

a) an inner edge horizontal and equal in length to the minimum specified width of the FATO plus the safety area, perpendicular to the centre line of the approach surface and located at the outer edge of the safety area;

b) two side edges originating at the ends of the inner edge;

I. for an instrument FATO with a non-precision approach, diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO;

II. for an instrument FATO with a precision approach, diverging uniformly at a specified rate from the vertical plane containing the centre line of the FATO, to a specified height above FATO, and then diverging uniformly at a specified rate to a specified final width and continuing thereafter at that width for the remaining length of the approach surface; and

c) an outer edge horizontal and perpendicular to the centre line of the approach surface and at a specified height above the elevation of the FATO.

Obstacle limitation requirements

The following obstacle limitation surfaces shall be established for an instrument FATO with a non-precision and/or precision approach:

a) take-off climb surface;

b) approach surface and

c) transitional surfaces.

Note — See Figure D-2 to D-5.

The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than, those specified in Tables D-1 to D-3.

D5 VISUAL AIDS: LIGHTS

Approach Lighting Systems

Where an approach lighting system is provided for a non-precision FATO, the system should not be less than 210 m in length.

Recommendation —The light distribution of steady lights should be as indicated in Figure 8-1, Illustration 2 except that the intensity should be increased by a factor of three for a non-precision FATO.

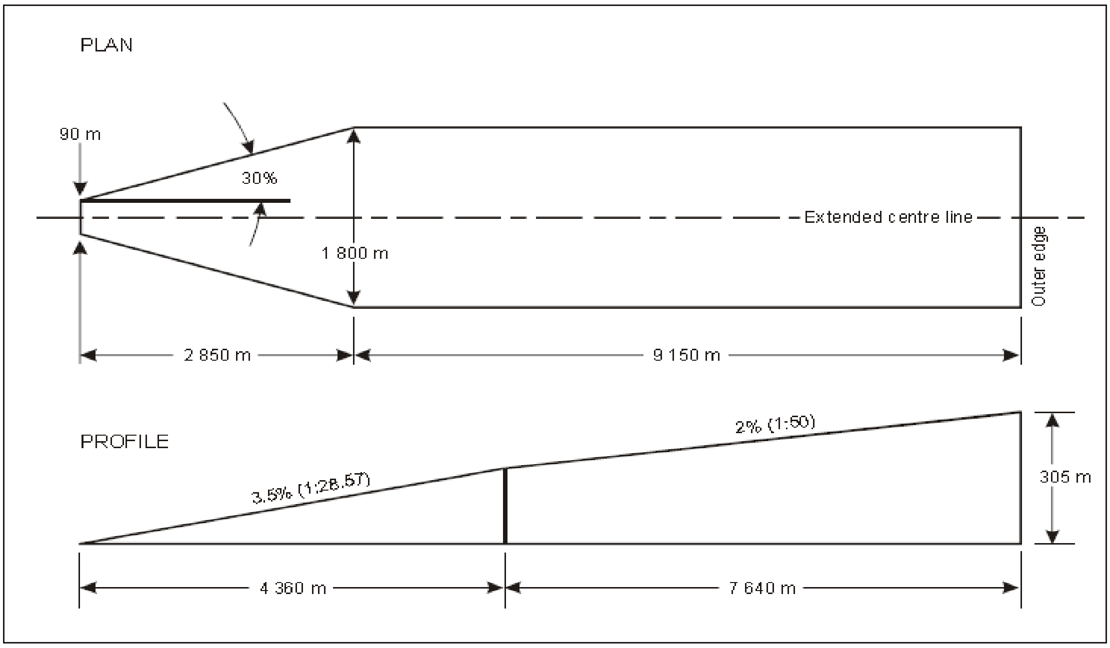


Figure D-2 – Take-off climb surface for instrument FATO

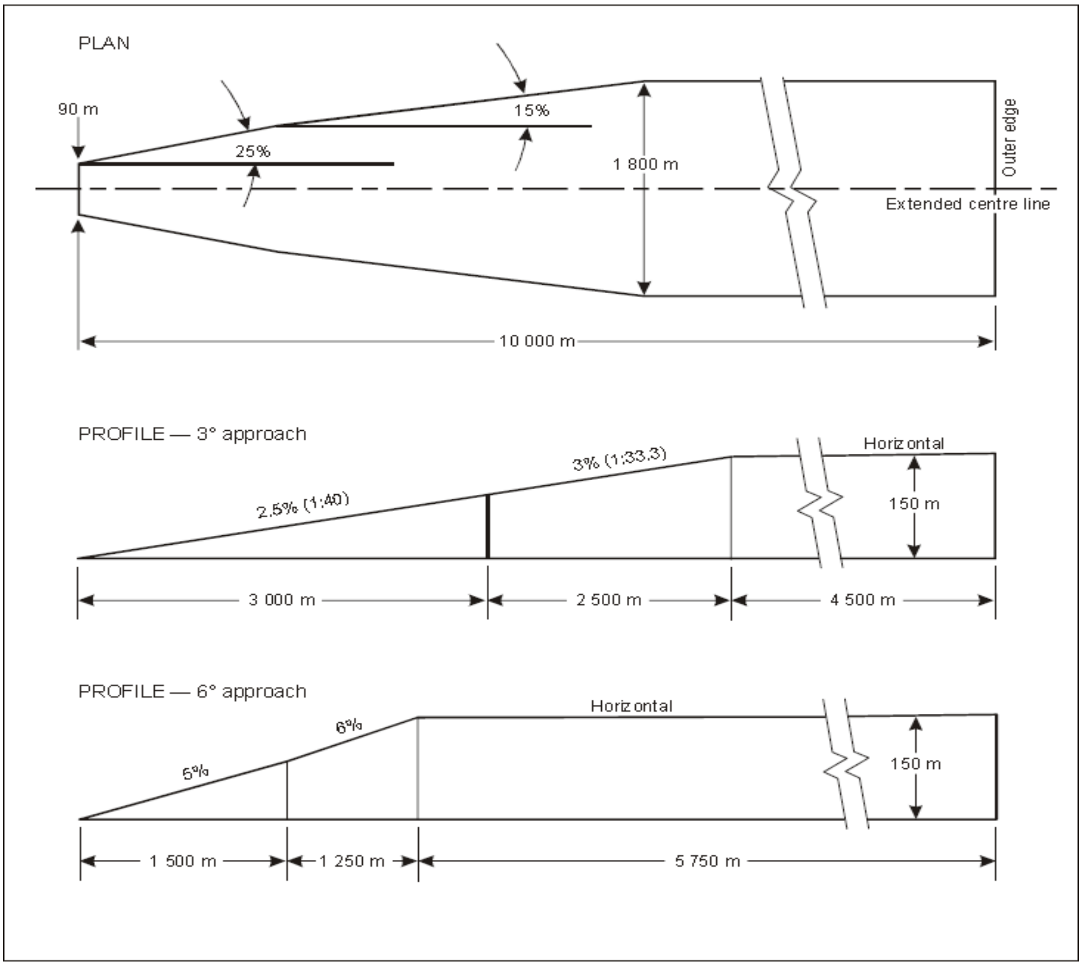


Figure D-3 – Approach surface for precision approach FATO

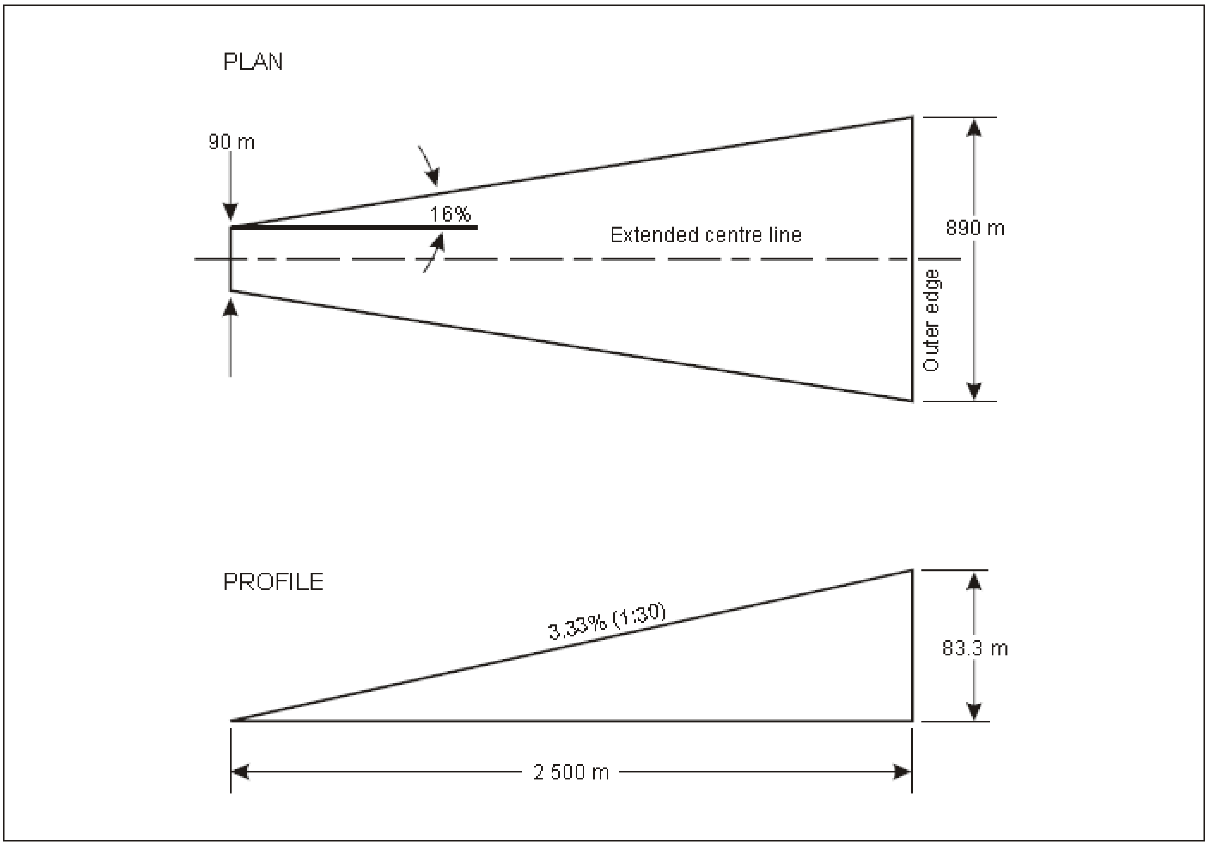


Figure D-4 – Approach surface for non-precision approach FATO

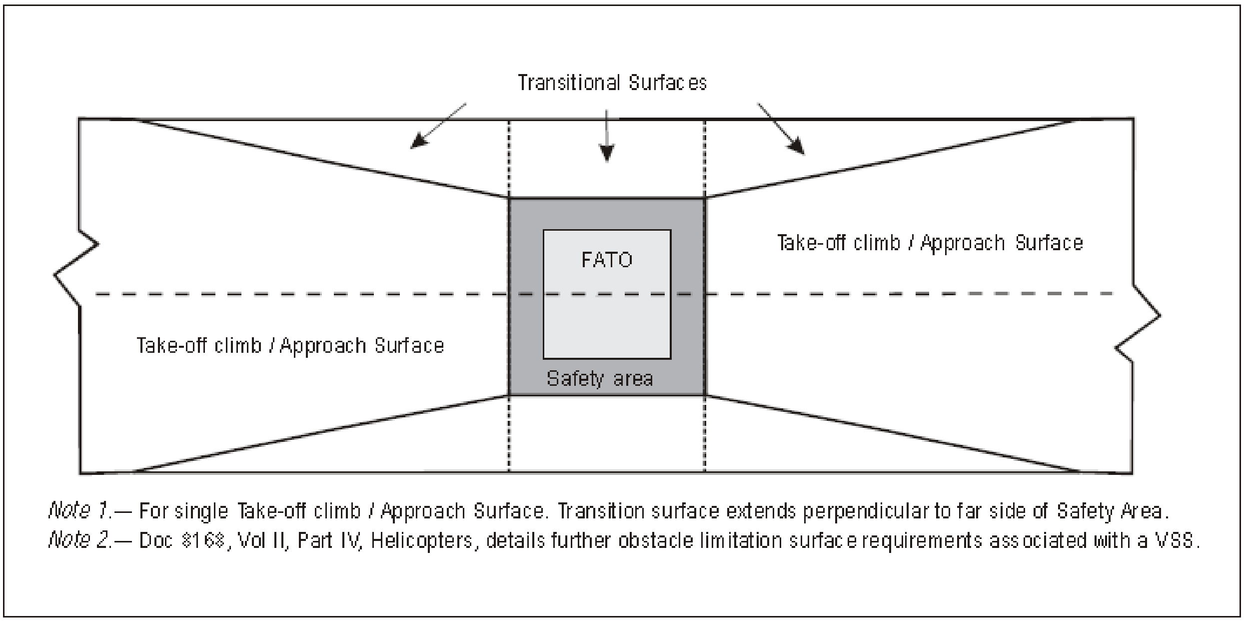


Figure D-5 – Transitional surfaces for an instrument FATO with a non-precision and/or precision approach

Table D-1 – Dimensions and slopes of obstacle limitation surfaces Instrument (Non-precision) FATO

Surface and Dimensions	
APPROACH SURFACE	
Width of inner edge	Width of safety area
Location of inner edge	Boundary of safety area
First Section	
Divergence	16%
Length	2500 m
Outer width	890 m
Slope (maximum)	3.33%
Transitional	
Slope	20%
Height	45 m

Table D-2 – Dimensions and slopes of obstacle limitation surfaces Instrument (Precision) FATO

Surface and dimensions	*3 deg approach Height above FATO*				*6 deg approach Height above FATC*			
	90 m (300 ft)	*60 m (200 ft)*	*45 m (150 ft)*	*30 m (100 ft)*	*90 m (300 ft)*	*60 m (200 ft)*	*45 m (150 ft)*	*30 m (100 ft)*
APPROACH SURFACE								
Length of inner edge	90 m	90 m	90 m	90 m	90 m	90 m	90 m	90 m
Distance from end of FATO	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60 m
Divergence each side to height above FATO	25%	25%	25%	25%	25%	25%	25%	25%
Distance to height above FATO	1745 m	1163 m	872 m	581 m	870 m	580 m	435 m	290 m
Width at height above FATO	962 m	671 m	526 m	380 m	521 m	380 m	307.5 m	235 m
Divergence to parallel section	15%	15%	15%	15%	15%	15%	15%	15%
Distance to parallel section	2793 m	3763 m	4246 m	4686 m	3380 m	3187 m	3090 m	2993 m
Width of parallel section	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m
Distance to outer edge	5462 m	5074 m	4882 m	4686 m	3380 m	3187 m	3090 m	2993 m
Width at outer edge	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m	1800 m
Slope of first section	2.5% (1:40)	2.5% (1:40)	2.5% (1:40)	2.5% (1:40)	5% (1:20)	5% (1:20)	5% (1:20)	5% (1:20)
Length of first section	3000 m	3000 m	3000 m	3000 m	1500 m	1500 m	1500 m	1500 m
Slope of second section	3% (1:33.3)	3% (1:33.3)	3% (1:33.3)	3% (1:33.3)	6% (1:16.66)	6% (1:16.66)	6% (1:16.66)	6% (1:16.66)
Length of second section	2500 m	2500 m	2500 m	2500 m	1250 m	1250 m	1250 m	1250 m
Total length of surface	10000 m	10000 m	10000 m	10000 m	8500 m	8500 m	8500 m	8500 m
TRANSITIONAL								
Slope	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m

Table D-3 – Dimensions and slopes of obstacle limitation surfaces

STRAIGHT TAKE-OFF

Surface and Dimensions	**Instrument**
TAKE-OFF CLIMB Width of inner edge Location of inner edge	90 m Boundary of end of clearway
First Section Divergence Length Outer width Slope (maximum)	 30% 2850 m 1800 m 3.5%
Second Section Divergence Length Outer width Slope (maximum)	 Parallel 1510 m 1800 m 3.5%*
Third Section Divergence Length Outer width Slope (maximum)	 Parallel 7640 m 1800 m 2%
*This slope exceeds the maximum mass one-engine inoperative climb gradient of many helicopters which are currently operating.	

Table D-4 – Dimensions and slopes of the obstacle protection surface

Surface and Dimensions	Non-Precision FATO	
Length of inner edge	Width of safety area	
Distance from end of FATO	60 m	
Divergence	15%	
Total length	2500 m	
Slope	PAPI	A[a] – 0.57°
	HAPI	A[b] – 0.65°
	APAPI	A[a] – 0.9°

[a] As indicated in YCAR Part IX

[b] The angle of the upper boundary of the “below slope” signal

APPENDIX E: HELIPORT DATA

To aid the process for an assessment of a heliport, the following table may be used with reference to the helicopter performance characteristics and dimensions:

Helicopters operated in: a) Performance class 1 b) Performance class 2 or 3 c) Visual d) Instrument i. Precision Approach FATO ii. Non-precision Approach FATO iii. Non-instrument FATO	
Greatest overall dimension (D) of the largest helicopter the FATO is intended to serve	
Largest helicopter maximum take-off mass (MTOM)	
Heliport name	
Heliport reference point (WGS-84 coordinates)	
Heliport elevation	
Heliport type: surface-level, elevated or heliport	
TLOF: dimensions to the nearest metre, slope, surface type, bearing strength in tonnes (1000 kg)	
FATO: a) true bearing to one-hundredth of a degree b) designation number (where appropriate) c) length d) width to the nearest metre e) slope f) surface type	
Safety area: a) length b) width c) surface type	
Helicopter ground taxiway, air taxiway and air transit route: a) designation b) width c) surface type	
Apron: a) surface type b) helicopter stands	
Clearway: a) length b) ground profile	
Visual aids: a) visual aids for approach procedures b) markings c) lighting of FATO, TLOF, taxiways and aprons	

Distances to the nearest metre of localizer and glide path elements comprising an instrument landing system (ILS) or azimuth and elevation antenna of a microwave landing system (MLS) in relation to the associated TLOF or FATO extremities.	
Declared Distances: a) take-off distance available b) rejected take-off distance available c) landing distance available	
Obstacle Limitation Surfaces: dimensions and slopes: a) Transitional Surface Slope: Height: b) Approach Surface* Width inner edge: Location of inner edge: First section: Divergence: Length: Outer width: Slope: Second section: Divergence: Length: Outer width: Slope: Third section: Divergence: Length: Outer width: Slope: c) Inner Horizontal Surface Height: Radius: d) Conical Surface Slope: Height: e) Take-Off Climb Surface Inner Edge: First section: Divergence: Length: Outer width: Slope: Second section: Divergence: Length: Outer width: Slope: Third section: Divergence: Length: Outer width: Slope: *For Instrument (Precision Approach) FATO, refer to refer to Table 5.8	

APPENDIX F: HELIPORT OPERATIONS GUIDANCE MATERIAL

The material contained in this Appendix is provided as an aid to assist heliport operators who have been issued with a Landing Area Acceptance, and may also be used as a basis for the written Heliport Operational Procedures required by Chapter 2.4.3 for Certificated Heliports.

This guidance material should be made available to all personnel that are involved in the operation, maintenance or inspection of the heliport, and those involved in the provision of an Emergency Response Team.

The information contained in this Appendix will be regarded by the CAMA as the primary indication of the standards likely to be achieved by the heliport operator. A copy of this Appendix is available from the CAMA on request as a standalone document.

Heliport Operations Guidance Material

PART 1 – GENERAL INFORMATION

1.1 PURPOSE

The purpose of this guidance material is to ensure, as far as is practicable, the safe operation of the heliports by stating policy and providing instructions and information to enable the heliport operating staff to carry out their duties in a safe, responsible and efficient manner. The related sections are intended to achieve this aim.

1.2 CONDITIONS OF USE

a) For a heliport that has been issued with a Landing Area Acceptance, the heliport is only available for private (not Air Service) operations. Operations by helicopters conducting an Air Service or using instrument approach or departure procedures are only permitted at Certificated Heliports.

b) No helicopter should take-off or land at the heliport unless such emergency response, medical services and emergency arrangements, as are required in respect of such a helicopter, are provided there. Such services, equipment and facilities should at all time, when the heliport is available for the take-off or landing of helicopters, be kept fit and ready for immediate use.

c) Changes in the physical characteristics of the heliport including the erection of new buildings and alterations to existing buildings or to visual aids should not be made without prior assessment in line with the Guidance provided in CAAP 70.

d) If the heliport is available for the take-off and landing of helicopters at night, such systems of lighting the heliport, as described in CAAP 70, shall be in operation at all times when helicopters are taking-off or landing at night.

1.5 DISTRIBUTION OF THE GUIDANCE MATERIAL

This guidance material should be made available to every member of the heliport operating staff.

PART 2 – HELIPORT OPERATING PROCEDURES AND SAFETY MEASURES

2.1 ACCESS TO HELIPORT MOVEMENT AREA

Safeguards should be in place to prevent inadvertent entry of animals and deter the entry of unauthorised persons or vehicles to the heliport operational area. Safeguards should be in place to ensure that there is reasonable protection of persons and property from helicopter rotor wash.

All access to the heliport movement area should be controlled, and access to the movement area only permitted for passengers, authorised persons or vehicles.

All vehicular entrances to the heliport and operational areas should have gates or barriers. Barriers should be high enough to present a positive deterrent to persons inadvertently entering an operational area and yet low enough to be non-hazardous to helicopter operations.

Heliport operators may choose to secure their operational areas via the use of security guards and a mixture of fixed and movable barriers. Training of personnel should be considered as a part of any operational procedure. All users of the heliport should comply with rules applicable to the heliport as regards keeping gates and barriers closed.

All vehicular entrances should be provided with appropriate warning notices.

No vehicle should proceed onto the manoeuvring area without authorisation. Vehicles should give way to helicopters at all times and all vehicles operating on the manoeuvring should display their vehicle hazard warning lights.

Drivers should be briefed and vehicles should be escorted, if considered necessary.

2.2 HELIPORT MOVEMENT AREA INSPECTIONS

The heliport should be inspected prior to the commencement of helicopter operations. Additional inspections should be carried out taking into account;

- the frequency of operations;
- duration of operations;
- types of helicopter served;
- the heliport environment; and
- the complexity of operations and the size of the heliport.

These inspections should ensure that the Movement Area is clear of foreign objects, harmful irregularities, temporary obstructions or hazardous conditions. These inspections should include the condition of the TLOF, signs, markings, lighting and the wind direction indicator. Details of each inspection should be recorded and should include any corrective action taken.

During periods of unusual weather conditions, additional inspections may be required.

In the event of any unserviceability that cannot be corrected within a reasonable time, helicopter operators that normally use the heliport should be made aware of the unserviceability.

A surface inspection of the appropriate area should be carried out whenever an accident or incident occurs, or a report of debris on the helicopter movement area is made.

2.3 HELIPORT MOVEMENT AREA SURFACE CONDITION AND MAINTENANCE

The heliport facilities should be maintained in a condition that does not impair the safety, security, regularity or efficiency of helicopter operations.

Assessments of the condition and bearing strength of the TLOF area should be carried out during routine and non-routine surface inspections.

The bearing strength should be assessed with reference to the maximum all up weight (MAUW) of the largest helicopter likely to use the heliport.

Where the assessment reveals a critical condition, the decision should be made on whether the surface conditions justify withdrawal of part or all of the manoeuvring area.

Heliport users and operators of should be advised of any changes in the heliport operational state.

2.4 HELIPORT VISUAL AIDS

Each visual aid for navigation should provide reliable and accurate Guidance to heliport users and any unserviceable or deteriorated items should be restored back into service without undue delay.

2.5 HELIPORT WORKS SAFETY

Works and maintenance on the movement area should only be allowed with prior approval and working parties should be briefed, having regard to the circumstances prevailing.

Short term work on or near the FATO or TLOF in use, or within the protected surfaces, should be continuously monitored.

All temporary obstacles and equipment, including personnel and vehicles, should be removed prior to the arrival or departure of helicopters.

Areas of work should to be clearly defined, and drivers of vehicles should adhere to briefed routes to and from such areas. Conduct of the work and vehicle movements should to be monitored throughout operational hours.

If works are in progress on the movement area, it should be suitably marked.

2.6 WILDLIFE HAZARD MANAGEMENT

The heliport management has a duty of care toward helicopter operators and should meet this responsibility as far as is reasonably practicable. This is achieved by providing an active Wildlife Management Control Programme utilising available staff and other resources in an efficient and effective manner, thereby reducing the bird strike hazard to helicopter on and around the heliport and to restrict access of animals entering the heliport.

The heliport and the visible surrounding areas should be monitored for wildlife activity, taking appropriate action when a hazard is detected. A warning should be issued to pilots by RTF (if possible) whenever birds are flocking on or near to the FATO and dispersal action is not complete or has not been fully effective.

All bird strikes and near misses, whether observed or reported, are to be notified to the CAMA via the Voluntary Occurrence Reporting System (VORSI) on the CAMA website.

Refer to Part 2.10 for reporting of Safety Incidents.

2.7 OBSTACLE CONTROL

An initial assessment should be undertaken to establish the obstacle environment surrounding the heliport with reference to the Obstacle Limitation Surfaces (OLS) specified in CAAP 70 Chapter 6. This should be validated annually by a Validation Assessment as described in CAAP 61.

Action should be taken to ensure that the Obstacle Limitation Surfaces remain clear of all permanent and semi-permanent obstructions.

For areas outside the heliport, safeguarding arrangements should be made with the local municipalities to aid the control of potential buildings or other structures which may affect helicopter operations.

2.8 REPORTING OF ACCIDENTS

The following notification procedure should be followed when a helicopter accident has occurred on or in the vicinity of the heliport;

a) if any person suffers death or serious injury; or
b) if the helicopter suffers substantial damage, or structural failure requiring major repairs; or
c) if a helicopter is missing or completely inaccessible.

A nominated person should telephone the CAMA Duty Inspector to report a helicopter accident or serious incident on +971 50 641 4667, and pass as much of the following information as is available:

a) helicopter type, model, nationality and registration
b) name of owner and operator
c) name of pilot in command
d) date and time (UTC) of accident
e) last point of departure and next point of intended landing of the helicopter
f) location of the accident
g) number of persons on board the helicopter at the time of the accident
h) number of persons killed or seriously injured
i) number of persons killed or injured elsewhere than on the helicopter
j) nature of the accident and brief description of damage to the helicopter

2.9 DISABLED HELICOPTER REMOVAL

The wreckage of a helicopter must not be removed or interfered with unless specific permission has been given by the CAMA except for the following purposes:

a) The extrication of persons, animals or mail
b) To prevent further destruction by fire or other danger
c) To remove an obstruction to the public, to air navigation or other transport.

If no immediate danger to persons, animals or mail exists, and specific permission has been given by the CAMA to move the wreckage, sketches and photographs of the incident and surrounding areas should be obtained with as much detail as possible prior to moving the wreckage, to assist in any subsequent investigation.

2.10 REPORTING OF SAFETY INCIDENTS

The CAMA has developed a voluntary reporting system (VORSY) available on the CAMA website Guidance on the CAMA's voluntary reporting is found in CAAP 57 – Voluntary Occurrence Reporting System.

A VORSY report may be reported when there is information that may help in improving aviation safety but it has not been reported through an existing channel, or the heliport operator wishes for others to learn and benefit from a safety event or hazard without disclosing their identify.

For less significant or minor incidents details should be kept and include:

a) Date of occurrence;
b) Action taken; and
c) Photos and Drawings.

PART 3 – HELIPORT EMERGENCY SERVICES

3.1 PRINCIPLE OBJECTIVE

The principal objective of an Emergency Response Team is to save lives. For this reason, the provision of means for dealing with a helicopter accident/incident occurring at or in the immediate vicinity of a heliport provides the greatest opportunity for saving lives.

Helicopter Rescue is defined as actions taken to save persons involved in a helicopter accident/incident, support self-evacuation, and to assist the removal of injured / trapped persons.

The operational objective is to staff the Emergency Response Team and respond as quickly as possible to any helicopter accident/incident.

3.2 EQUIPMENT INSPECTION

At the start of each initial flight, all the appropriate rescue equipment should be inspected, be in position and available for immediate use.

3.3 TRAINING

The Emergency Response Team should be provided with training and be competent in the safe use of fire extinguishers.

Equipment and training records should be maintained and retained for future reference.

Training should be conducted in the following subjects depending on the complexity of the operations.

Training
Familiarization of heliport
Familiarization of helicopter
Familiarization of fire extinguishers/Diffs
Familiarization of emergency call out procedures
Practical emergency exercise
Heliport Inspection Familiarization/Training
Helicopter Start up Procedure Training
Helicopter landing Procedure Training
Helicopter Fuelling Procedure Training

3.4 EMERGENCY RESPONSE

EMERGENCY CALL OUT PROCEDURE

IN THE EVENT OF AN **HELICOPTER CRASH / ENGINE FIRE / ACCIDENT**
THE FOLLOWING ACTION IS TO BE UNDERTAKEN IMMEDIATELY

CALL IMMEDIATELY:-

CIVIL DEFENCE FIRE SERVICE	179
AMBULANCE SERVICE	195
POLICE	199
HELIPORT OPERATOR/OWNER	

PROVIDE THE FOLLOWING INFORMATION

NAME OF THE HELIPORT	
LOCATION	
LAND MARKS	
TYPE OF INCIDENT (HELICOPTER CRASH / FIRE)	
NUMBER OF PASSENGERS / PERSONS AFFECTED	

PART 4 –SAFETY MANAGEMENT SYSTEM GUIDANCE MATERIAL

This guidance material is written for small, non-complex organisations. Whether or not this guidance material is suitable for your organisation will depend on various factors including the size, complexity and the level of risk associated with your activities. For further guidance, please refer to YCAR Part X (Safety Management System Requirements).

4.1 INTRODUCTION

This Guidance Material has been developed to direct all personnel in the safe operations of the organisation and defines the policy that governs the operation of the heliport.

SMS is a pro-active, integrated approach to safety management. SMS is part of an overall management process in order to ensure that the goals of the organisation can be accomplished. It embraces the principle that the identification and management of risk increases the likelihood of accomplishing the mission. Hazards can be identified and dealt with systematically through the Hazard Reporting Program that facilitates continuing improvement and professionalism. Auditing and monitoring processes ensures that helicopters are operated in such a way as to minimize the risks inherent in flight operations.

4.2 SAFETY MANAGEMENT PLAN

Safety holds the key to this organisation's future and affects everything we do.

The Safety Management Plan is the tool used to define how SMS supports the organisation's Operations Plan. Organisation management is committed to the SMS, and is required to give leadership to the program and demonstrate through everyday actions, the commitment to safety and its priority in the achievements of the organisation.

The processes in place in the Safety Management Plan include the active involvement of all personnel, who, through planning and review, must continue to drive efforts for continuing improvement in safety and safety performance. The term "Safety Management" should be taken to mean safety, security, health, and environmental management. The key focus is the safe operations of airworthy helicopter.

Safety audits are essential components of the Safety Management Plan. They review systems, identify safety issues, prioritize safety issues, must involve all personnel, and enhance the safety of operations.

4.3 SAFETY PRINCIPLES

Management embraces the following safety principles:

a) Always operate in the safest manner practicable
b) A culture of open reporting of all safety hazards in which management will not initiate disciplinary action against any personnel, who in good faith, due to unintentional conduct, disclose a hazard or safety incident
c) Never take unnecessary risks
d) Safe does not mean risk free
e) Everyone is responsible for the identification and management of risk
f) Familiarity and prolonged exposure without a mishap leads to a loss of appreciation of risk

4.4 KEY PERSONNEL

The Heliport Operator has overall accountability for safety and the safe management of operational services and systems planned, provided and operated by the heliport. Safety accountabilities include:

a) All operations are conducted in the safest manner practicable.
b) Ensuring the safety of all employees, customers, passengers and visitors.
c) Development of long-term safety objectives, including establishment of safety policies and practices.
d) Implementation of management systems that will establish and maintain safe work practices.
e) Ensuring the heliport's business plan is sufficiently resourced to enable the success of the safety policy and management system.
f) Taking a leadership role in the heliport's safety programme and ensuring that safety does not become subordinate to financial matters.
g) Appointing competent and safety conscious persons and monitoring their performance to ensure that safety is given a high priority within their training and development plans.
h) Setting safety targets and objectives and monitoring achievements.

4.5 COMPLIANCE WITH STANDARDS

All personnel have the duty to comply with approved standards. These include organisation policy, procedures; helicopter manufacturer's operating procedures and limitations, and government regulations. Research shows that once you start deviating from the rules, you are almost twice as likely to commit an error with serious consequences.

Breaking the rules usually does not result in an accident; however, it always results in greater risk for the operation, and the organisation supports the principle of, "NEVER take unnecessary risks."

4.6 INTENTIONAL NON-COMPLIANCE WITH STANDARDS

Behaviour is a function of consequences. Management is committed to identifying deviations from standards and taking immediate corrective action. Corrective action can include counselling, training, discipline, grounding or removal. Corrective action must be consistent and fair.

Organisation management makes a clear distinction between honest mistakes and intentional non-compliance with standards. Honest mistakes occur, and they should be addressed through counselling and training.

Research has shown that most accidents involve some form of flawed decision-making. This most often involves some form of non-compliance with known standards. Non-compliance rarely results in an accident; however, it always results in greater risk for the operation.

Organisation policy agrees with the following conclusions:

a) Compliance with known procedures produces known outcomes
b) Compliance with standards helps guarantee repeatable results
c) Bad rules produce bad results
d) Complacency affects the safe operation of the helicopter and cannot be tolerated
e) Standards are mechanisms for change
f) The hardest thing to do, and the right thing to do are often the same thing

4.7 REWARDING PEOPLE

Reward systems are often upside down. Reinforced bad behavior breeds continued bad behavior. This is unacceptable. This organisation is committed to the principle that people should be rewarded for normal, positive performance of *their* duties that complies with organisation standards. Personnel will not be rewarded for accomplishing the mission by breaking the rules.

4.8 SAFETY PROMOTION

Safety is promoted as a “core value.” Procedures, practices and allocation of resources and training must clearly demonstrate the organisation’s commitment to safety. We must change the perception that the mission is what’s most important no matter the risk. The following methods are used to promote safety:

a) Posting the Safety Policy in prominent locations around the base of operations

b) Starting meetings with a comment or review about safety issues

c) Having a safety bulletin board

d) Having an employee safety feedback process

4.9 DOCUMENT AND DATA INFORMATION CONTROL

All safety documents should be controlled through the technical library. This includes the SMS, operations, maintenance and training manual. Change control procedures should be incorporated into each of these documents.

The Safety Officer should be responsible for maintaining and safekeeping safety related data, including the minutes of safety meetings, information on hazard and risk analysis, risk management, remedial action, incident and accident investigations, and audit reports.

4.10 HAZARD IDENTIFICATION AND RISK MANAGEMENT

Risk management is the identification and control of risk and is the responsibility of every member of the organisation. The first goal of risk management is to avoid the hazard. The organisation should establish sufficient independent and effective barriers, controls and recovery measures to manage the risk posed by hazards to a level as low as practicable. These barriers, controls and recovery measures can be equipment, work processes, standard operating procedures, training or other similar means to prevent the release of hazards and limit their consequences should they be released. The organisation should ensure that all individuals responsible for safety critical barriers, controls, and recovery measures are aware of their responsibilities and competent to carry them out. The organisation should establish who is doing what to manage key risks and ensure that these people and the things they should do are up to the task.

The systematic identification and control of all major hazards is foundational. The success of the organisation depends on the effectiveness of the Hazard Management Program.

The purpose of the risk assessment process is to identify risks, assess them in terms of severity and likelihood so that appropriate mitigation measures can be implemented to either eliminate the risk or reduce the risk to as low as reasonably practicable. The assessment process also allows the risks to be ranked in order of risk potential so that priorities can then be established and resources can be targeted more effectively.

The risk assessment process starts with identifying the hazards associated with the heliport operation and then the actual risks associated with the hazard. It is important to include people with the relevant expertise and experience in the risk assessment process to ensure the robustness of the process. All risk assessments are reliant on the quality of the information used to make the assessment and the knowledge of the people conducting the assessment.

The hazard/risk identification process should be both proactive and reactive and depending on the size and complexity of the heliport the following methods may be useful to identify safety hazards and the risks associated with them:

a) Brainstorming, where any relevant persons meet to identify/review potential hazards and associated risks at the heliport. This may be required for a range of items or to consider a specific risk.
b) Heliport incident reports.
c) Confidential voluntary reports.
d) Internal/external audits.
e) Either internal or external safety assessments/technical inspections.
f) Liaison with other similar heliports.
g) Generic hazard checklists.

Following the identification of a hazard, the risks associated with the hazard will need to be assessed. The risk should be assessed in terms of severity (the severity of the potential adverse consequences) and probability (the likelihood of the risk causing adverse consequences).

SEVERITY OF CONSEQUENCES		
Aviation definition	**Meaning**	**Value**
Catastrophic	Equipment destroyed. Multiple deaths.	A
Hazardous	A large reduction in safety margins, physical distress or a workload such that the personnel cannot be relied upon to perform their tasks accurately or completely. Serious injury or death to a number of people. Major equipment damage.	B
Major	A significant reduction in safety margins, a reduction in the ability of personnel to cope with adverse operating conditions as a result of the workload, or as a result of conditions impairing their efficiency. Serious incident. Injury to persons.	C
Minor	Nuisance. Operating limitations. Use of emergency procedures. Minor incident.	D
Negligible	Little consequence	E

PROBABILITY OF OCCURRENCE		
Qualitative definition	**Meaning**	**Value**
Frequent	Likely to occur many times	5
Reasonably probable	Likely to occur sometimes	4
Remote	Unlikely, but possible to occur.	3
Extremely remote	Very unlikely to occur	2
Extremely improbable	Almost inconceivable that the event will occur	1

When the levels of severity and likelihood have been defined, a Risk Tolerability Matrix can then be used to assess the tolerability of the risk. While the severity of the consequences can be defined relatively easily, the likelihood of occurrence (probability) may be more subjective and rely on a logical, common sense analysis of the inter-related facts.

Risk Tolerability Matrix

Probability

Severity	1 Extremely improbable	2 Improbable	3 Remote	4 Occasional	5 Frequent
A Catastrophic	Review	Review	Unacceptable	Unacceptable	Unacceptable
B Hazardous	Acceptable	Review	Review	Unacceptable	Unacceptable
C Major	Acceptable	Review	Review	Review	Unacceptable
D Minor	Acceptable	Acceptable	Review	Review	Review
E Negligible	Acceptable	Acceptable	Acceptable	Review	Review

From the risk tolerability matrix the risk can then be classified as either acceptable, to be reviewed or un-acceptable allowing a suitable risk mitigation strategy to be developed if required.

Unacceptable: If the risk is unacceptable, major mitigation will be necessary to reduce the severity of the consequences and/or the likelihood of the occurrence associated with the hazard.

Review: If the risk needs to be reviewed the severity of the consequences or the probability of occurrence is of concern; measures to mitigate the risk to as low as reasonably practicable should be sought. Where the risk is still in the review category after this action has been taken it may be that the cost or actions

required to reduce the risk further are too prohibitive. The risk may be accepted, provided that the risk is understood and has the endorsement of the individual ultimately accountable for safety at the heliport.

Acceptable: If the risk is acceptable the consequence is so unlikely or not severe enough to be of concern; the risk is tolerable. However, consideration should still be given to reducing the risk further to as low as reasonably practicable in order to further minimise the risk of an accident or incident.

If the level of risk falls into the **unacceptable** or **review** categories, mitigation measures should be introduced to reduce the risk to an acceptable level. Mitigation strategies could include eliminating the risk altogether or taking measures to reduce the severity if the risk occurred or the likelihood of the risk occurring. Risks should be managed to be as low as reasonably practicable, which means that the risk must be balanced against the time, cost and difficulty of taking measures to reduce or eliminate the risk.

Where the risk cannot be further reduced by reasonably practicable means, the following actions are to be taken:

a) If a high severity risk, the matter is to be brought to the Safety Review Board (SRB). The risk will be reviewed by the SRB, and if accepted will be signed off by the Senior Manager/Accountable Manager. Or if deemed necessary, a more senior director.
b) For a risk with a less potential severity, the matter should be reviewed by another manager reporting to the Accountable Manager and signed off. The reviewing manager must note the reasons and considerations for accepting the risk.

The final outcomes of the risk assessment process will be recorded and filed.

Risk Assessment Form

<table>
<tr><td colspan="7">RECORD OF ASSESSMENT</td></tr>
<tr><td colspan="7">Ref. No.</td></tr>
<tr><td colspan="4">Base: Section/Department:</td><td colspan="3">Type of harm:</td></tr>
<tr><td colspan="4">Work Activity:</td><td colspan="2">Injury</td><td></td></tr>
<tr><td colspan="4">Team:</td><td colspan="2">Damage to environment</td><td></td></tr>
<tr><td colspan="7"></td></tr>
<tr><td colspan="2">Assessor Name:</td><td colspan="5">Signature:</td></tr>
<tr><td colspan="2">Date of Assessment:</td><td colspan="5">Review date:</td></tr>
<tr><td colspan="7">Employees at risk:</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td colspan="7">Others who may be at risk:</td></tr>
<tr><td colspan="7"></td></tr>
<tr><td colspan="7"></td></tr>
<tr><td colspan="6">IF ADDITIONAL CONTROL MEASURES ARE REQUIRED, CAN THEY BE IMPLEMENTED IMMEDIATELY</td><td>YES / NO</td></tr>
<tr><td colspan="7">IF NO, SUMMARISE ACTION PLAN BELOW</td></tr>
<tr><td>Action required:</td><td colspan="2">Target Date</td><td colspan="2">Action by:</td><td colspan="2">Completed by (Name & Date)</td></tr>
<tr><td></td><td colspan="2"></td><td colspan="2"></td><td colspan="2"></td></tr>
<tr><td colspan="7">Date for full implementation of control measures:</td></tr>
<tr><td colspan="7">Assessment accepted by: (relevant manager):</td></tr>
<tr><td colspan="7">Title:</td></tr>
<tr><td colspan="7">Date:</td></tr>
</table>

Risk Assessment Form (continued)

RISK ASSESSMENT

Hazards/Risks	Severity	Probability	Risk Rating	Additional control measures required	Residual Risk Rating		

4.11 OCCURRENCE AND HAZARD REPORTING

All occurrences and hazards identified by an employee should be reported using a reporting system. An example of an Occurrence and Hazard Report is given below.

Occurrence Report -- Hazard Identification Report	
Date:	Time:
Location:	Employee name:
Event or unsafe act(s) observed:	
Injuries/Illnesses experienced:	
Corrective action(s) taken:	
Causal Factors:	
Comments/*Recommendation*s:	
Safety Officer's Signature:	Date:

Occurrence - Definition

An occurrence is defined as: Any unplanned safety related event, including accidents and incidents that could impact the safety of guests, passengers, organisation personnel, equipment, property or the environment.

Hazard – Definition

A hazard is defined as: Something that has the potential to cause harm to a persons, loss of or damage to equipment, property or the environment.

Occurrences

All relevant comments and agreed actions should be recorded in the report. Reports should be closed when all actions have been taken. Occurrences should be reviewed on a monthly basis.

Personnel may anonymously report hazards using the same report.

Personnel who report should be treated fairly and justly, without punitive action from management except in the case of known reckless disregard for regulations and standards, or repeated substandard performance.

4.12 MANAGEMENT OF CHANGE (MOC)

The systematic approach to managing and monitoring organisational change is part of the risk management process. Safety issues associated with change are identified and standards associated with change are maintained during the change process.

Procedures for managing change include:

a) Risk assessment

b) Identification of the goals and objectives and nature of the proposed change

c) Operational procedures are identified

d) Changes in location, equipment or operating conditions are analyzed

e) Maintenance and operator Manuals are posted with current changes

f) All personnel are made aware of and understand changes

g) Level of management with authority to approve changes identified

h) The responsibility for reviewing, evaluating and recording the potential safety hazards from the change or its implementation

i) Approval of the agreed change and the implementation procedure(s)

There are methods for managing the introduction of new technology. All personnel should be consulted when changes to the work environment, process or practices could have health or safety implications. Changes to resource levels and competencies associated risks are assessed as part of the change control procedure.

Therefore an objective of the safety management system is to provide a framework for managing change and addressing risks when introducing or changing:

a) Equipment

b) Systems

c) Procedures

d) Personnel structures

All such changes must be adequately addressed to ensure that safety is not degraded during or as a consequence of such changes and that wherever practical, safety is enhanced by such changes.

APPENDIX G: DESIGN ACCEPTANCE

G1 GENERAL

G1.1 For new heliports, the heliport operator should obtain a Design Acceptance prior to commencing construction. A Design Acceptance will provide assurance that the proposed heliport will comply with the physical characteristic requirements contained in this CAAP.

G.1.2 The issue of a Design Acceptance by the CAMA does not provide approval to commence construction of the heliport. The applicant is still required to obtain a letter of no objection from

G2 REQUEST

G2.1 To request a Design Acceptance, the applicant must submit an application as detailed in Chapter 2.2, and commence the process to request a Heliport Certificate or a Landing Area Acceptance.

G2.2 A request for a Design Acceptance will be subject to the payment of any applicable CAMA Services Fees.

G3 INFORMATION

G3.1 The information required to support the request for a Design Acceptance shall include design drawings or other documentation which provides details on the:

a) physical size and layout of the facility;
b) location of the heliport with regards to buildings and areas of public use;
c) size, colour and layout of any markings; and
d) layout, location and colour of any lighting and other visual aids.

G3.2 The CAMA may ask for clarification or additional information. Once satisfied, the CAMA will issue a Design Acceptance of the proposal.

G4 ACCEPTANCE

G4.1 A Design Acceptance shall be valid for a period of one year. If construction of the heliport has not been completed by that time, the applicant should request another Design Acceptance to ensure that the proposal remains in compliance with CAMA Regulations.

G4.2 The issue of a Design Acceptance does not permit the heliport to be used for helicopter operations when construction is completed. The heliport operator must still obtain a Heliport Certificate or a Landing Area Acceptance as detailed in Chapter 2.

APPENDIX H: EMERGENCY EVACUATION HELIPAD

H1 INTRODUCTION

H1.1 An emergency evacuation helipad is a clear area on a roof of a tall building that is not intended to function fully as a heliport, yet is capable of accommodating helicopters engaged in emergency evacuation operations.

H1.2 To facilitate emergency evacuation operations, local building requirements (where applicable) may require structures over a specified height to provide a clear area on the roof capable of accommodating a helicopter. Since the cleared area is not intended to function as a heliport, there is no requirement to apply for certification or acceptance from the CAMA, however permissions or approvals may be required from the local authorities, municipalities or the Civil Defense.

H1.3 An emergency evacuation helipad shall not show the Heliport Identification Marking detailed in Chapter 7.2.

H1.4 The owner/occupier of a building with an emergency evacuation helipad shall provide details of the emergency evacuation helipad to the CAMA at ***ad.certification@cama.gov.ye***. This information shall include the name of the building, its geographic location in WGS-84 coordinates and the D-Value.

H1.5 The D-value is the largest overall dimension of the largest helicopter intended to use the helipad. It is measured from the most forward position of the main rotor tip path plane to the most rearward position of the tail rotor tip path plane or helicopter structure.

H1.6 Operators of emergency evacuation helipads should also advise the local air traffic services of the facility and should produce supporting procedures.

H1.7 If the emergency evacuation helipad is no longer intended to be used, all markings shall be removed or the Closed Marking detailed in Chapter 7.16 shall be painted on the helipad.

H2 FINAL APPROACH AND TAKE-OFF AREAS

H2.1 *Recommendation* — An emergency evacuation helipad should be provided with a final approach and take-off area (FATO) that should be obstacle free.

H2.2 *Recommendation* — The dimension of the FATO should of sufficient size and shape to contain an area within which can be drawn a circle of 1.25 D.

H3 TOUCHDOWN AND LIFT-OFF AREA

H3.1 *Recommendation* — An emergency evacuation helipad should be provided with a touchdown and lift-off area (TLOF), with the centre of the TLOF collocated with the centre of the FATO.

H1.2 *Recommendation* — The TLOF should be of sufficient size to contain a circle of diameter of at least 0.83 D.

H3.3 *Recommendation* — The TLOF should be dynamic load bearing.

H3.4 *Recommendation* – A TLOF perimeter marking should be displayed along the edge of the TLOF.

H3.5 *Recommendation* – A TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

H4 HELIPAD IDENTIFICATION MARKING

H4.1 *Recommendation* — An emergency evacuation helipad should be provided with a helipad identification marking located at the centre of the TLOF.

H4.2 *Recommendation* — The helipad identification marking should consist of a yellow colored 'E' as depicted in Figure 11-1, with dimensions no less than those shown.

H5 MAXIMUM ALLOWABLE MASS

H5.1 *Recommendation* — A marking indicating the maximum allowable mass for which the helipad has been designed to accommodate should be displayed at an emergency evacuation helipad.

H5.2 *Recommendation* — A maximum allowable mass marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

H5.3 *Recommendation* — The maximum allowable mass marking should be expressed to the nearest 100 kg. The marking should be presented to one decimal place and rounded to the nearest 100 kg followed by the letter "t".

H6 D-VALUE MARKING

H6.1 *Recommendation* — The D-value marking should be located within the TLOF and so arranged as to be readable from the preferred final approach direction.

H6.2 *Recommendation* — The D-value marking should be white. It should be rounded down to the nearest whole number, followed by the letter "m".

H7 BUILDING FIRE PROTECTION

The buildings fire protection system shall be designed so as to afford fire protection for the evacuation helipad to support its operational function.

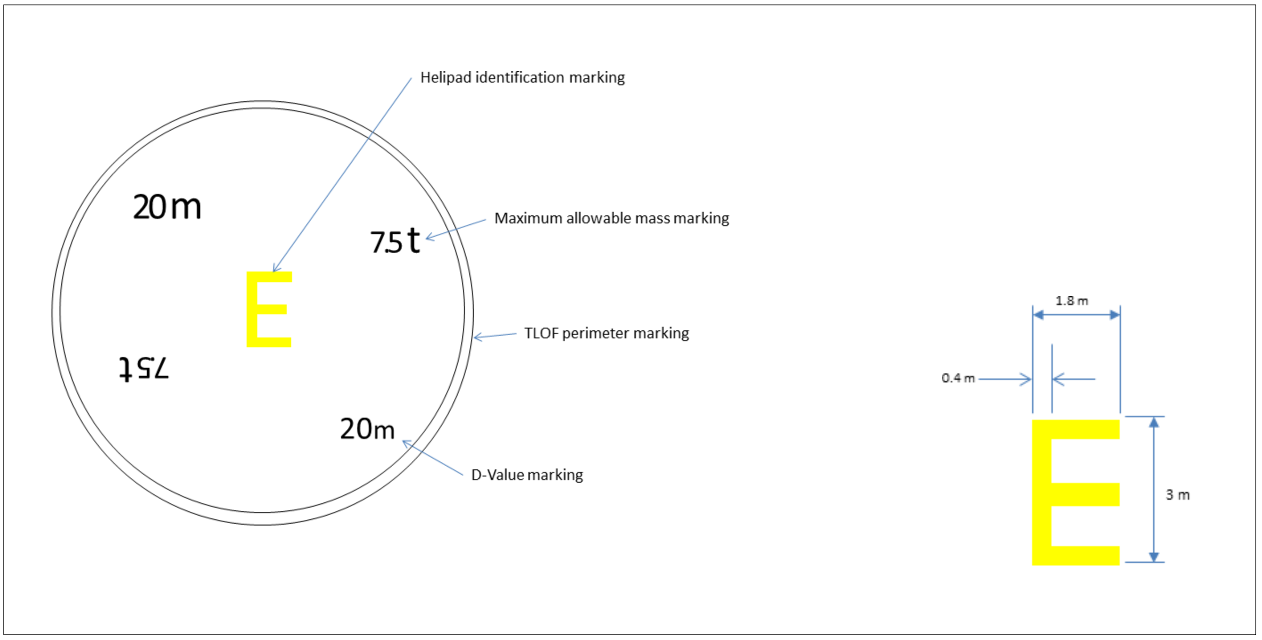


Figure H-1 – Emergency Evacuation Helipad Markings