Part 138

Certification and Operations: Heliports

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Abbreviations

APAPI	Abbreviated precision approach path indicator
ASPSL	Arrays of segmented point source lighting
cd	Candela
cm	Centimeter
DIFFS	Deck integrated firefighting system
FAS	Fixed application system
FATO	Final approach and take-off area
FFAS	Fixed foam application system
FMS	Fixed monitor system
Ft	Foot
GNSS	Global navigation satellite system
HAPI	Helicopter approach path indicator
HFM	Helicopter flight manual
kg	Kilogram
km/h	Kilometer per hour
kt	Knot
L	Litre
lb	Pounds
LDAH	Landing distance available
L/min	Litre per minute
LOA	Limited obstacle area
LOS	Limited obstacle sector
LP	Luminescent panel
m	Meter
MAPt	Missed approach point
MTOM	Maximum take-off mass
NVIS	Night Vision Imaging Systems
OFS	Obstacle free sector
FFAS	Fixed foam application system
FMS	Fixed monitor system
PinS	Point-in-space
R/T	Radiotelephony or radio communications
RTODAH	Rejected take-off distance available
RFFS	Rescue and firefighting service
RTOD	Rejected take-off distance
s	Second
TTonne (1000 kg)	
TLOF	Touchdown and lift-off area
TODAH	Take-off distance available
UCW	Undercarriage width
VASI	Visual approach slope indicator

SUBPART A
Certification and Operations of International and National Heliports

138.1 Applicability

(a) This Part prescribes rules governing the certification and operation of heliports intended to be either wholly or in part used for the arrival, departure and surface movement of helicopter operations. Coordination between the airports and the ECAA is required for the implementation of this regulation. The requirements of ECAR Part 139 shall apply, where appropriate, to these heliports as well. This revised Part shall be effective as of the date of issue outlined in the footer of each Subpart.

Note. —The dimensions discussed in this part are based on consideration of single main rotor helicopters. For tandem rotor helicopters the heliport design will be based on a case-by-case review of the specific models using the basic requirement for a safety area and protection areas specified in this part. The specifications of the main subpart of this ECAR are applicable for visual heliports that may or may not incorporate the use of a Point-in-space approach or departure. Additional specifications for instrument heliports with non-precision and/or precision approaches and instrument departures are detailed in Appendix 2. The specifications of this ECAR are not applicable for water heliports (touchdown or lift-off on the surface of the water).

(b) The interpretation of some of the requirements in the ECAR expressly requires the exercising of discretion, the taking of a decision or the performance of a function by operator. In other requirements, the expression operator does not actually appear although its inclusion is implied. In both cases, the decision for whatever determination or action is necessary shall be approved from ECAA.

(c) The requirements in ECAR 138, shall apply to all heliports intended to be used by helicopters . They shall apply equally to areas for the exclusive use of helicopters at an aerodrome primarily meant for the use of aero planes. Where relevant, the provisions of ECAR 139, shall apply to the helicopter operations being conducted at such an aerodrome.

138.2 Introductory Note:

This Part contains requirements that prescribe 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 requirements limit or regulate the operation of an aircraft. When designing a heliport, the critical design helicopter, having the largest set of dimensions and the greatest maximum take-off mass (MTOM) the heliport is intended to serve, would need to be considered. It is to be noted that provisions for helicopter flight operations are contained in ECAR Parts 121, 145, and 91.

138.3 Definitions

ECAR, Part 139, contains definitions for the terms which are used in both parts. Those definitions are not reproduced in this part, with the exception of the following two, which are included for ease of Reference.

Heliport. An aerodrome or a defined area on a structure intended to be used wholly or in part for the arrival, departure and surface movement of helicopters.

Obstacle. All fixed (whether temporary or permanent) and mobile objects, or parts thereof, that:

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

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

(c) Stand outside those defined surfaces and that have been assessed as being a hazard to air navigation.

The following list contains definitions of terms that are used only in ECAR138, withthe meanings given below:

D. 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.

Design D. The D of the design helicopter.

D-value. A limiting dimension, in terms of "D", for a heliport, helideck or shipboard heliport, or for a defined area within.

Declared distances - heliports:

(1) Take-off distance available (TODAH): The length of the final approach and take-off area plus the length of helicopter clearway (if provided) declared available and suitable for helicopters to complete the take-off.

(2) Rejected take-off distance available (RTODAH): The length of the final approach and take-off area declared available and suitable for helicopters operated in performance class 1 tocomplete a rejected take-off.

(3) Landing distance available (LDAH): The length of the final approach and take-off area plus any additional area declared available and suitable for helicopters to complete the landing maneuver from a defined height.

Dynamicloadbearing surface: A surface capable of supporting the loadsgenerated by a helicopterIn motion.

Elevatedheliport: A heliportlocated on a raised structure on land.

Elongated. When used with TLOF or FATO, elongated means an area which has a length more than twice its width.

Final approach and take-off area (FATO).:A defined area over which the final phase of the approachmanoeuvre to hover or landing iscompleted and fromwhich the take-off manœuvreiscommenced. Where the FATO is to beused by helicoptersoperated in performance class 1, the defined area includes the rejected take-off area available.

Helicopterclearway: A defined area on the ground or water selected and/or prepared as a suitable area over which a helicopteroperated in performance class 1 mayaccelerate and achieve a specificheight.

Helicoptertaxiway:A defined path on a heliportintended for the ground movement of helicopters and that may be combined with an air taxi-route to permit both ground and air taxiing.

Helicopter reference point (HRP): The designated location of a helicopter.

Helicopter stand :A defined area intended to accommodate a helicopter for purposes of: loading or unloading passengers, mail or cargo; fuelling, parking or maintenance; and, where air taxiing operations are contemplated, the TLOF.

Helicopter taxi-route. A defined path established for the movement of helicopters from one part of a heliport to another.

i) An air taxi-route. A marked taxi-route intended for air taxiing.

ii) A ground taxi-route. A taxi-route centred on a taxiway.

Helideck:A heliportlocatedon fixed or floating offshorefacilitysuch as an exploration and/orproduction unit used for the exploitation of oil or gas.

Heliportelevation. The elevation of the highest point of the FATO.

Point-in-spaceapproach (PinS). The Point-in –spaceapproachisbased on GNSS and is an approachproceduredesigned for helicopteronly. It isalignedwith a reference point located to permit subsequent flight manoeuvring or approach and landing usingvisualmanoeuvring in adequatevisual conditions to see and avoid obstacles.

Point- in- space (PinS) visual segment. This is the segment of a helicopterPinSapproachprocedurefrom theMAPt to the landing location for a PinS "proceedvisually" 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 PANS-OPS (Doc 8168).

Protection area. A defined area surrounding a stand intended to reduce the risk of damage from helicopters accidentally diverging from the stand.

Rejected take-off area: A defined area on a heliportsuitable for helicopters operating in performance class 1 to complete a rejected take-off.

Runway - type FATO : A FATO havingcharacteristicssimilar in shape to a runway .

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.

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.Anon-

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 a structure on the surface of the water.

Touchdown and lift-off area (TLOF): An area on which a helicopter may touchdown or lift off.

Touchdown positioning circle (TDPC). A touchdown positioning marking (TDPM) in the form of a circle used for omnidirectional positioning in a TLOF.

Touchdown positioning marking (TDPM*).* A marking or set of markings providing visual cues for the positioning of helicopters.

Winching area: An area provided for the transfer by helicopter of personnel or stores to or from a ship .

138.5 Standards and procedures for compliance with the certification and operations requirements of this Part

(a) The requirements prescribed in this Part shall apply to all heliports and must be complied with in a manner acceptable to the ECAA. Egyptian Civil Aviation Advisory Circulars contain standards and procedures that are acceptable to the ECAA for compliance with this Part. Some of these advisory circulars are referenced in specific sections of this Part. The standards and procedures in them, or other standards and procedures approved by the ECAA, may be used to comply with those sections. Heliports used for military operations only are excluded from complying with the provisions contained in Part 138. Heliports must comply with the provisions contained in this Part and other related documents, and such provisions must be contained in the heliport certification manual.

(b) Wherever a colour is referred to in this Part, the requirements for that colour given in Appendix 1 of ECAR Part 139 shall apply.

(c) The requirements of this revised Part that include the operative verb “shall” or “must’ are considered mandatory as of the date of effectiveness of this revised Part.

(d) In the event of non compliance with a requirement of this revised Part that include the operative verb "should”, the heliport operators shall submit a relevant compliance plan with those requirements at the date of effectiveness of this revised Part to be reviewed and approved by ECAA prior to certification.

138.7 Commonreference systems

(a) Horizontal reference system:

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

Note: Comprehensive guidance material concerning WGS-84 is contained in ECAR Part 173.

(b) Vertical reference system:

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

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

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

(c) Temporal reference system:

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

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

138.9 through 138.99 Reserved

SUBPART B

Certification

138.101 Certification requirements: General

(a) No person may operate an international heliport (including any buildings, installations, and equipment) in the Arab Republic of Egypt, or any territory or possession of the Arab Republic of Egypt, intended to be used either wholly or in part for the arrival, departure and surface movement of helicopter operations without heliport certificate issued by the ECAA (in accordance with the specifications contained in this Part, as well as the EACs referred to in this Part), or in violation to that certificate, the applicable provisions of this Part, or the approved heliport certification manual for that heliport.

(b) As of 1st January 2006, no person may operate a national heliport (including any buildings, installations, and equipment) in the Arab Republic of Egypt, or any territory or possession of the Arab Republic of Egypt, intended to be used either wholly or in part for the arrival, departure and surface movement of helicopter operation without heliport certificate issued by the ECAA and in accordance with the requirements contained in this Part as well as the EACs referred to therein.

(c) The Operator of a non-approved heliport may be authorized by ECAA, to serve a commercial or non-commercial helicopter, in case of emergency and unusual circumstances.

138.103 Application for heliport certificate

(a) Each applicant for heliport certificate must submit an application, in the form and manner prescribed by the ECAA.

(b) The application should be accompanied by two copies of a completed heliport certification manual prepared in accordance with Subpart C of this Part.

138.105 ECAA Inspection Authority

Each aerodrome operator shall grant unrestricted and unlimited access for ECAA inspectors to inspect his personnel, facilities, equipment, documents and records to determine

(a) Compliance with the requirements of this Part;

(b) The use of all related advisory circulars guidance, Certalerts approved equivalent means of compliance.

138.107 Issuance of heliport certificate

(a) An applicant for heliport certificate is entitled to a certificate if:
  (1) The provisions of 138.103 of this Subpart are met;
  (2) The ECAA, after investigation, finds that the applicant is properly and adequately equipped and able to provide a safe heliport-operating environment in accordance with:
    (i) This Part, and
    (ii) Any limitations the ECAA finds necessary in the public interest.

(b) The ECAA accepts the heliport certification manual.

138.109 Duration of heliport certificate

(a) Heliport certificate may be granted or renewed for a period of one year.

(b) Heliport certificate issued under this Part remains in force until it is surrendered by the heliport certificate holder, expired, suspended, or revoked by the ECAA, whatever is earlier.

(c) The holder of heliport certificate that is expired or is revoked shall promptly surrender the certificate to the ECAA.

(d) The holder of heliport certificate that is suspended shall promptly produce the certificate to the ECAA for appropriate endorsement.

138.111 Exemptions

(a) An applicant or a heliport certificate holder may petition the ECAA for an exemption from complying with any requirement of this Part if deemed for a compelling reason (i.e., emergency, burdensome or impractical). .

(b) Each petition filed under this section must be submitted in duplicate to the ECAA, in the form and manner acceptable to the ECAA.

(c) The ECAA may exempt, in writing, heliport operator from complying with specific provisions of this Part only and where permitted by those provisions, after carrying out

aeronautical studies, and determining the conditions and procedures that are necessary and shall be adopted by the heliport operator to ensure a level of safety equivalent to that established by the relevant standard or practice.

(d) An exemption is subject to the heliport operator complying with the conditions and procedures specified by the ECAA in the heliport certificate as being necessary in the interest of safety.

138.113 Deviations and endorsement of conditions on heliport certificate

(a) In emergency conditions requiring immediate action for the protection of life or property, involving helicopter, the heliport certificate holder may deviate from any requirement of this Part to the extent required to meet that emergency. Each heliport certificate holder who deviates from a requirement under this paragraph shall, as soon as practicable, but not later than 14 days after the emergency, report in writing to the ECAA stating the nature, extent, and duration of the deviation.

(b) Deviations from a requirement of this Part and conditions for the type of use of the heliport and other details will be set out in an endorsement on the heliport certificate.

138.115 Amendment of heliport certificate

Provided that the requirements of 138.107(a) and 138.213 have been met, ECAA may amend heliport certificate when:

(a) There is a change in the ownership or management of the heliport;
(b) There is a change in the use or operation of the heliport;
(c) There is a change in the boundaries of the heliport; or
(d) The holder of the heliport certificate request an amendment.

138.117 Surrender of heliport certificate:

(a) The heliport certificate holder must give the ECAA, not less than 30 days, written notice of the date on which the certificate is to be surrendered in order that suitable promulgation action can be taken.

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

138.119 Transfer of heliport certificate:

(a) The ECAA may give its consent to and issue an instrument of transfer of heliport certificate to a transferee when :
  (1) The current holder of the heliport certificate notifies the ECAA, in writing, at least 90 days before ceasing to operate the heliport, that the current holder will cease to operate the heliport as of the date specified in the notice;
  (2) The current holder of the heliport certificate notifies the ECAA, in writing, of the name of the transferee;
  (3) The transferee applies to the ECAA, in writing, in the form and manner prescribed by ECAA, within 90 days before the current holder of the heliport certificate ceases to operate the heliport certificate to be transferred to the transferee; and
  (4) The requirements set out in regulation 138.107 are met by the transferee.

(b) If the ECAA does not consent to the transfer of heliport certificate, it shall notify the current heliport certificate holder and the transferee, in writing of its reasons no later than 7 days after making that decision.

138.121 Interim heliport certificate:

(a) The ECAA may issue an interim heliport certificate to the heliport certificate applicant or the proposed transferee, authorizing the applicant or transferee to operate heliport if the ECAA is satisfied that:
  (1) Heliport certificate in respect of the heliport will be issued to the applicant, or transferred to the transferee as soon as the application procedure for the grant or transfer of heliport certificate has been completed; and
  (2) The grant of the interim certificate is in the public interest and is not detrimental to aviation safety.

(b) An interim heliport certificate issued pursuant to regulation 138.121(a) shall expire on:
  (1) The date on which the heliport certificate is issued or transferred; or
  (2) The expiry date specified in the interim heliport certificate.

  Whichever is earlier.

(c) This Part applies to an interim heliport certificate in the same manner as they apply to heliport certificate.

138.123Renewal of heliport certificate

(a) An application for the renewal of heliport operating certificate shall be made using the appropriate application form.
(b) The application shall be submitted to the ECAA 60-days before the certificate expires.
(c) The heliport certificate holder shall comply with any additional conditions specified by the ECAA to renew the certificate.

138.125Enforcement action

(a) Penalties:
  (1) ECAA may impose a penalty (according to the Civil Aviation Law No. 28, item No. 157) if:
    (i) It finds that the heliport certificate holder does not comply with the requirements of this Part and such holder failed to remedy such non-compliance within 60-days after receiving notice in writing from ECAA to do so;
    (ii) Such action is necessary in the interest of aviation safety;
    (iii) Its inspector is prevented by the heliport operator from carrying out a safety inspection when his report recommends such action;
    (iv) The heliport certificate holder failed to provide the service in the required standard level, which is confirmed to ECAA by receiving reports from the users of the service and proved by ECAA formal field inspection; and
  (2) When proposing a penalty, ECAA will state the reasons for such action and will furnish them to the heliport certificate holder.

(b) Suspension of heliport certificate:
This is a subsequent procedure to impose a penalty.
  (1) ECAA may suspend for a defined period, heliport certificate issued under this Part if:
    (i) Subject to item 138.125 Paragraph (a), ECAA is satisfied that the heliport certificate holder still unable to remedy any of these non-compliant areas within the specified time frame of 60-days;
    (ii) The investigation, in case of an accident, proves that it was caused due to the faulty procedures and/or the malfunction or failure of heliport operating equipment or system;
    (iii) The heliport certificate holder failed to perform the action plan stated in the heliport certification manual within the exact period of time if so stated; and
    (iv) Such suspension is still necessary in the interest of aviation safety.
  (2) When enforcing a suspension, the ECAA will state the reasons for such action and furnish them to the heliport certificate holder.
  (3) The heliport certificate holder may appeal against such notice within 10-days of receipt.
  (4) The appellant shall furnish to ECAA any documents, records, or other pertinent information supporting the appeal.
  (5) ECAA may confirm, modify, or set aside the proposed suspension based on the appeal.

(c) Revocation of heliport certificate:
This is a subsequent procedure to suspension.
  (1) ECAA may permanently revoke heliport certificate issued under this Part if:
    (i) It is verified that the heliport certificate holder will not be able to remedy non-compliant areas; or
    (ii) The heliport certificate holder stops providing the service concerned without a convincing argument.
    (iii) ECAA has decided for the interest of safety to terminate services provided at this heliport.
    (iv) The Ministerial Order issued for the heliport certificate holder is revoked.
  (2) The revoked certificate cannot be renewed, however, it may be reissued not less than six months after the revocation date.

138.127 Through 138.199 Reserved

SUBPART C
Heliport Certification Manual

138.201 Preparation of heliport certification manual

Each heliport certification manual required by this Part shall:

(a) Be type written or printed and signed by the heliport operator or owner;
(b) Be in a form that is easy to revise;
(c) Have the date of initial approval or approval of the latest revision on each page or item in the manual and include a page revision log; and
(d) Be organized in a manner helpful to the preparation, review, and approval processes.

138.203 Maintenance of heliport certification manual

Each holder of heliport certificate shall:

(a) Keep its heliport certification manual current at all times;
(b) Maintain at least one complete and current copy of its approved heliport certification manual on the heliport;
(c) Furnish the applicable portions of the approved heliport certification manual to the heliport personnel responsible for their implementation;
(d) Make the copy required by paragraph (b) of this section available for inspection by the ECAA upon request; and
(e) Provide the ECAA with one complete and current copy required by paragraph (b) of this section.

138.205 Heliport certificate: Heliport certification manual

(a) An applicant for heliport certificate must prepare, and submit with the application, two copies of a heliport certification manual for approval by the ECAA. Only those items addressing subjects required for certification under this Part shall be included in the heliport certification manual.
(b) Each heliport certificate holder shall comply with the approved heliport certification manual that meets the requirements of 138.201, 138.203 and 138.207.

138.207 Contents of heliport certification manual

(a) Each heliport certification manual required by this Part shall include operating procedures, facilities and equipment descriptions, responsibility assignments, and any other information needed by personnel concerned with operating the heliport in order to comply with:
  (1) The provisions of this Part; and
  (2) Any limitations which the ECAA finds necessary in the public interest.

(b) In complying with paragraph (a) of this section, the heliport certification manual must include at least the following elements:
  (1) Lines of succession of heliport operational responsibility;
  (2) Each current exemption issued to the heliport from the requirements of this Part;
  (3) Any limitations imposed by the ECAA;
  (4) A grid map or other means of identifying locations and terrain features on and around the heliport which are significant to emergency operations;
  (5) The system of Air taxiways, air transit route and ground taxiway identification;
  (6) The location of each obstruction required to be lighted or marked within the heliport's area of authority;
  (7) A description of each movement area available for helicopter (Final approach and take-off areas, Helicopter clearways, Touchdown and lift-off areas, Safety areas, Helicopter ground taxiways, Air taxiways, Air transit route, Aprons, and Location of a final approach and take-off area in relation to a runway or taxiway);
  (8) Procedures for avoidance of interruption or failure during construction work of utilities serving facilities or navaids which support helicopter operations;
  (9) Procedures for complying with the requirements of 138.305 relating to heliport data;
  (10) Procedures for complying with the requirements of 138.307 relating to Physical characteristics;
  (11) Procedures for Obstacle restriction and removal as required by 138.309;
  (12) A description of, and procedures for maintaining, the indicators as required by 138.311;

(13) A description of, and procedures for maintaining, Markings and markers systems as required by 138.313;
(14) A description of, and procedures for maintaining, the lightings systems as required by 138.315;
(15) A description of the facilities, equipment, personnel, and procedures for meeting the rescue and fire fighting requirements in 138.317;
(16) Procedures for conducting the maintenance program
(17) Procedures for conducting the self-inspection program; and
(18) Any other item, which the ECAA finds, is necessary in the public interest.

138.209 (Reserved)

138.211 (Reserved)

138.213 Amendment of heliport certification manual

(a) The heliport certification manual shall be a living document subject to amendment in order to ensure that it provides current and accurate information.
(b) The ECAA may issue written directives to the heliport operator requiring the operator to alter or amend the heliport certification manual approved under this Part, either:
  (1) Upon application by the heliport certificate holder; or
  (2) On the ECAA own initiative if it determines that safety in air transportation or air commerce and the public interest require the amendment.
(c) An applicant for an amendment to its heliport certification manual shall file its application with the ECAA at least 30 days before the proposed effective date of the amendment, unless a shorter filing period is allowed by the ECAA.
(d) At any time within 30 days after receiving a notice of refusal to approve the application for amendment, the heliport certificate holder may petition the ECAA to reconsider the refusal to amend.
(e) In the case of amendments initiated by the ECAA, the heliport certificate holder shall be notified by the ECAA of the proposed amendment, in writing, fixing a reasonable period (but not less than 7 days) within which the heliport certificate holder may submit written information, views, and arguments on the amendment. After considering all relevant material presented, the ECAA notifies the heliport certificate holder of any amendment adopted or rescinds the notice. The amendment becomes effective not less than 30 days after the heliport certificate holder receives notice of it, except that prior to the effective date the heliport certificate holder may petition the ECAA to reconsider the amendment, in which case its effective date is stayed pending a decision by the ECAA.
(f) Notwithstanding the provisions of paragraph (e) of this section, if the ECAA finds that there is an emergency requiring immediate action with respect to safety in air transportation or air commerce that makes the procedures in this paragraph impractical or contrary to the public interest, the ECAA may issue an amendment, effective without stay on the date the heliport certificate holder receives notice of it. In such a case, the ECAA incorporates the finding of the emergency, and a brief statement of the reasons for the finding, in the notice of the amendment. Within 30 days after the issuance of such an emergency amendment, the heliport certificate holder may petition the ECAA to reconsider either the finding of an emergency or the amendment itself or both. This petition does not automatically stay the effectiveness of the emergency amendment.
(g) The heliport certificate holder shall be responsible for the amendment of the manual, whenever necessary, in order to maintain the accuracy of the information in the manual. Amendments of the manual shall be accepted from the ECAA before their application.

138.215 through 138.299 Reserved

SUBPART D
Heliport Data, Physical Characteristics and Obstacle

138.301 Reserved

138.303 Personnel

(a) Each certificate holder shall maintain sufficient qualified personnel to comply with the requirements of its heliport certification manual and the applicable provisions of this Part.

(b) Each heliport operator shall implement a program to upgrade the competency of the personnel.

138.305 Heliport data

(a) Aeronautical data:

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

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

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

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

(b) Heliport reference point:

(1) A heliport reference point shall be established for a heliport not co-located with an aerodrome.
Note: When the heliport is co-located with an aerodrome, the established aerodrome reference point serves both aerodrome and heliport.

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

(3) The position of the heliport reference point shall be measured and reported by heliport administration to the ECAA in degrees, minutes and seconds.

(c) Heliport elevation:

(1) The heliport elevation and geoid undulation at the heliport elevation position shall be measured and reported by heliport administration to the ECAA to the accuracy of one-half meter or foot.

(2) The elevation of the touchdown and lift-off area and/or the elevation and geoid undulation of each threshold of the final approach and take-off area (where appropriate) shall be measured and reported by heliport administration to the ECAA to the accuracy of one half meter or foot.
Note: Geoid undulation must be measured in accordance with the appropriate system of coordinates.

(d) Heliport dimensions and related information:

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

(i) Heliport type: surface-level, elevated , shipboardor helideck;

(ii) TLOF: dimensions to the nearest meter or foot, slope, surface type, bearing strength in tonnes (1 000 kg);

(iii) FATO: type of FATO, true bearing to one-hundredth of a degree, designation number (where appropriate), length, and width to the nearest meter or foot, slope, surface type;

(iv) Safety area: length, width and surface type;

(v) Helicopter taxiway, and helicopter taxi route: designation, width, surface type;

(vi) Apron: surface type, helicopter stands;

(vii) Clearway: length, ground profile; and

(viii) Visual aids for approach procedures, marking and lighting of FATO, TLOF, helicopter groundtaxiways, helicopter air taxiwaysand helicopterstands.

(2) The geographical coordinates of the geometric centre of theTLOF and/or of each threshold of the FATO (where appropriate) shall be measured and reported by heliport administration to the ECAA in degrees, minutes, seconds and hundredths of seconds.

(3) The geographical coordinates of appropriate center line points of helicopter taxiways, and helicopter taxi routes shall be measured and reported by heliport administration to the ECAA in degrees, minutes, seconds and hundredths of seconds.

(4) The geographical coordinates of each helicopter stand shall be measured and reported by heliport administration to the ECAA in degrees, minutes, seconds and hundredths of seconds.

(5) The geographical coordinates of obstacles in Area 2(the part within the heliport boundary) and in Area 3 shall be measured by heliport administration and reported to the ECAA in degrees, minutes, seconds and tenths of seconds. In addition, the top elevation, type, marking and lighting (if any) of obstacles shall be reported by heliport administration to the ECAA.

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

(e)Declared distances: The following distances to the nearest meter or foot shall be declared, where relevant, for a heliport:

(1) Take-off distance available;

(2) Rejected take-off distance available; and

(3) Landing distance available.

(f) Co-ordination between aeronautical information services and heliport authorities:

(1) To ensure that aeronautical information services units obtain information to enable them to provide up-to-date pre-flight information and to meet the need for in-flight information, arrangements shall be made between aeronautical information services and heliport authorities responsible for heliport services to report to the responsible aeronautical information services unit, with a minimum of delay:

(i) Information on heliport conditions;

(ii) The operational status of associated facilities, services and navigation aids within their area of responsibility;

(iii) Any other information considered to be of operational significance.

(2) Before introducing changes to the air navigation system, due account shall be taken by the services responsible for such changes of the time needed by the aeronautical information service for the preparation, production and issue of relevant material for promulgation. To ensure timely provision of the information to the aeronautical information service, close co-ordination between those services concerned is therefore required.

(3) Of a particular importance are changes to aeronautical information that affect charts and/or computer based navigation systems which qualify to be notified by the aeronautical information regulation and control (AIRAC) system, as specified in ECAR Part 173. The predetermined, internationally agreed AIRAC effective dates in addition to 14 days postage time shall be observed by the responsible heliport services when submitting the raw information/data to aeronautical information services.

Note.— Detailed specifications concerning the AIRAC system are contained in the PANS-AIM (Doc 10066), Chapter 6.

(4) The heliport services responsible for the provision of raw aeronautical information/data to aeronautical information services shall do that while taking into account accuracy and integrity requirements necessary to meet the needsof the end-user of aeronautical data.

Note 1.— Specifications concerning the accuracy and integrity classification of heliport-related aeronautical data arecontained in the PANS-AIM (Doc 10066), Appendix 1.

Note 2.— AIRAC information is distributed by aeronautical information services at least 42 days in advance of the AIRAC effective dates with the objective of reaching recipients at least 28 days in advance of the effective date.

Note 3.— The schedule of the predetermined internationally agreed AIRAC common effective dates at intervals of 28 days and guidance for AIRAC use are contained in ECAR 173

(g) Rescue and firefighting

Note.— See 139.317.b for information on rescue and firefighting services.

(1) Information concerning the level of protection provided at a heliport for helicopter rescue and firefighting purposes shall be made available.

(2) The level of protection normally available at a heliport should be expressed in terms of the category of the rescue and firefighting service as described in 139.317.b and in accordance with the types and amounts of extinguishing agents normally available at the heliport.

(3) Changes in the level of protection normally available at a heliport for rescue and firefighting shall be notified to the appropriate aeronautical information services units and, where applicable, air traffic units to enable them to provide the necessary information to arriving and departing helicopters. When such a change has been corrected, the above units shall be advised accordingly.

Note. — Changes in the level of protection from that normally available at the heliport could result from, but may not be limited to, a change in the availability of extinguishing agent or equipment used to deliver agents, or of personnel used to operate the equipment.

(4) A change should be expressed in terms of the new category of the rescue and firefighting service available at the heliport.

138.307Physical characteristics

(a) Onshoreheliports:

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 138.309, do not overlap Further guidance on this issue is given in the Heliport Manual (EAC 139-27) .

Note 3.— The provisions given in this section are common for surface-level heliports and elevated heliports unless otherwise specified.

Note 4.— Guidance on the minimum size for elevated FATO/TLOFs in order to permit facilitation of essential operations around the helicopter is given in the Heliport Manual (EAC 139-27).

Note 5.— Guidance on structural design to account for the presence on elevated heliports of personnel, snow, freight, refuelling and firefighting equipment, etc. is given in the Heliport Manual (EAC 139-27).

Note 6.— Guidance on siting of a heliport and the location of the various defined areas, with due consideration of the effects of rotor downwash and other aspects of helicopter operations on third parties is given in the Heliport Manual (EAC 139-27).

(1) **Final approach and take-off areas (FATO):**

Note. — Guidance on siting and orientation of the FATO at a heliport to minimize interference of arrival and departure tracks with areas approved for residential use and other noise-sensitive areas close to the heliport is given in the Heliport Manual (EAC 139-27).

A FATO shall:

a) provide :

1)an area free of obstacles, except for essential objects which because of their function are located on it, and of sufficient size and shape to ensure containment of every part of the design helicopter in the final phase of approach and commencement of take-off - in accordance with the intended procedures;

Note.— Essential objects are visual aids (e.g. lighting) or others (e.g. firefighting systems) necessary for safety purposes. For further requirements regarding penetration of a FATO by essential objects, see 139.307.a.4

2)when solid, a surface which is resistant to the effects of rotor downwash; and

i) when collocated with a TLOF, is contiguous and flush with the TLOF; has bearing strength capable of withstanding the intended loads; and ensures effective drainage; or

ii) when not collocated with a TLOF, is free of hazards should a forced landing be required; and

Note.— Resistant implies that effects from the rotor downwash neither cause a degradation of the surface nor result in flying debris. And,

b) be associated with a safety area.

Final approach and take-off areas:

(2) A heliport shall be provided with at least one which need not be solid.

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

(3) The minimum dimensions of a FATO shall be:

a) where intended to be used by helicopters operated in performance class 1:

i) the length of the Rejected Take-Off Distance (RTOD) for the required Take-Off procedure prescribed in the helicopter flight manual (HFM) of the helicopters for which the FATO is intended, or 1.5 Design D, whichever is greater; and

ii) the width for the required procedure prescribed in the HFM of the helicopters for which the FATO is intended, or 1.5 Design D, whichever is greater.

b) where intended to be used by helicopters operated in performance classes 2 or 3, the lesser of:

i) an area within which can be drawn a circle of diameter of 1.5 Design D; or,

ii) when there is a limitation on the direction of approach and touchdown, an area of sufficient width to meet the requirement of 139.307.a.1.a.i but not less than 1.5 times the overall width of the design helicopter.

Note 1.— The RTOD is intended to ensure containment of the helicopter during a rejected take-off. Although some flight manuals provide the RTOD, in others the dimension provided is the "minimum demonstrated … size" (where "…" could be "heliport", "runway", "helideck" etc.) and this may not include helicopter containment. When this is the case, it is necessary to consider sufficient safety area dimensions as well as the dimensions of l.5·D for the FATO, should the HFM not deliver data. For further guidancesee Heliport Manual (EAC 139-27).

Note 2.— Local conditions, such as elevation, and temperature, and permitted manoeuvring may need to be considered when determining the size of a FATO. Guidance is given in the Heliport Manual (EAC 139-27).

(4) Essential objects located in a FATO shall not penetrate a horizontal plane at the FATO elevation by more than 5 cm.

(5) When the FATO is solid the slope should not:

a) except as provided in b) or c) below; exceed 2 per cent in any direction;

b) when the FATO is elongated and intended to be used by helicopters operated in performance class 1, exceed 3 per cent overall, or have a local slope exceeding 5 per cent; and

c) when the FATO is elongated and intended to be used solely by helicopters operated in performance class 2 or 3, exceed 3 per cent overall, or have a local slope exceeding 7 per cent.

(6) The FATO should be located so as to minimize the influence of thesurrounding environment,

including turbulence, which could have an adverse impact on helicopter operations.

Note.— Guidance on determining the influence of turbulence is given in the EAC 139-27. If turbulence mitigating design measures are warranted but not practical, operational limitations may need to be considered under certain wind conditions.

(7) A FATO shall be surrounded by a safety area which need not be solid.

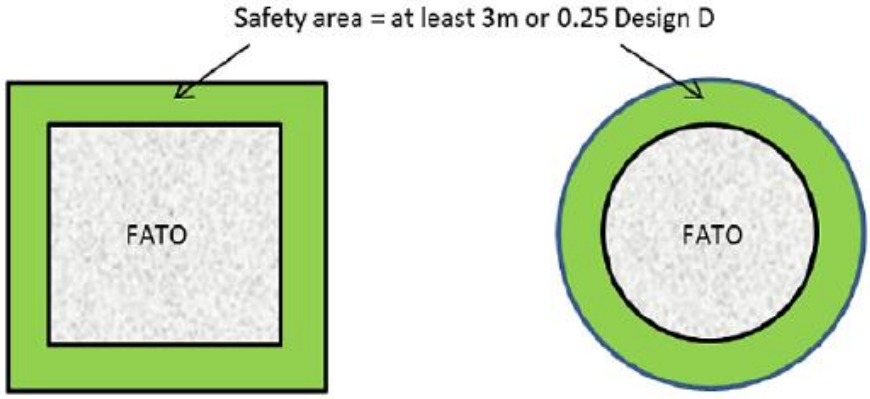


Figure 3-1. FATO and associated safety area

(8)Safety areas :A safety area shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it, to compensate for manoeuvring errors; and

b) when solid, a surface which: is contiguous and flush with the FATO; is resistant to the effects of rotor downwash; and ensures effective drainage.

(9) The 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 Design D, whichever is greater. see Figure 3-1

(10) No mobile object shall be permitted in a safety area during helicopter operations.

(11)Essential objects located in the safety area shall not penetrate a surface originating at the edge of the FATO at a height of 25 cm above the plane of the FATO sloping upwards and outwards at a gradient of 5 per cent.

(12) When solid, the slope of the safety area shouldnot exceed an upward slope of 4 per cent outwards from the edge of the FATO.

(13) **Protected side slope:** A heliport shall be provided with at least oneprotected side slope rising at 45 degrees from the edge of the safety area and extending to a distance of 10 m, (see figure 3-2) 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.

(14) A heliport should be provided with at least two protected side slopes, rising at 45 degrees outward from the edge of the safety area and extending to a distance of 10 m.

(15) The surface of a protected side slope shall not be penetrated by obstacles.

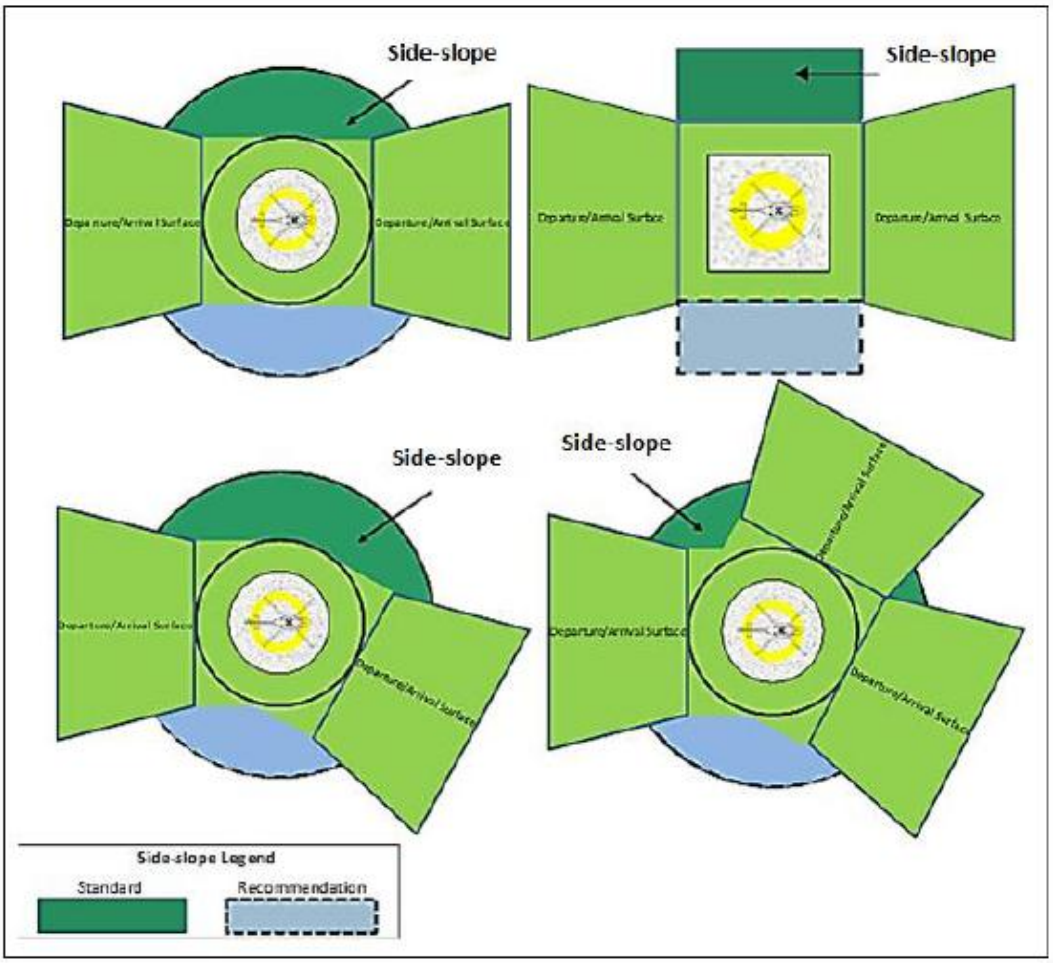


Figure 3-2. FATO simple/complex safety area and side slope protection

Note.— These diagrams show a number of configurations of FATO/Safety Areas/Side slopes. For a more complex arrival/departure arrangement which consists of: two surfaces that are not diametrically opposed; more than two surfaces; or an extensive obstacle free sector (OFS) which abuts directly to the FATO, it can be seen that appropriate provisions are necessary to ensure that there are no obstacles between the FATO and/or safety area and the arrival/departure surfaces.

(16) **Helicopter clearways** : A helicopter clearway shall provide:

Note.— The inclusion of detailed specifications for helicopter clearways in this section is not intended to imply that a clearway has to be provided.

a) an area free of obstacles, except for essential objects which because of their function are located on it, and of sufficient size and shape to ensure containment of the design helicopter when it is accelerating in level flight, and close to the surface, to achieve its safe climbing speed; and

b) when solid, a surface which: is contiguous and flush with the FATO; is resistant to the effects of rotor downwash; and is free of hazards if a forced landing is required.

(17)Helicopter clearways: When a helicopter clearway is provided, it shall be located beyond **the** end of the FATO

(18)The width of a helicopter clearway should not be less than that of the FATO and associated safety area (see Figure 3-1).

(19)When solid , ~~T~~the ground in a helicopter clearway should not project above a plane having an overall upward slope of 3 per cent,or having a local upward slope exceeding 5 per cent, the lower limit of this plane being a horizontal line which is located on the periphery of the FATO.

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

(21)**Touchdown and lift-off areas** : A TLOF shall:

a) provide:

1) an area free of obstacles and of sufficient size and shape to ensure containment of the undercarriage of the most demanding helicopter the TLOF is intended to serve in accordance with the intended orientation;

2) a surface which:

i) has sufficient bearing strength to accommodate the dynamic loads associated with the anticipated type of arrival of the helicopter at the designated TLOF;

ii) is free of irregularities that would adversely affect the touchdown or lift-off of helicopters;

iii) has sufficient friction to avoid skidding of helicopters or slipping of persons;

iv) is resistant to the effects of rotor downwash; and

v) ensures effective drainage while having no adverse effect on the control or stability of a helicopter during touchdown and lift-off, or when stationary; and

b) be associated with a FATO or a stand.

(22)A heliport shall be provided with at least one TLOF .

(23) A TLOF shall be provided whenever it is intended that the undercarriage of the helicopter will touch down within a FATO or stand, or lift off from a FATO or stand.

(24) The minimum dimensions of a TLOF shall be:

a) when in a FATO intended to be used by helicopters operated in performance class 1, the dimensions for the required procedure prescribed in the helicopter flight manuals (HFMs) of the helicopters for which the TLOF is intended; and

b) when in a FATO intended to be used by helicopters operated in performance classes 2 or 3, or in a stand:

1) when there is no limitation on the direction of touchdown, of sufficient size to contain a circle of diameter of at least 0.83 D of:

i) in a FATO, the design helicopter; or

ii) in a stand, the largest helicopter the stand is intended to serve;

2) when there is a limitation on the direction of touchdown, of sufficient width to meet the requirement of 139.307.a.21.a.1above but not less than twice the undercarriage width (UCW) of:

i) in a FATO, the design helicopter; or,

ii) in a stand, the most demanding helicopter the stand is intended to serve.

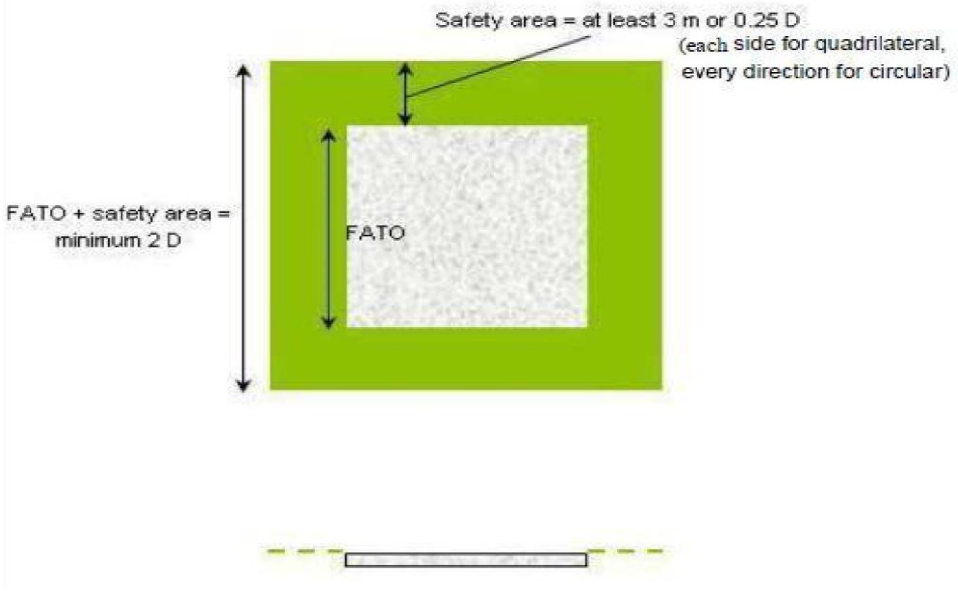
(25) For an elevated heliport, the minimum dimensions of a TLOF, when in a FATO, shall be of sufficient size to contain a circle of diameter of at least 1 Design-D.

(26) Slopes on a TLOF should not:

a) except as provided in b) or c) below; exceed 2 per cent in any direction;

b) when the TLOF is elongated and intended to be used by helicopters operated in performance class 1; exceed 3 per cent overall, or have a local slope exceeding 5 per cent; and

c) when the TLOF is elongated and intended to be used solely by helicopters operated in performance class 2 or 3, exceed 3 per cent overall, or have a local slope exceeding 7 per cent.



27) When a TLOF is within a FATO it should be:

a) centered on the FATO; or
b) for an elongated FATO, centred on the longitudinal axis of the FATO.

(28) When a TLOF is within a helicopter stand, it shall be centred on the stand

(29) A TLOF shall be provided with markings which clearly indicate the touchdown position and, by their form, any limitations on maneuvering.

Note.— When a TLOF in a FATO is larger than the minimum dimensions, the TDPM may be offset while ensuring containment of the undercarriage within the TLOF and the helicopter within the FATO.

(30) Where an elongated Performance Class 1 FATO/TLOF contains more than one TDPM, measures should be in place to ensure that only one can be used at a time.

(31) Where alternative TDPMs are provided they should be placed to ensure containment of the undercarriage within the TLOF and the helicopter within the FATO.

Note.— The efficacy of the rejected take-off or landing distance will be dependent upon the helicopter being correctly positioned for take-off, or landing.

(32) Safety devices such as safety nets or safety shelves shall be located around the edge of an elevated heliport but shall not exceed the height of the TLOF.

Helicopter Taxiway and taxi routes

Note 1.— The specifications for ground taxi-routes and air taxi-routes are intended for the safety of simultaneous operations during the manoeuvring of helicopters. The effect of wind velocity/turbulence induced by the rotor downwash would need to be considered.

Note 2.— The defined areas addressed in this section are :

a) Taxiways associated with air taxi-routes may be used by both wheeled and skidded helicopters for either ground or air taxiing.

b) Ground taxi-routes are meant for use by wheeled helicopters, for ground taxiing only.

(33) A helicopter taxiway shall:

a) provide:

1) an area free of obstacles and of sufficient width to ensure containment of the undercarriage of the most demanding wheeled helicopter the taxiway is intended to serve;

2) a surface which:

i) has bearing strength to accommodate the taxiing loads of the helicopters the taxiway is intended to serve;

ii) is free of irregularities that would adversely affect the ground taxiing of helicopters;

iii) is resistant to the effects of rotor downwash; and

iv) ensures effective drainage while having no adverse effect on the control or stability of a wheeled helicopter when being manoeuvred under its own power, or when stationary; and

b) be associated with a taxi-route

(34) The minimum width of a helicopter taxiway shall be the lesser of:

a) two times the undercarriage width (UCW) of the most demanding helicopter the taxiway is intended to serve; or

b) a width meeting the requirements of 139.307.a.33.a).1)

(35) The transverse slope of a taxiway should not exceed 2 per cent andthe longitudinal slope should not exceed 3 per cent.

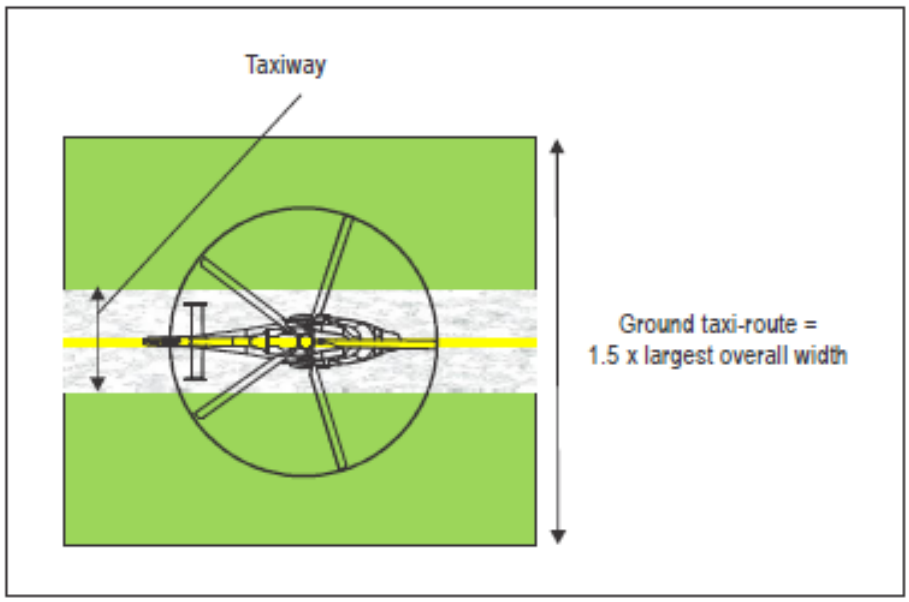


Figure 3-3. Helicopter taxiway/ground taxi-route

(36) **Helicopter Taxi routes :** A helicopter taxi-route shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it, established for the movement of helicopters; with sufficient width to ensure containment of the largest helicopter the taxi-route is intended to serve;

b) when solid, a surface which is resistant to the effects of rotor downwash; and

1) when collocated with a taxiway:

i) is contiguous and flush with the taxiway;

ii) does not present a hazard to operations; and

iii) ensures effective drainage; and

2) when not collocated with a taxiway:

i) is free of hazards if a forced landing is required.

(37)No mobile object shall be permitted on a taxi-route during helicopter operations .

Note.— See the (EAC 139-27) for further guidance.

(38) When solid and collocated with a taxiway, the taxi-route should not exceed an upward transverse slope of 4 per cent outwards from the edge of the taxiway.

(39) **Helicopter ground taxi-routes** : A helicopter ground taxi-route shall have a minimum width of 1.5 x the overall width of the largest helicopter it is intended to serve, and be centered on a taxiway. See Figure 3-3

(40) Essential objects located in a helicopter ground taxi-route shall not:

a) be located at a distance of less than 50 cm outwards from the edge of the helicopter taxiway; and

b) penetrate a surface originating 50 cm outwards of the edge of the helicopter taxiway and a height of 25 cm above the
surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.

(41)A helicopter air taxi-route shall have a minimum width of twice the overall width of the largest helicopter it is intended to serve.

(42) If collocated with a taxiway for the purpose of permitting both ground and air taxi operations (see Figure 3.4):

a) the helicopter air taxi-route shall be centred on the taxiway; and

b) essential objects located in the helicopter air taxi-route shall not:

1) be located at a distance of less than 50 cm outwards from the edge of the helicopter taxiway; and

2) penetrate a surface originating 50 cm outwards of the edge of the helicopter taxiway and a height of 25 cm above the surface of the taxiway and sloping upwards and outwards at a gradient of 5 per cent.

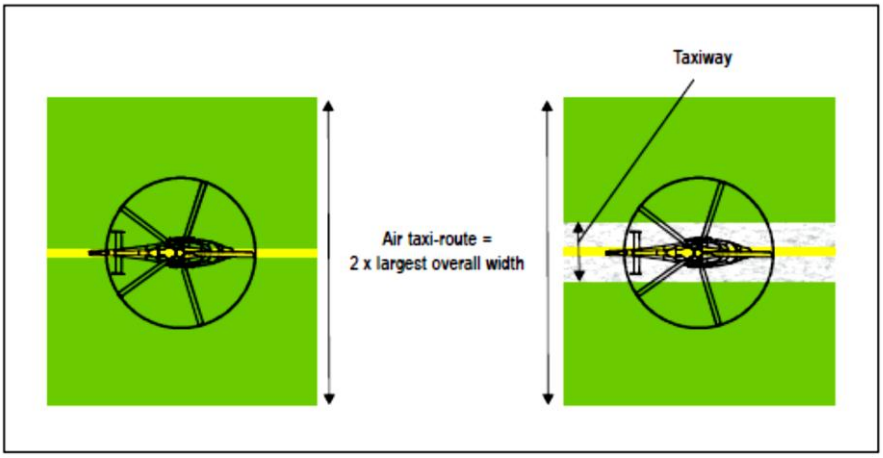


Figure 3-4. Helicopter air taxi-route and combined air taxi-route/taxiway

(43)When not collocated with a taxiway,the slopes of the surface an air taxi-routeshould not exceed the slope landing limitations of the helicopters the taxi-route 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.

(44)Helicopter stands: A helicopter stand shall:

a) provide:

1) an area free of obstacles and of sufficient size and shape to ensure containment of every part of the largest helicopter the stand is intended to serve when it is being positioned within the stand;

2) a surface which:

i) is resistant to the effects of rotor downwash;

ii) is free of irregularities that would adversely affect the manoeuvring of helicopters;

iii) has bearing strength capable of withstanding the intended loads;

iv) has sufficient friction to avoid skidding of helicopters or slipping of persons; and

v) ensures effective drainage while having no adverse effect on the control or stability of a wheeled helicopter when being manoeuvred under its own power, or when stationary; and

b) be associated with a protection area.

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 EAC 139-27 for further guidance.

(45) The minimum dimensions of a helicopter stand shall be:

a) a circle of diameter of 1.2 D of the largest helicopter the stand is intended to serve; or

b) when there is a limitation on manoeuvring and positioning, of sufficient width to meet the requirement of 138.307.a.44.a).1) above but not less 1.2 times overall width of largest helicopter the stand is intended to serve.

Note 1.— For a helicopter stand intended to be used for taxi-through only, a width less than 1.2D but which provides containment and still permits all required functions of a stand to be performed, might be used (in accordance with 138.307.a.44.a),1)).

Note 2.— For a helicopter stand intended to be used for turning on the ground, the minimum dimensions may be influenced by the turning circle data provided by the manufacturer and are likely to exceed 1.2 D. See the Heliport Manual (EAC 139-27)for further guidance.

(46) The mean slope of a helicopter stand in any direction should 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.

(47)Each helicopter stand shall be provided with positioning markings to clearly indicate where the helicopter is to be positioned and, by their form, any limitations on manoeuvring.

(48)A stand shall be surrounded by a protection area which need not be solid.

(49)**Protection areas** : A protection area shall provide:

a) an area free of obstacles, except for essential objects which because of their function are located on it; and

b) when solid, a surface which is contiguous and flush with the stand; is resistant to the effects of rotor downwash; and ensures effective drainage.

(50)When associated with a stand designed for turning, the protection area shall extend outwards from the periphery of the stand for a distance of 0.4D. (See Figure 3.5).

(51)When associated with a stand designed for taxi-through, the minimum width of the stand and protection area shall not be less than the width of the associated taxi-route (see Figures 3.6 and 3.7).

(52) When associated with a stand designed for non-simultaneous use (see Figures 3.8 and 3.9):

a) the protection area of adjacent stands may overlap but shall not be less than the required protection area for the larger of the adjacent stands; and

b) the adjacent non-active stand may contain a static object but it shall be wholly within the boundary of the stand.

Note.— To ensure that only one of the adjacent stands is active at a time, instruction to pilots in the AIP make clear that a limitation on the use of the stands is in force.

(53)No mobile object shall be permitted in a protection area during helicopter operations.

(54) Essential objects located in the protection area shall not:

i 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

ii 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.

(55) When solid, the slope of a protection area should not exceed an upward slope of 4 per cent outwards from the edge of the stand.

(56)Location of final approach and Take-off area in relation to a runway or taxiway: Where a FATO is located near a runway or taxiway, and where simultaneous operations are planned, the separation distance between the edges of a runway or taxiway and the edge of a FATO shall not be less than the appropriate dimension in Table 3-1.

(57)A FATO should not be located:

(i)Near taxiway intersections or holding points where jet engine efflux is likely to cause high turbulence; or

(ii)Near areas where aero plane vortex wake generation is likely to exist.

Table 3- 1 : FATO minimum separation distance for simultaneous operations

If aero plane mass and/or helicopter mass are	Distance between FATO edge and runway edge or taxiway edge
up to but not including 3175 kg	60m
3175 kg up to but not including 5 760 kg	120m
5760 kg up to but not including 100 000 kg	180m
100 000 kg and over	250 m

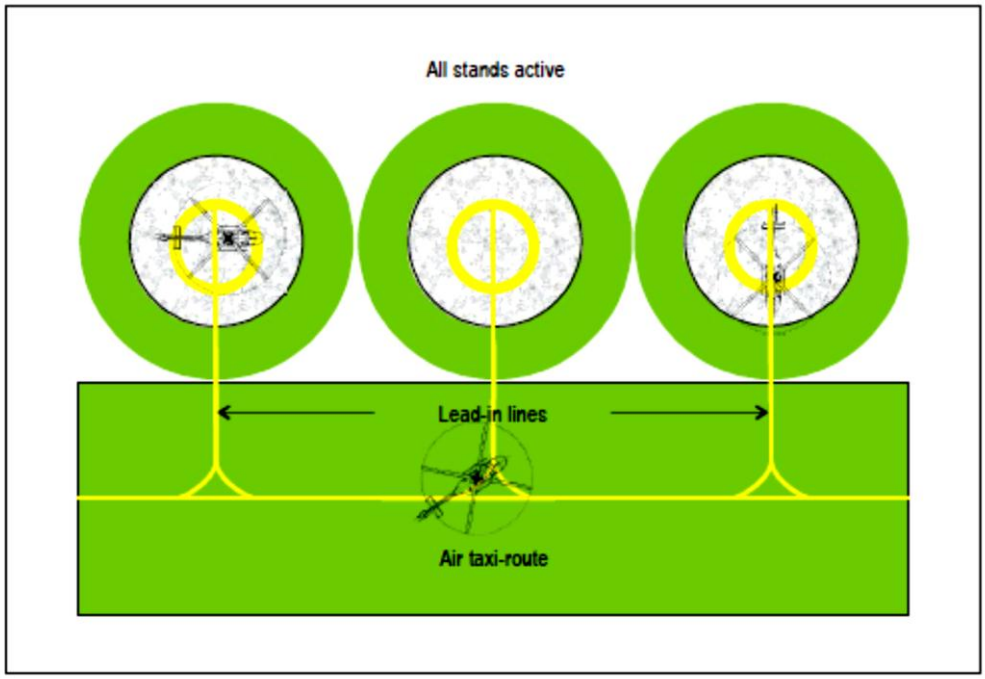


Figure 3-5. Turning stands (with air taxi-routes) — simultaneous use

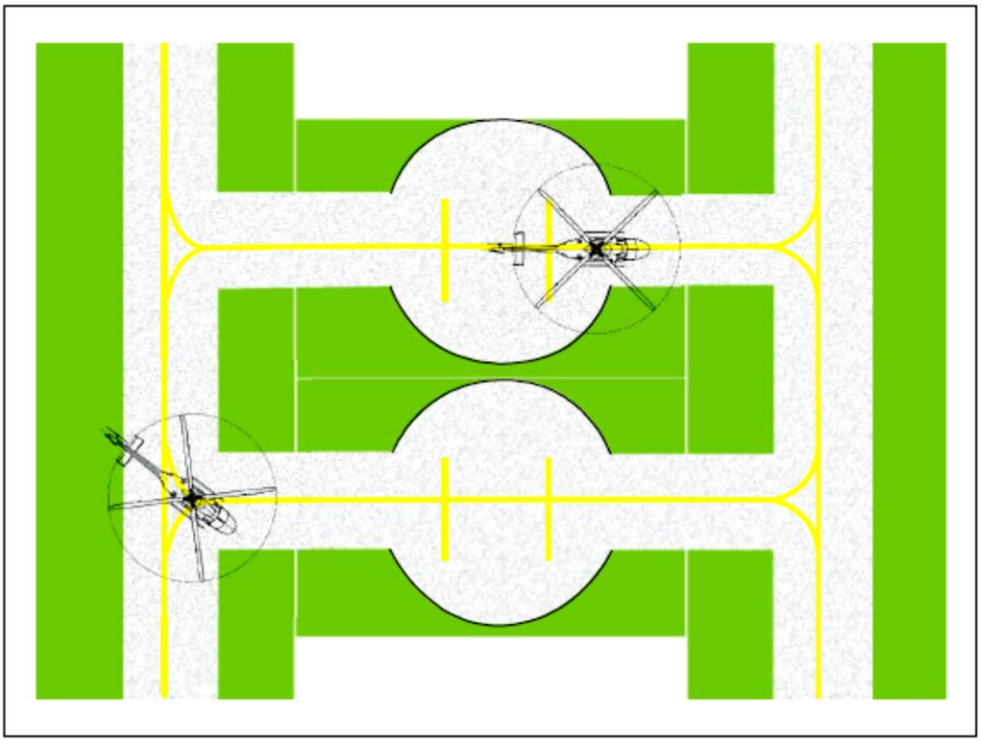


Figure 3-6. Ground taxi-through stands (with taxiway/ground taxi-route) simultaneous use

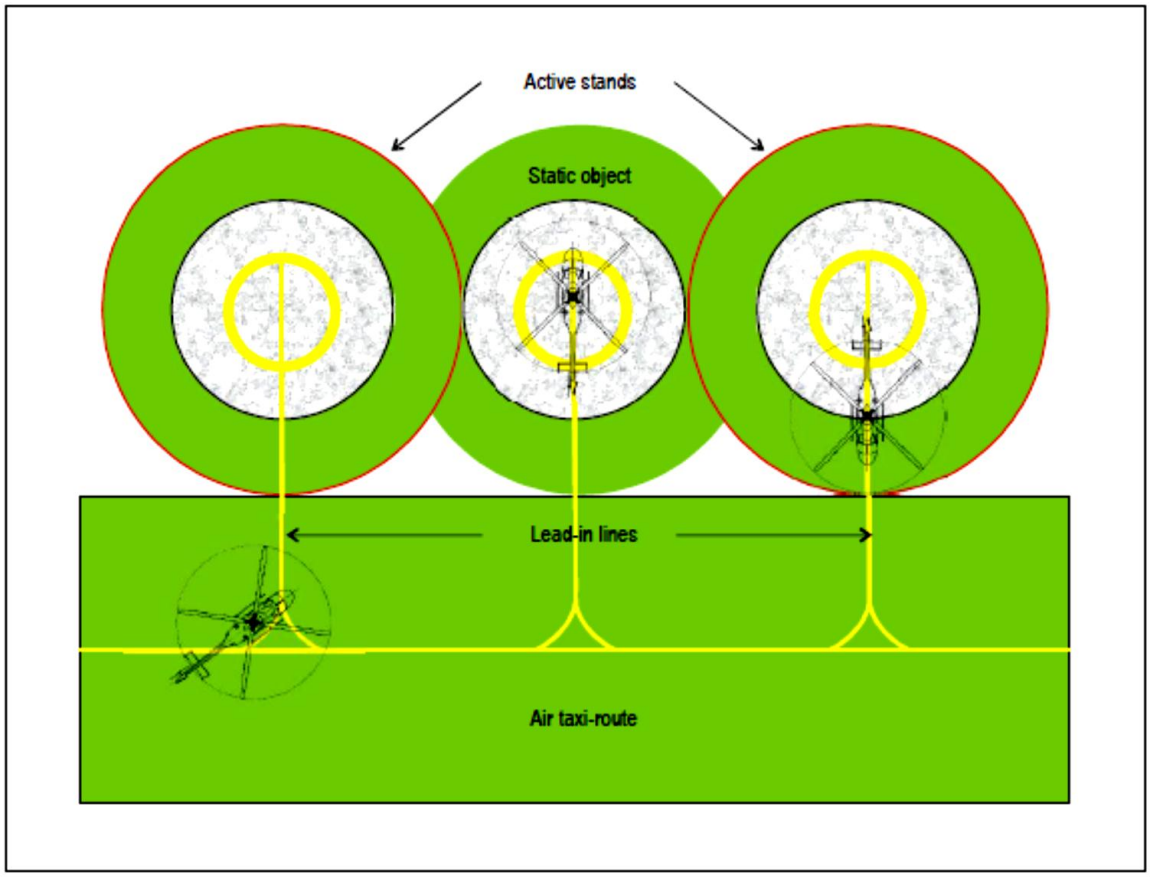


Figure 3-8. Turning stands (with air taxi-routes) non-simultaneous use — outer stands active

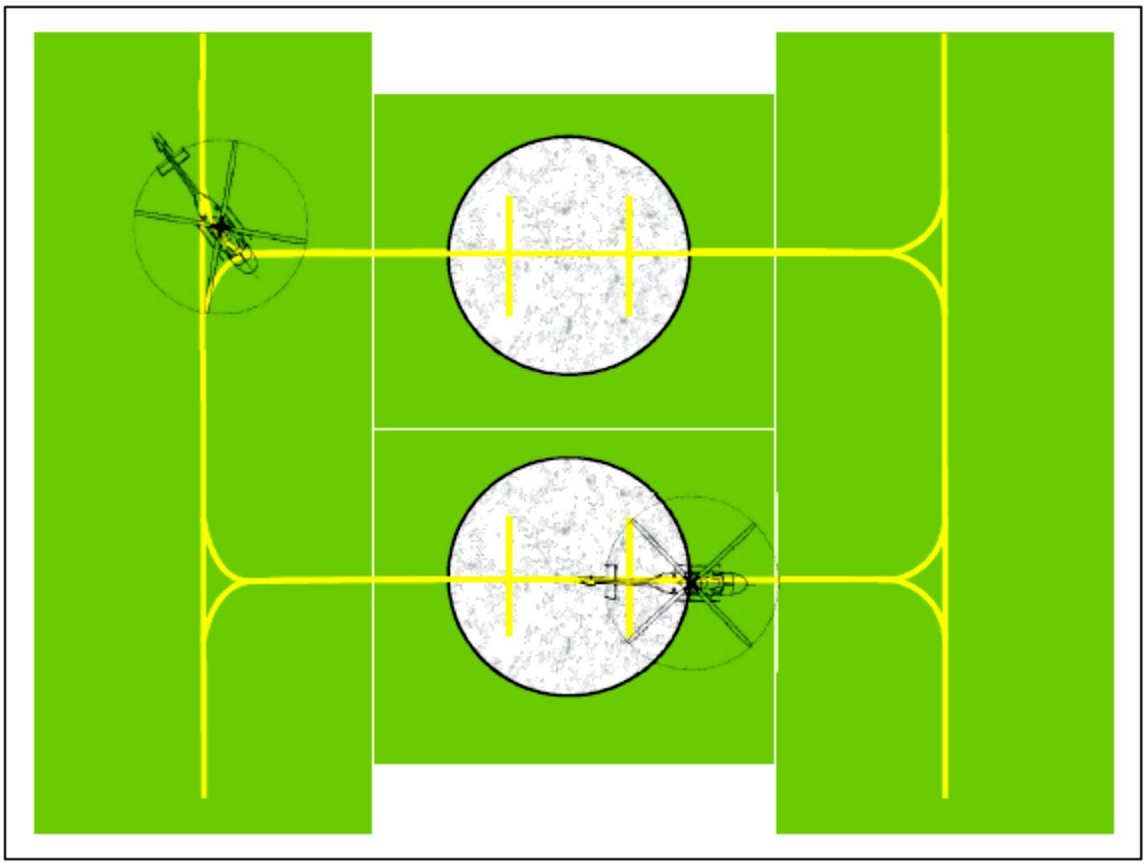


Figure 3-7. Air taxi-through stands (with air taxi-route) simultaneous use

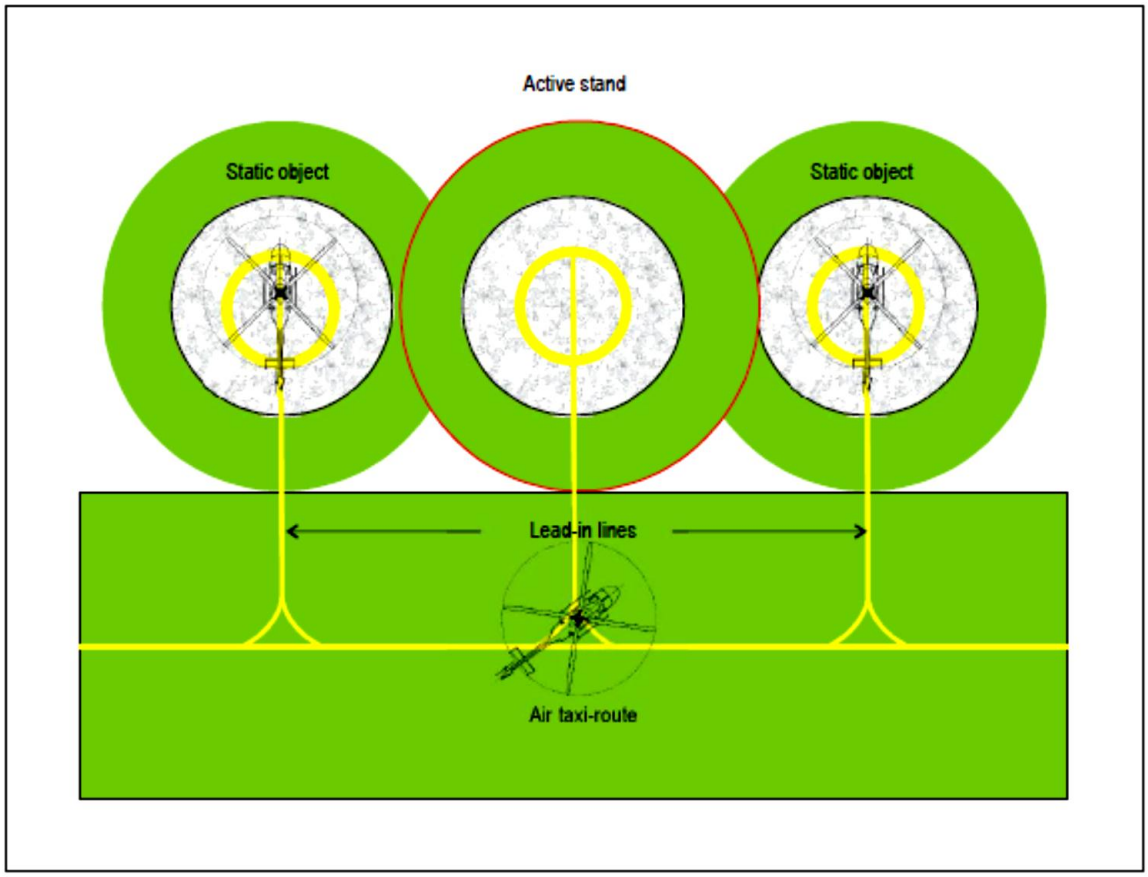


Figure 3-9. Turning stands (with air taxi-route) non-simultaneous use — inner stand active

(B)

Helidecks:

Note: The following requirements are for helidecks located on structures engaged in such activities as mineral exploitation, research or construction. See 138.307(d) for shipboard heliport provisions.

Final approach and take-off area and touchdown and lift-off area

Note 1: For helidecks that have a 1D or larger FATO it is presumed that the FATO and the TLOF will always occupy the same space and have the same load bearing characteristics so as to be coincidental. For helidecks that are less than 1D, the reduction in size is only applied to the TLOF which is a load bearing area. In this case, the FATO remains at 1D but the portion extending beyond the TLOF perimeter need not be load bearing for helicopters. The TLOF and the FATO may be assumed to be collocated.

Note 2: Guidance on the effects of airflow directions and turbulence prevailing wind velocity and high temperature from gas turbine exhausts or flare radiated heat on the location of the FATO is given in EAC 139-27

Note 3: Guidance on the design and markings of helidecks parking areas is given in EAC 139-27

(1) The specifications in paragraphs 138.307.(c).)(14) and 138.307.(c).)(15) shall be applicable for helidecks completed on or after 1 January 2012.

(2) A helideck shall be provided with at least one FATO and one coincident or collocated TLOF.

(3) A FATO may be any shape but shall be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1.0 D of the largest helicopter the helideck is intended to serve.

(4) A TLOF may be any shape but shall be of sufficient size to contain:

(i) For helicopters with a MTOM of more than 3175 kg, an area within which can be accommodated a circle of diameter of not less than 1.0 D of the largest helicopter the helideck is intended to serve.

(ii) For helicopters with a MTOM of 3175 kg or less, an area within which can be accommodated a circle of diameter of not less than 0.83 D of the largest helicopter the helideck is intended to serve.

(5) For helicopters with a MTOM of 3175 kg or less, the TLOF should be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1.0 D of the largest helicopter the helideck is intended to serve.

(6) A helideck shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO.

Note.- Specific guidance on the characteristics of an air-gap is given in EAC 139-27 . As a general rule, except for shallow superstructures of three stories or less, a sufficient air-gap will be at-least 3m.

(7) The FATO should be located so as to avoid, as far as is practicable, the influence of environmental effects, including turbulence, over the FATO, which could have an adverse impact on helicopter operations.

(8) The TLOF shall be dynamic load bearing.

(9) The TLOF shall provide ground effect.

(10) No fixed object shall be permitted around the edge of the TLOF except for frangible objects, which, because of their function. must be located thereon.

(11) For any TLOF 1D or greater and any TLOFdesigned for use by helicopters having a D-value of greater than 16.0m, objectsinstalled in the obstacle free sector whose function requires them to be located on the edge of the TLOF shall not exceed a height of 25 cm. ,

(12) For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF should be as low as possible and in any case not exceed a height of 15 cm.

(13) For any TLOF designed for use by helicopters having a D-value of 16.0 m or less, and any TLOF having dimensions of less than 1D, objects installed in the obstacle-free sector, whose function requires them to be located on the edge of the TLOF, shall not exceed a height of 5 cm.

Note.- Lighting that is mounted at a height of less than 25 cm is typically assessed for adequacy of visual cues before and after installation.

(14) Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm.. Such objects shall only be present if they do not represent a hazard to helicopters.

Note: Examples of potential hazards include nets or raised fittings on the deck that might induce dynamic rollover for helicopters equipped with skids.

(15) Safety devices such as Safety nets or safety shelves shall be located around the edge of a helideck but shall not exceed the height of the TLOF.

(16) The surface of the TLOF shall be skid-resistant to both helicopters and persons and be sloped to prevent pooling of water.

Note: Guidance on rendering the surface of the TLOF skid-resistant is contained in EAC 139-27.

(C) Shipboard heliports:

(1) The requirements in item 138.307(d)(16) and 138.307.d.(17) shall be applicable to shipboard heliports completed on or after 1 January 2012 and 1January 2015 respectively..

(2) When helicopter operating areas are provided in the bow or stern of a ship or are purpose-built above the ship's structure, they shall be regarded as purpose-built shipboard heliports.

(3) A Shipboard heliports shall be provided with one FATO and one coincidentalor collocated TLOF.

Note 1: Except for the arrangement described in 307.D.8 ii) for shipboard heliports, it is presumed that the FATO and the TLOF will be coincidental.Guidance on the effects

of airflow direction and turbulence, prevailing wind velocity and high temperature from gas turbine exhausts or flare radiated heat on the location of the FATO is given in EAC 139-27 (under preparation).

(4) A FATO may be any shape but shall be of sufficient size to contain an area within which can be accommodated a circle of diameter of not less than 1.0 D of the largest helicopter the heliport is intended to serve.

(5) The TLOF of a shipboard heliport shall be dynamic load bearing.

(6) The TLOF of a shipboard heliport shall provide ground effect.

(7) For purpose-built shipboard heliports provided in a location other than the bow or stern the TLOF shall be of sufficient size to contain a circle with a diameter not less than 1.0 D of the largest helicopter the heliport is intended to serve.

(8) For purpose-built shipboard heliports provided in the bow or stern of a ship, the TLOF shall be of sufficient size to:

(i) Contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve; or

(ii) For operations with limited touchdown directions, contain an area within which can be accommodated two opposing arcs of a circle with a diameter of not less than 1 D in the helicopters longitudinal direction. The minimum width of the heliport shall be not less than 0.83 D.(See Figure 3-10).

Note 1: The ship will need to be maneuvered to ensure that the relative wind is appropriate to the direction of the helicopter touchdown heading.

Note 2: The touchdown heading of the helicopter is limited to the angular distance subtended by the 1 D arcs headings, minus the angular distance which corresponds to 15 degrees at each end of the arc.

(9) For non-purpose built shipboard heliports, the TLOF shall be of sufficient size to contain a circle with a diameter not less than 1 D of the largest helicopter the heliport is intended to serve.

(10) A shipboard heliport shall be arranged to ensure that a sufficient and unobstructed air-gap is provided which encompasses the full dimensions of the FATO.

Note.- Specific guidance on the characteristics of an air-gap is given in EAC 139-27 . As a general rule, except for shallow superstructures of three stories or less, a sufficient air-gap will be at-least 3m.

(11) The FATO should be located so as to avoid, as far as is practicable, the influence of environmental effects, including turbulence, over the FATO, which could have an adverse impact on helicopter operations.

(12) No fixed object shall be permitted around the edge of the TLOF except for frangible objects, which, because of their function, must be located thereon.

(13) For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0m, objects installed in the obstacle free sector whose function requires them to be located on the edge of the TLOF shall not exceed a height of 25 cm.

(14) For any TLOF 1D or greater and any TLOF designed for use by helicopters having a D-value of greater than 16.0 m, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF should be as low as possible and in any case not exceed a height of 15 cm.

(15) For any TLOF designed for use by helicopters having a D-value of 16.0 m or less, and any TLOF having dimensions of less than 1D, objects installed in the obstacle-free sector whose function requires them to be located on the edge of the TLOF, shall not exceed a height of 5 cm.

Note. — Lighting that is mounted at a height of less than 25 cm is typically assessed for adequacy of visual cues before and after installation.

(16) Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

(17) Safety devices such as safety nets or safety shelves shall be located around the edge of a shipboard heliport, except where structural protection exists, but shall not exceed the height of the TLOF.

(18) The surface of the TLOF shall be skid-resistant to both helicopters and persons.

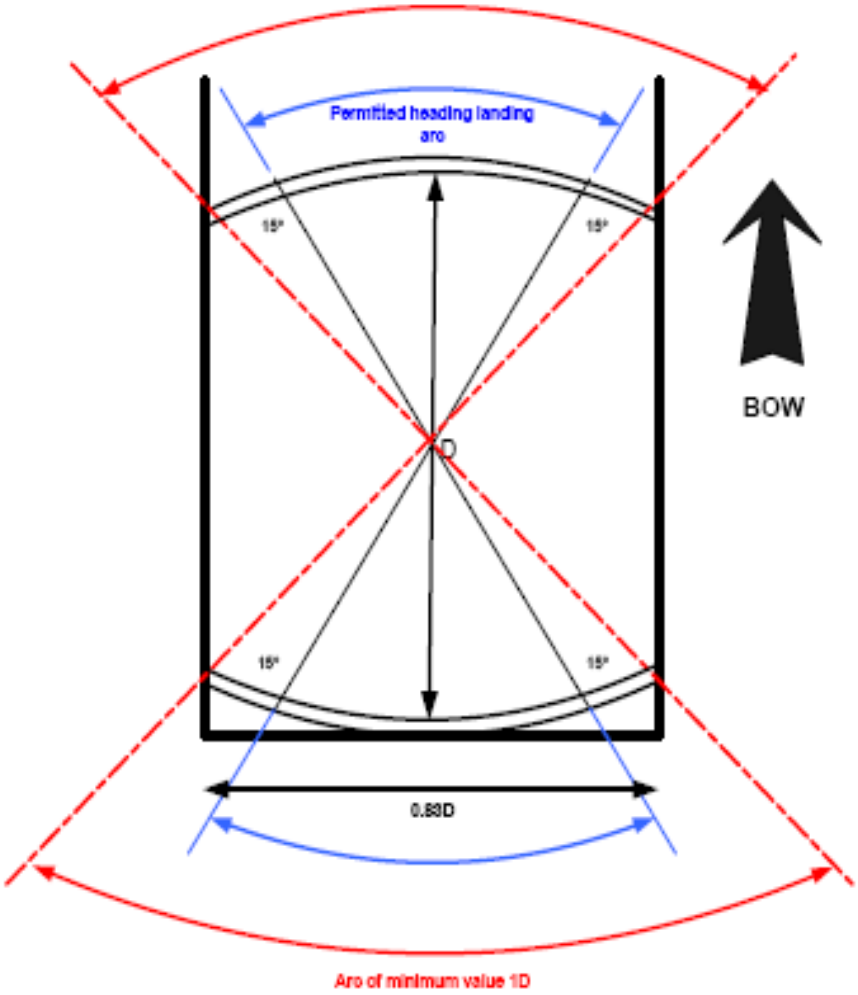


Figure 3-10. Shipboard permitted landing headings for limited heading operations

138.309 Obstacle Environment

Note: The objectives of the requirements in this Subpart are to describe the airspace around heliports so as to permit the intended helicopter operations to be conducted safely and to prevent,heliports fromthe heliports 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.

(a) Obstacle limitation surfaces and sectors:

(1) Description of approach surface: An inclined plane or a combination of planesor, when a turn is involved, a complex surface sloping upwards from the end of the safety area and centered on a line passing through the centre of the FATO.

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

(2) Characteristics: The limits of an approach surface shall comprise:

(i) An inner edge horizontal and equal in length to the minimum specified width /diameterof 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;

(ii) 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:

(iii) An outer edge horizontal and perpendicular to the center line of the approach surface and at a specified heightof 152 m (500 ft)above the elevation of the FATO.

(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.

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

(5) In the case of an approach surface involving a turn, the surface shall be a complex surface containing the horizontal normal's 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 4-5

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

(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.

(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 good practice for theapproach 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 will may be factors in determining the suitability of such areas.

(9) Description of transitional surface: A complex surface along the side of the safety area and part of the side of the approach /take-off climbsurface, that slopes upwards and outwards to a predetermined heightof 45 m (150 ft).

Note1. – See Figure 4-3 Transitional Surfaces. See Table 4-1 for dimensions and slopes of surfaces.

Note2. – For a FATO at a heliport without a PinS approach incorporating a visual segment surface (VSS) there is no requirement to provide transitional surfaces.

(10) Characteristics: The limits of a transitional surface shall comprise:

(i) A lower edge beginning at a point on the side of the approach/take-offclimb 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

(ii) An upper edge located at a specified height above the lower edge as set outin Table 4-1.

(11) The elevation of a point on the lower edge shall be:

(i) 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

(ii) Along the safety area: equal to the elevation of the inner edge of the approach/take-off climb surface.

Note1. - If the origin of the inclined plane of the approach/take-off climb surface is raised as approved by ECAA the elevation of the origin of the transitional surface will be raised accordingly.

Note 2: As a result of (ii) 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.

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

(13) Description of take-off climb surface: 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 centered on a line passing through the centre of the FATO.

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

(14) Characteristics: The limits of a take-off climb surface shall comprise:

(i) An inner edge horizontal and equal in length to the minimum specified width /diameterof 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;

(ii) 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

(iii) An outer edge horizontal and perpendicular to the center line of the take-off climb surface and at a specified height of 152 m (500 ft)above the elevation of the FATO.

(15) The elevation of the inner edge shall be the elevation of the FATOat 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.

(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.

(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.

(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 center line shall be the same as that for a straight take-off climb surface.

Note.— See Figure 4-5.

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

(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.

(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.

Note1. – 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 beused by performance class 2 and 3 it is goodpractice fordeparture 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.

(22) Description of obstacle-free sector/surface - helidecks: A complex surface originating at and extending from, a reference point on the edge of the TLOF of a helideck In the case of a TLOF of less than1 D, the reference point shall be located not less than 0.5 D from the centre of the TLOF.

(23) Characteristics: An obstacle-free sector/surface shall subtend an arc of specified angle.

(24) A helideck obstacle-free sector shall comprise of two components, one above and one below helideck level Note: See Figure 4-7.

(i) Above helideck level: The surface shall be a horizontal plane level with the elevation of the helideck surface that subtends an arc of at least 210° with the apex located on the periphery of the D reference circle extending outwards to a distance that will allow for an unobstructed departure path appropriate to the helicopter the helideck is intended to serve.

(ii) Below helideck level: Within the (minimum) 210° arc, the surface shall additionally extend downward from the edge of the FATO below the elevation of the helideck to water level for an arc of not less than 180° that passes through the centre of the FATO and outwards to a distance that will allow for safe clearance from the obstacles below the helideck in the event of an engine failure for the type of helicopter the helideck is intended to serve.

Note: For both the above obstacle free sectors for helicopters operated in Performance class 1 or 2 the horizontal extent of these distances from the helideck will be compatible with the one-engine inoperative capability of the helicopter type to be used.

(25) Description of limited obstacle sector/surface- helidecks: A complex surface originating at the reference point for the obstacle-free sector and extending over the arc not covered by the obstacle-free sector within which the height of obstacles above the level of the TLOF will be prescribed.

Note: Where obstacles are necessarily located on the structure, a helideck may have a limited obstacle sector

(26) Characteristics. A limited obstacle sector shall not subtend an arc greater than 150 degrees.

Its dimensions and location shall be as indicated in Figure 4-8for a 1D FATO with coincidental TLOF and Figure 4-9 for a 0.83D TLOF.

(b) 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 man oeuvre to hover or landing, or take-off man oeuvre 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.– Guidance on obstacle protection surfaces, for when a visual approach slope indicator (VASI) is installed, is given in the onshore section of the Heliport Manual (EAC 139-27).

Note3: The following requirements138.309(b)(1) to (b)(9) detail requirements particular to Surface level heliports.

(1) The following obstacle limitation surfaces shall be established for a FATO at heliports with a PinS approach procedure utilizing a visual segment surface:
(i) Take-off climb surface:
(ii) Approach surface; and
(iii) Transitional surfaces.

Note 1.- See Figure 4-3 – Transitional Surfaces

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

(2) The following obstacle limitation surfaces shall be established for a FATO at heliports, other than specified in 138.309.b.1, including heliports with a PinS approach procedure where a visual segment surface is not provided:
(i) Take-off climb surface; and
(ii) Approach surface.

(3) The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than those specified in Table 4-l and shall be located as shown in Figures 4-1, 4-2 and 4-6.

(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.

(5) New objects or extensions of existing objects shall not be permitted above any of the surfaces in 138.309(b)(1) to (b)(2) above except 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.

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 EAC 139-23.

(6) Existing objects above any of the surfaces in 138.309(b) (1) to (b)(2) above 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 ECAAdeterminesthat the object will not adversely affect the safety or significantly affect the regularity of operations of helicopters.

Note: The application of curved approach ortake-off climb surfaces as specified in 138.309(a)(5) or 138.309.a.(18) may alleviate the problems created by objects infringing these surfaces.

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

(i) The area/terrain over which the flight is being conducted;

(ii) The obstacle environment surrounding the heliportand the availability of at least one protected side slope.

(iii) The performance and operating limitations of helicopters intending to use The heliport; and

(iv) The local meteorological conditions including the prevailing winds.

(8) 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 EAC 139-27.

(9) The obstacle limitation surfaces for elevated heliports shall conform to the requirements for surface level heliports specified in 138.309(b)(1) to (b) 6.

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

(i) The area/terrain over which the flight is being conducted;

(ii) The obstacle environment surrounding the heliport and the availability of at least one protected side slope.

(iii) The performance and operating limitations of helicopters intending to use the heliport; and

(iv) The local meteorological conditions including the prevailing winds.

(11) 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 EAC 139-27 for guidance.

(12)A helideck shall have an obstacle-free sector.

Note: A helideck may have a limited obstacle sector (see paragraph 138.309.(a).(25).

(13)There shall be no fixed obstacles within the obstacle-free sector above the obstacle-free surface.

(14) In the immediate vicinity of the helideck, obstacle protection for helicopters shall be provided below the helideck level. This protection shall extend over an arc of at least 180º with the origin at the centre of the FATO, with a descending gradient having a ratio of one unit horizontally to five units vertically from the edges of the FATO within the 180º sector. This descending gradient may be reduced to a ratio of one unit horizontally to three units vertically within the 180° sector for multi-engine helicopters operated in performance class 1 or 2 (see Figure 4-7).

Note. - Where there is a requirement to position, at sea surface level, one or more offshore support vessel(s) (e.g. a Standby Vessel) essential to the operation of a fixed or floating offshore facility, but located within the proximity of the fixed or floating offshore facility, any offshore support vessel(s) would need to be positioned so as not

to compromise the safety of helicopter operations during take-off departure and/or approach to landing.

(15) For a TLOF of 1D and larger, within the 150º limited obstacle surface/sector out to a distance of 0.12D measured from the point of origin of the limited obstacle sector , objects shall not exceed a height of 25 cm above the TLOF. Beyond that arc, out to an over-all distance of a further 0.21D measured from the end of the first sector, the limited obstacle surface rises at a rate of one unit vertically for each two units horizontally originating at a height 0.05D above the level of the TLOF (see Figure 4-8).

Note.- Where the area enclosed by the TLOF perimeter marking, is a shape other than circular, the extent of the LOS segments are represented as lines parallel to the perimeter of the TLOF rather than arcs. Figure 4-8 has been constructed on the assumption that an octagonal helideck arrangement is provided. Further guidance for square (quadrilateral) and circular FATO and TLOF arrangements is given in the EAC 139-27.

(16) For a TLOF less than 1D, within the 150 degree limited obstacle surface/sector out to a distance of 0.62D and commencing from a distance 0.5D, both measured from the centre of the TLOF, objects shall not exceed a height of 5 cm above the TLOF.

Beyond that arc, out to an overall distance of 0.83D from the centre of the TLOF, the limited obstacle surface rises at a rate of one unit vertically for each two units horizontally originating at a height 0.05D above the level of the TLOF (see Figure 4-9).

Note.- Where the area enclosed by the TLOF perimeter marking, is a shape other than circular, the extent of the LOS segments are represented as lines parallel to the perimeter of the TLOF rather than arcs. Figure 4-9 has been constructed on the assumption that an octagonal helideck arrangement is provided. Further guidance for square (quadrilateral) and circular FATO and TLOF arrangements is given in the EAC 139-27.

(17) Shipboard heliports (Purpose-built heliports located forward or aft): The specifications in paragraphs, 138.309(b)(20)and 38.309(b)(22)shall be applicable for shipboard heliport completed on or after 1 January 2012.

(18) Purpose-built heliports located forward or aftWhen helicopter operating areas are provided in the bow or stern of a ship they shall apply the obstacle criteria for helidecks.

(19) Amidships location – purpose built and non-purpose built: Forward and aft of a TLOF of 1D and larger shall be two symmetrically located sectors, each covering an arc of 150º, with their apexes on the periphery of the TLOF. Within the area enclosed by these two sectors, there shall be no objects rising above the level of the TLOF, except those aids essential for the safe operation of a helicopter and then only up to a maximum height of 25 cm.

(20) Objects whose function requires them to be located within the TLOF (such as lighting or nets) shall not exceed a height of 2.5 cm. Such objects shall only be present if they do not represent a hazard to helicopters.

Note: Examples of potential hazards include nets or raised fittings on the deck that might induce dynamic rollover for helicopters equipped with skids.

(21) To provide further protection from obstacles fore and aft of the TLOF, rising surfaces with gradients of one unit vertically to five units horizontally shall extend from the entire length of the edges of the two 150º sectors. These surfaces shall extend for a horizontal distance equal to at least 1 D of the largest helicopter the TLOF is intended to serve and shall not be penetrated by any obstacle (see Figure 4-10).

(22) Non-purpose built heliports Ship's side location : No objects shall be located within the TLOF except those aids essential for the safe operation of a helicopter (such as nets or lighting) and then only up to a maximum height of 2.5cm. Such objects shall only be present if they do not represent a hazard to helicopters.

(23) From the fore and aft mid-points of the D circle in two segments outside the circle, limited obstacle areas shall extend to the ship's rail to a fore and aft distance of 1.5

times the fore-to-aft-dimension of the TLOF, located symmetrically about the athwart ships bisector of the D circle. Within these areas there shall be no objects rising above a maximum height of 25cm above the level of the TLOF (see Figure 4-11). Such objects shall only be present if they do not represent a hazard to helicopters.

(24) A limited obstacle sector horizontal surface shall be provided, at least 0.25 D beyond the diameter of the D circle, which shall surround the inboard sides of the TLOF to the fore and aft mid-points of the D circle The limited obstacle sector shall continue to the ship's rail to a fore and aft distance of 2.0 times the fore-to-aft dimension of the TLOF, located symmetrically about the athwart ships bisector of the D circle. Within this sector there shall be no objects rising above a maximum height of 25cm above the level of the TLOF

Note. Any objects located within the areas described in 309.B.23 and309.b.24that exceed the height of the TLOF are notified to the helicopter operator using a ship's helicopter landing area plan. For notification purposes it may be necessary to consider immoveable objects beyond the limit of the surface prescribed in 309.b.24 particularly if objects are significantly higher than 25 cm and in close proximity to the boundary of the Limited Obstacle Sector. See EAC 139-27 for guidance.

(25) Winching areas An area designated for winching onboard ships shall be comprised of a circular clear zone of diameter 5 m and extending from the perimeter of the clear zone, a concentric maneuvering zone of diameter2D.(see Figure 4-12)

(26) The maneuvering zone shall be comprised of 2 areas:

(i) The inner maneuvering zone extending from the perimeter of the clear zone and of a circle of diameter not less than 1.5 D; and

(ii) The outer maneuvering zone extending from the perimeter of the inner maneuvering zone and of a circle of diameter of not less than 2D.

(27) Within the clear zone of a designated winching area, no objects shall be located above the level of its surface.

(28) Objects located within the inner maneuvering zone of a designated winching area shall not exceed a height of 3 m.

(29) Objects located within the outer maneuvering zone of a designated winching area shall not exceed a height of 6 m.

Note. - See EAC 139-27 for guidance.

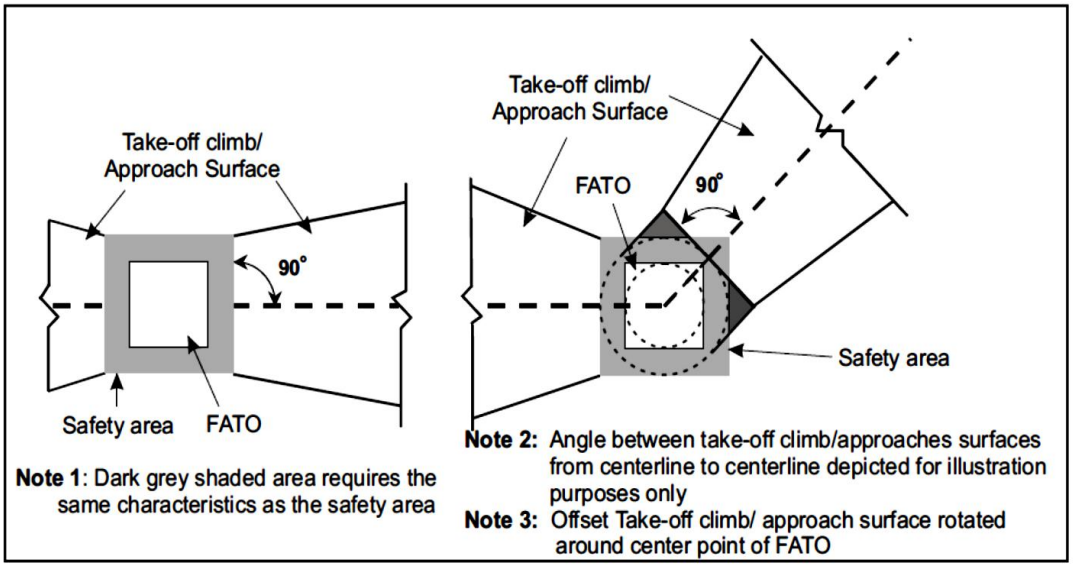


Figure 4-1. Obstacle Limitation Surfaces - Take-off Climb & Approach Surface

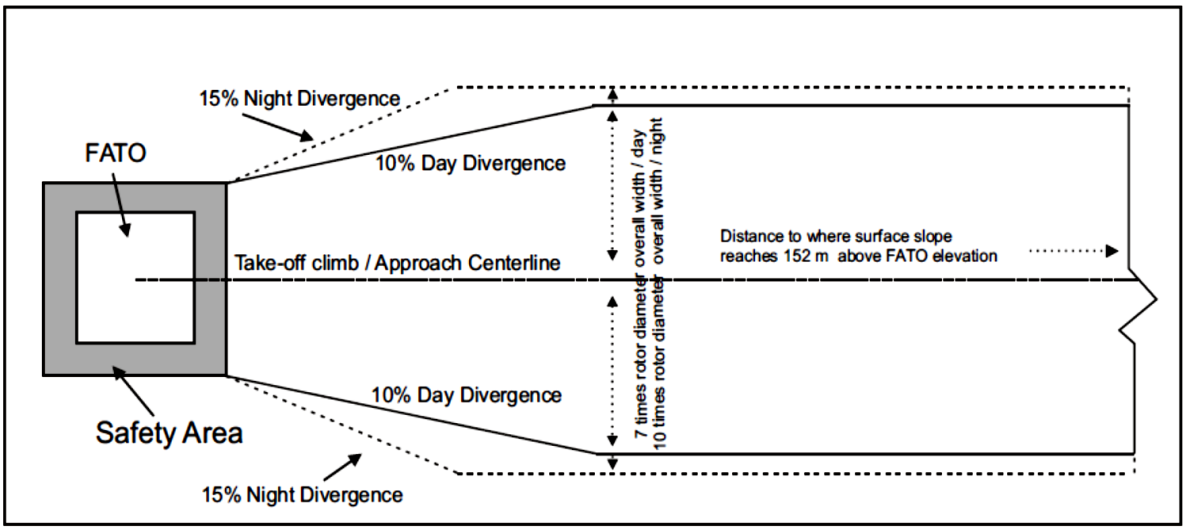


Figure 4-2 Take-off Climb / Approach Surface Width

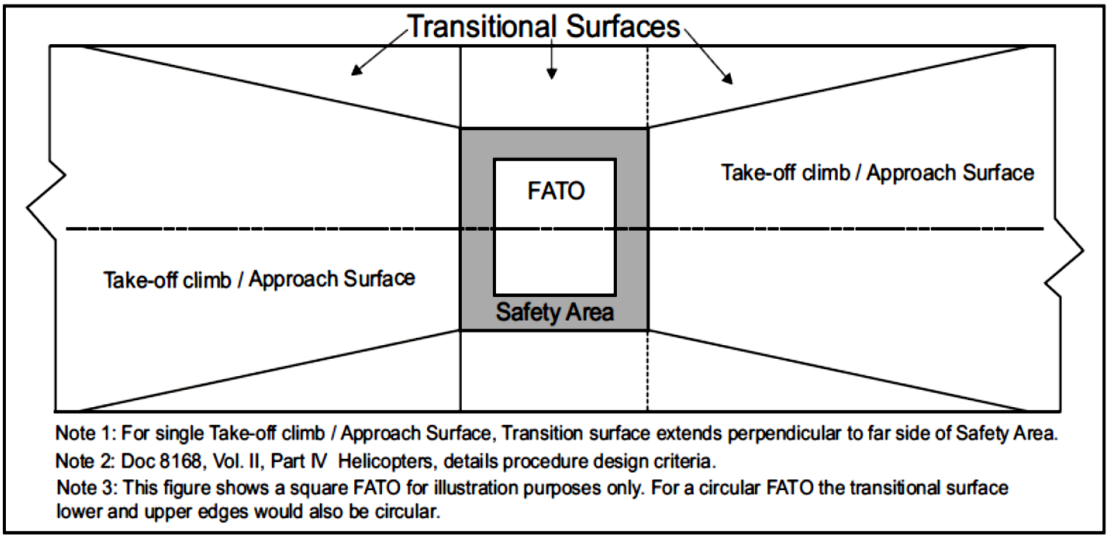


Figure 4-3 Transitional Surfaces for a FATO with a PinS approach procedure with a VSS

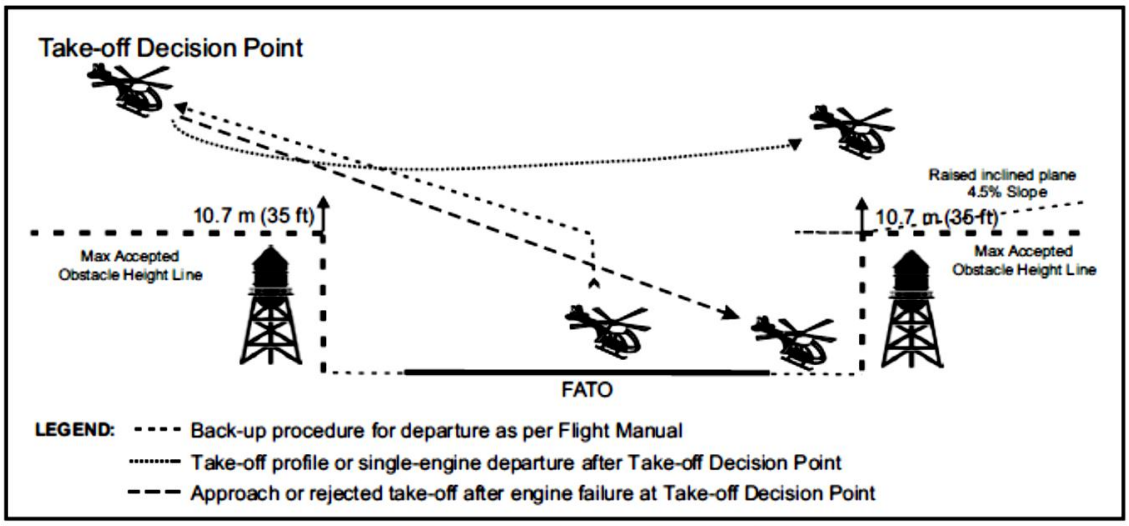
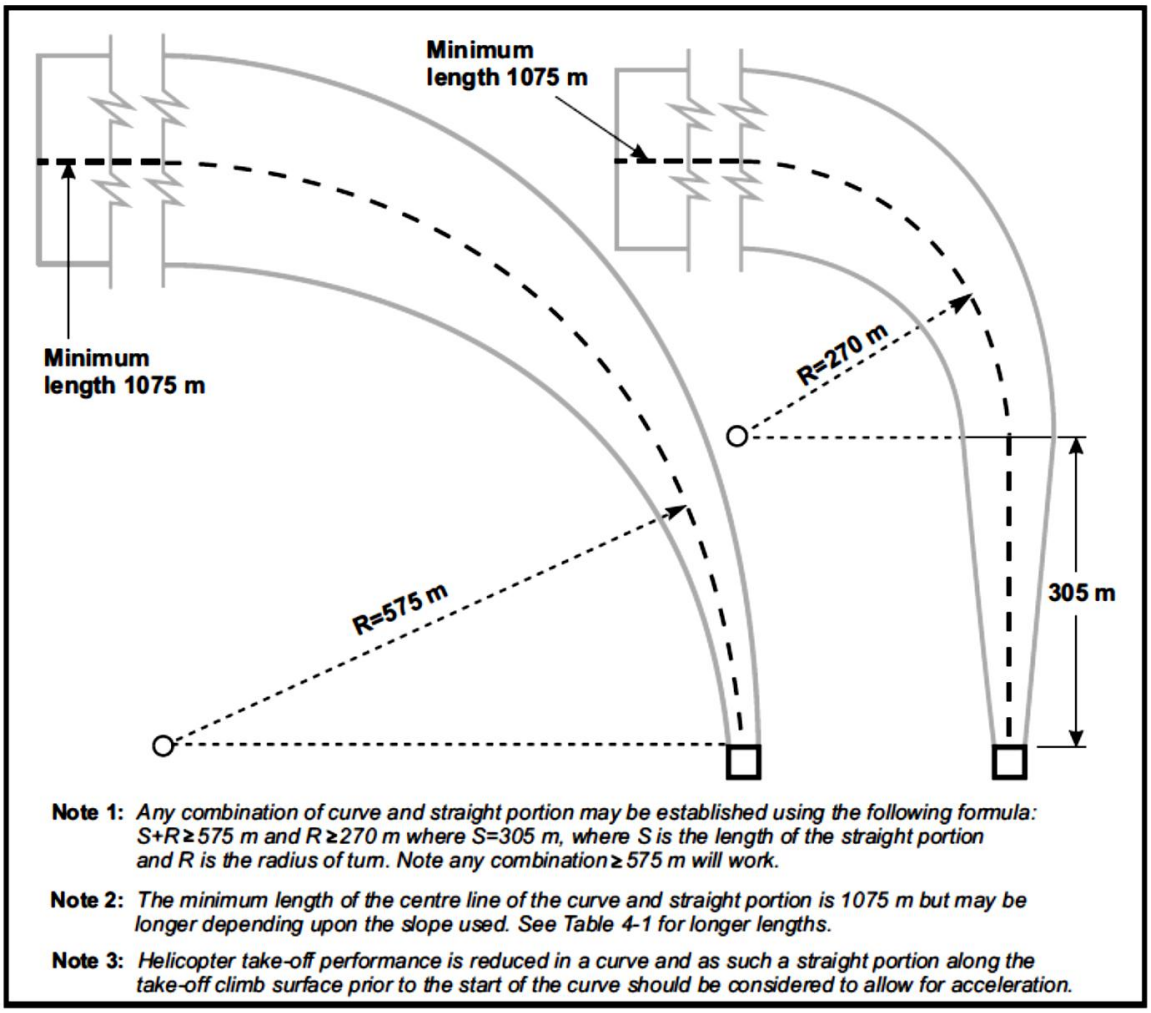


Figure 4-4 Example of Raised Inclined Plane During Operations in Performance Class 1

Note1. - 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. ICAO Annex 6, Part 3, Attachment A provides back-up procedures that may be useful for operations in performance class 1.

Note2. – The approach / landing profile may not be the reverse of the take-off profile.

Note3. – 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 ≥ 575 m and R ≥ 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 ≥ 575 m will work.*

Note 2: *The minimum length of the centre line of the curve and straight portion is 1075 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 4-5. Curved approach and take-off climb surface for all FATOs

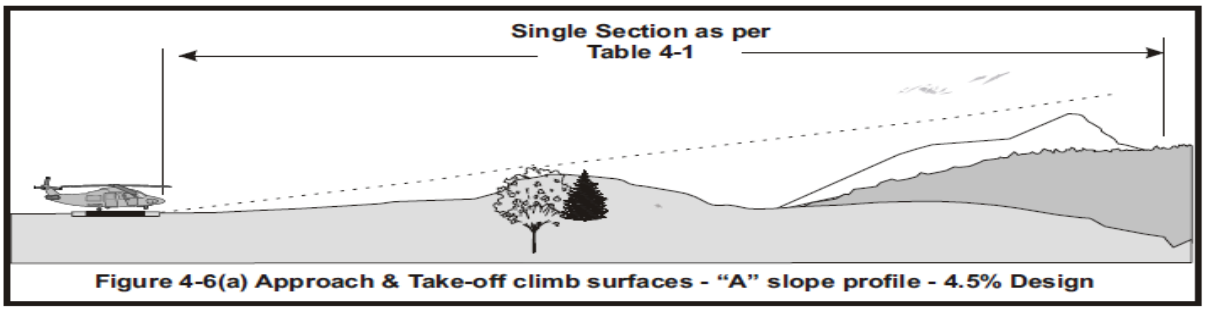


Figure 4-6(a) Approach & Take-off climb surfaces - "A" slope profile - 4.5% Design

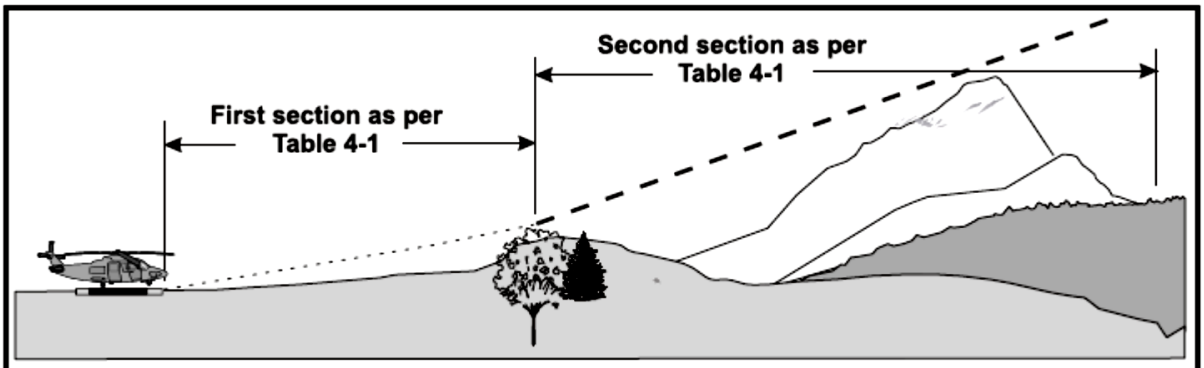


Figure 4-6(b) Approach & Take-off climb surfaces - "B" slope profile - 8% & 16% Design

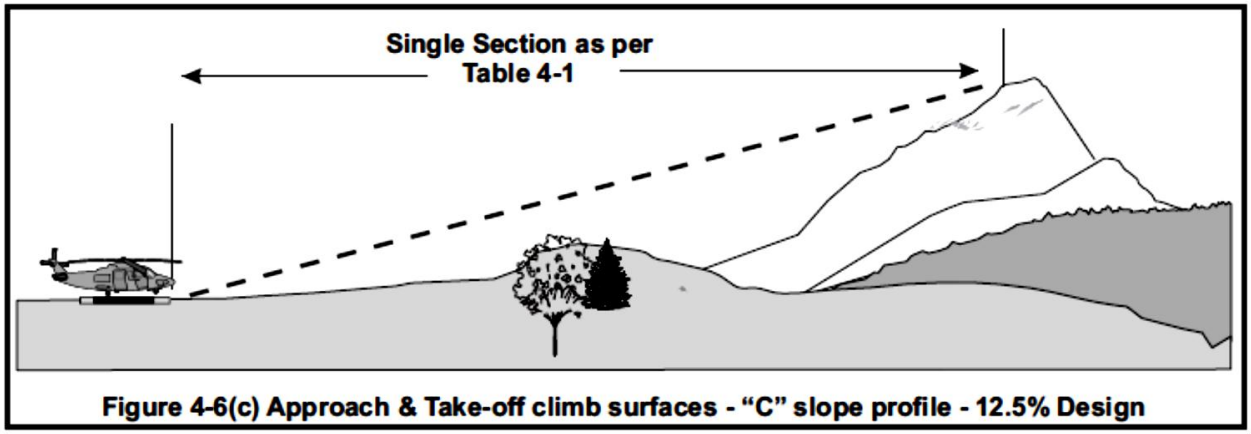


Figure 4-6(c) Approach & Take-off climb surfaces - "C" slope profile - 12.5% Design

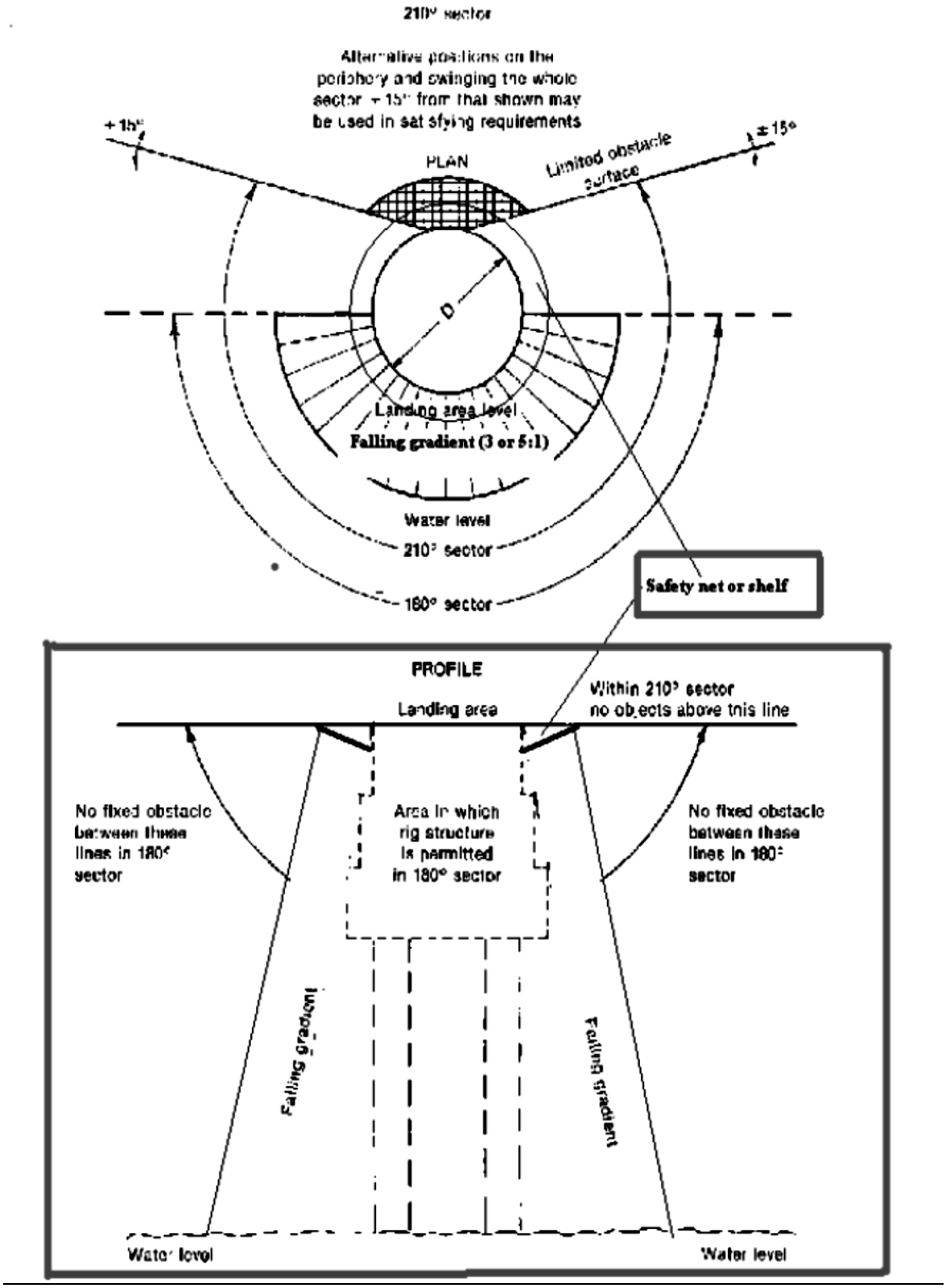


Figure 4-7. Helideck obstacle-free sector

Table 4-1. 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	3 386 m	245 m	1 220 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)	3 386 m	1 075 m	1 220 m
Transitional surface: (FATOs with a 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 4-1 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 4-1 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. 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.

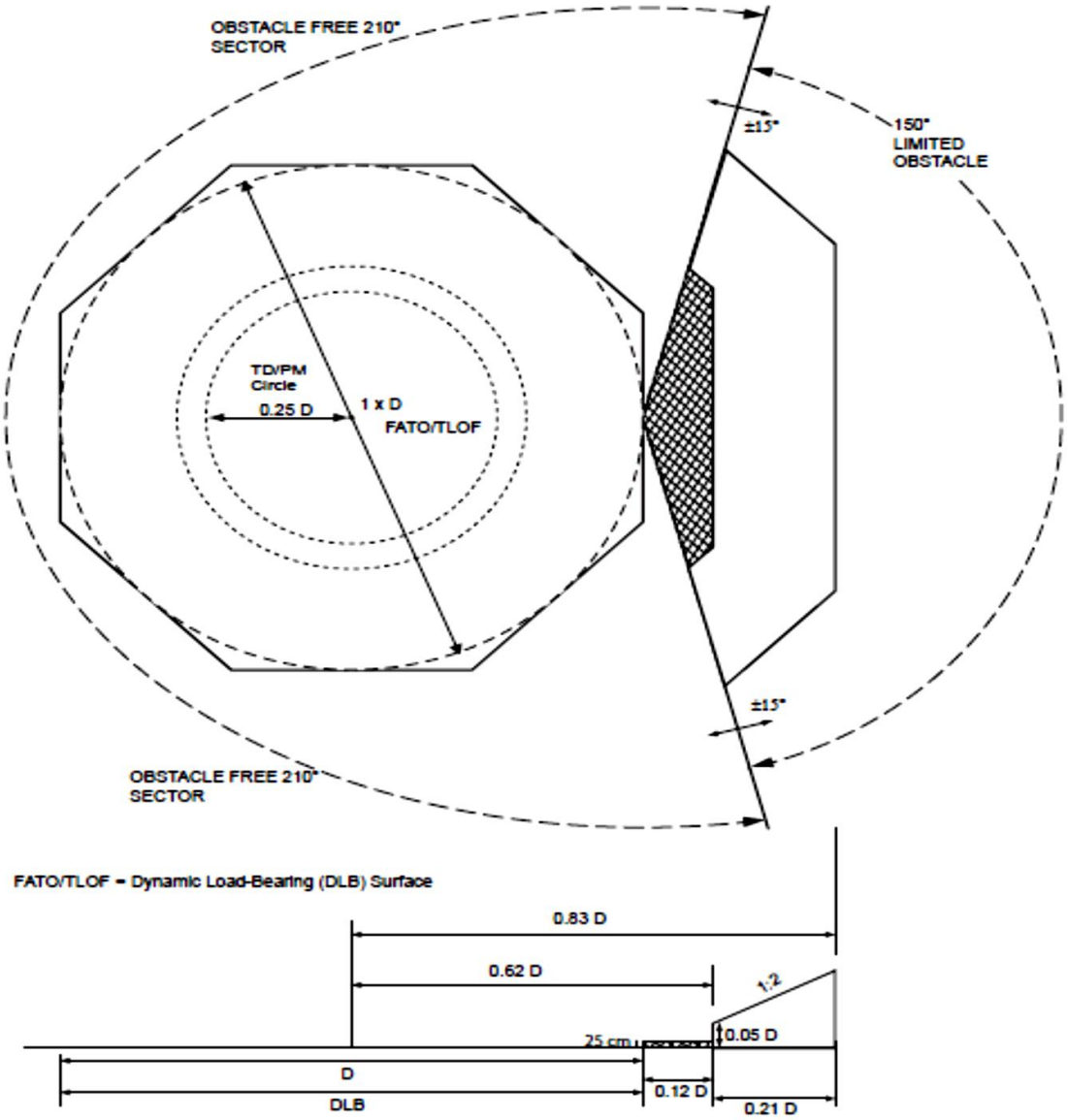


Figure 4-8. Helideck obstacle limitation sectors and surfaces for a FATO and coincidental TLOF of 1D and larger.

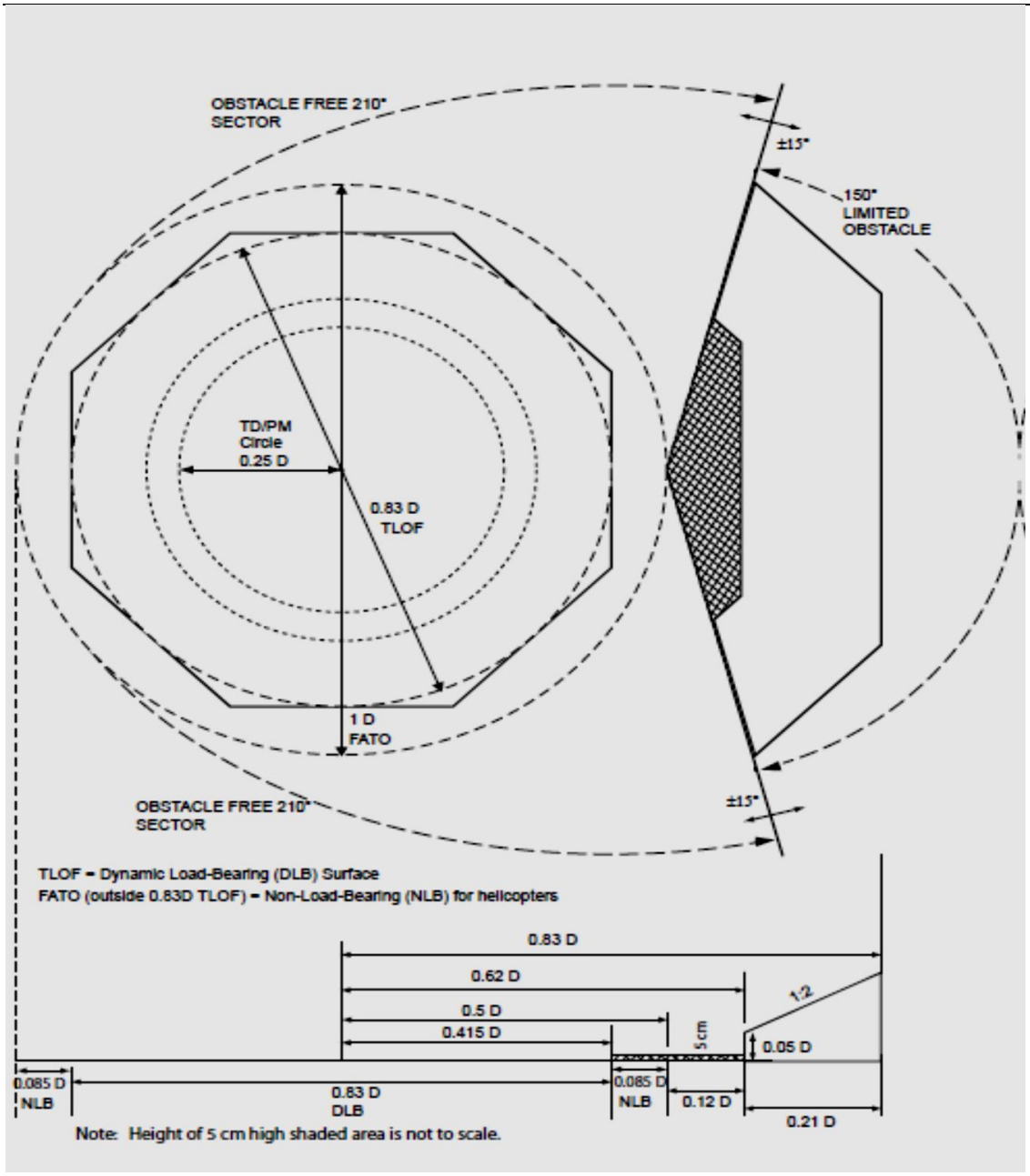


Figure 4-9. Helideck obstacle limitation sectors and surfaces for a TLOF of 0.83D and larger.

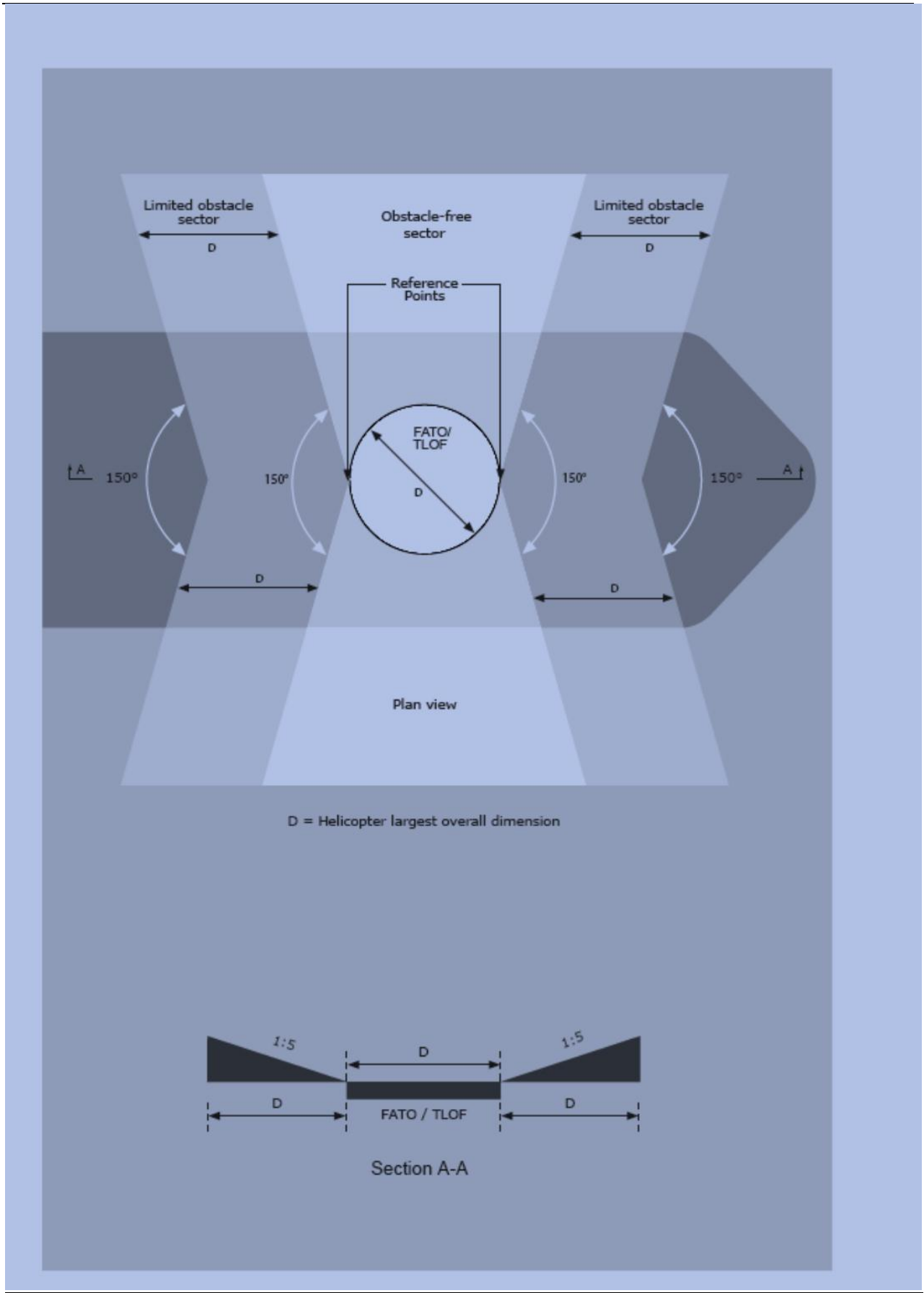


Figure 4- 10: Amidships non-purpose built heliport obstacle limitation surfaces

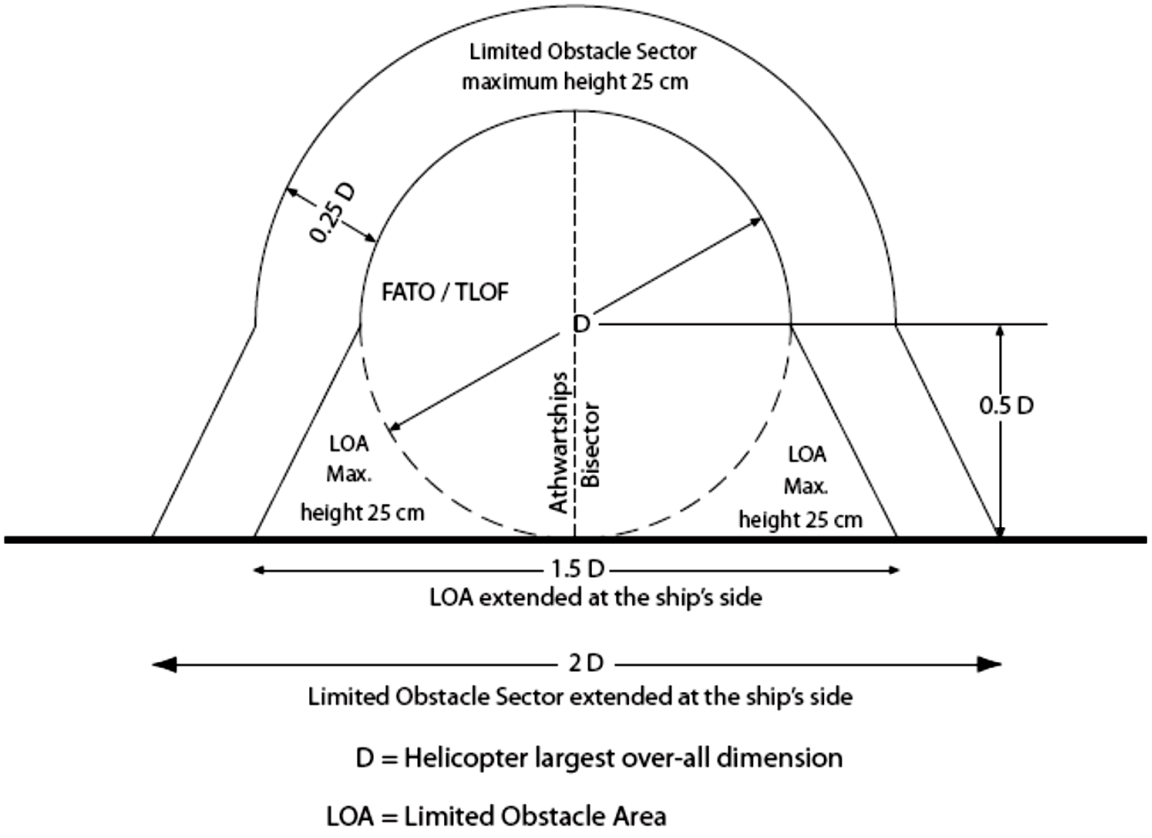


Figure 4-11. Ships-side non-purpose-built heliport obstacle limitation sectors and surfaces

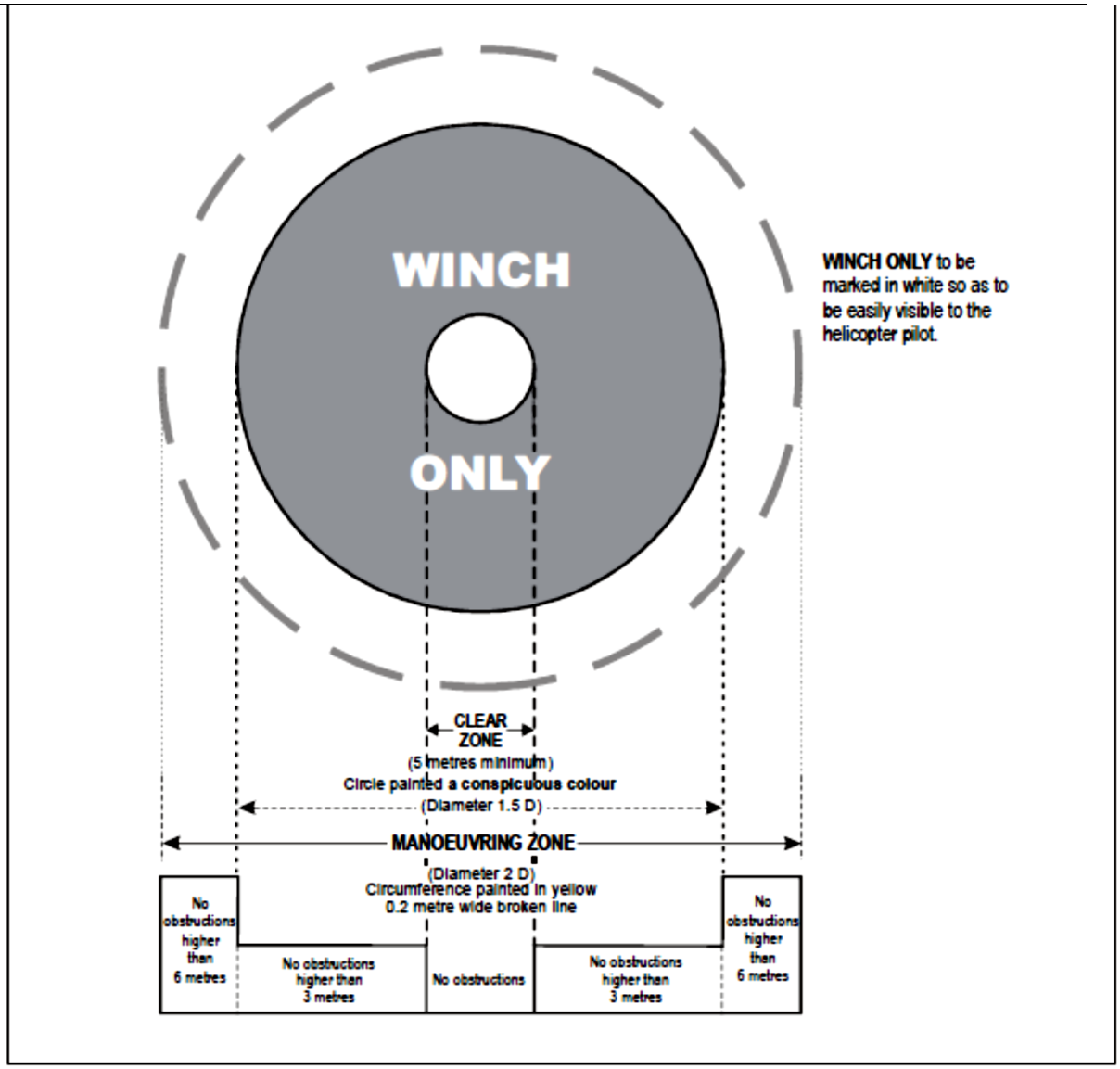


Figure 4-12 Winching area of a ship.

SUBPART E
Visual Aids

138.311 Indicators

Note 1: The procedures used by some helicopters require that they utilize 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.

Note 3: Guidance is given in the EAC 139-27 on marking the maximum allowable mass (138.313.c), the D-value (138.313.d) and, if required, the actual FATO Dimension(s) (138.313.e) on the heliport surface to avoid confusion between markings where metric units are used and markings where imperial units are used.

Note 4: For a non-purpose built heliport located on a ship's side the surface colour of the main deck can vary from ship to ship and therefore some discretion may need to be exercised in the colour selection of heliport paint schemes; the objective being to ensure that the markings are conspicuous against the surface of the ship and the operating background.

(a) Wind direction indicators:
  (1) Application: A heliport shall be equipped with at least one wind direction indicator.
  (2) Location: A wind direction indicator shall be located so as to indicate the wind conditions over FATO and TLOF 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.
  (3) Where a TLOF and/or TLOFmay be subject to a disturbed air flow, 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 EAC 139-27
  (4) Characteristics: 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.
  (5) An indicator should be a truncated cone made of lightweight fabric and should have the following minimum dimensions:

	Surface level heliports	Elevated heliports and helpdesks
Length	2.4 m	1.2 m
Diameter (larger end)	0.6 m	0.3 m
Diameter (smaller end)	0.3 m	0.15 m

  (6) The color 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 color, preferably white or orange, should be used. Where a combination of two colors 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 color.
  (7) A wind direction indicator at a heliport intended for use at night shall be illuminated.

138.313 Markings and markers

Note: See ECAR Part 139, 139.321(a)(4) Note 1, concerning improving conspicuity of markings.

(a) Winching area marking:

(1) Application Winching area markings shall be provided at a designated winching area (see Figure 4-12).

(2) Location: Winching area markings shall be located so that their centre(s) coincides with the centre of the clear zone of the winching area(see Figure 4-12).

(3) Characteristics : Winching area markings shall comprise of a winching area clear zone marking and a winching area maneuvering zone marking.

(4)A winching area clear zone marking shall consist of a solid circle of diameternot less than 5 m and of a conspicuous color.

(5) A winching area maneuvering zone marking shall consist of a broken circle of line of 30 cmm in width and of a diameter not less than 2 D and be marked in a conspicuous color. Within it "WINCH ONLY" shall be marked to be easily visible to the pilot.

Note.— The objective of winching area markings is to provide to the pilot visual cues to assist a helicopter to be positioned over, and retained within, an area from which a passenger or equipment can be lowered or raised.

(b) Heliport identification marking:

(1) Application: A heliport identification markings shall be provided at a heliport.

(2) Location: All FATOs except runway-type FATOsA heliport identification marking shall be located at or near the centre of FATO.

Note 1.— The objective of heliport identification marking is to provide to the pilot an indication of the presence of a heliport and, by its form, the likely usage; the preferred direction(s) of approach; or the FATO orientation within the

helideck obstacle environment.

Note 2.— For other than helidecks, the preferred direction(s) of approach corresponds to the median of the departure/arrival surface(s).

Note 3.— For helidecks, the bar of the "H" points to the centre of the limited obstacle sector (LOS).

Note 4: 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 5: On a FATO, which does not contain a TLOF and which is marked with an aiming point marking (see 138.313.h), except for a heliport at a hospital, the heliport identification marking is established in the centre of the aiming point marking as shown in Figure 5-1. And 5-2

(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.

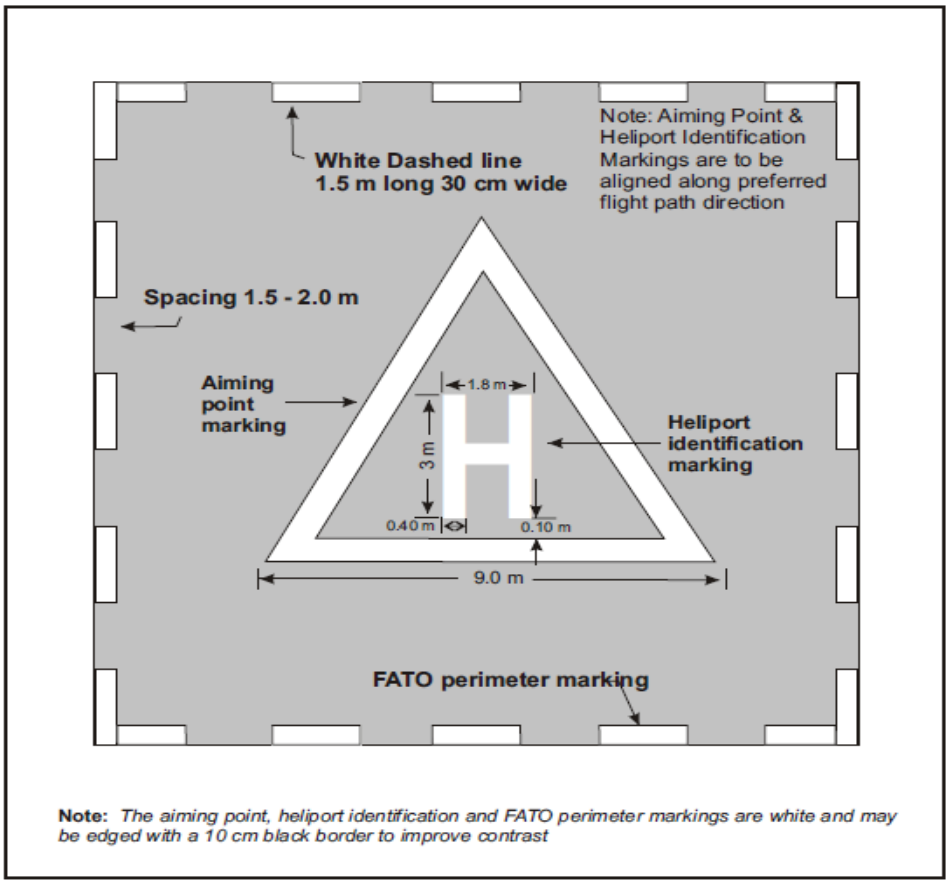


Figure 5-1. Combined heliport identification, aiming point and FATO perimeter markings

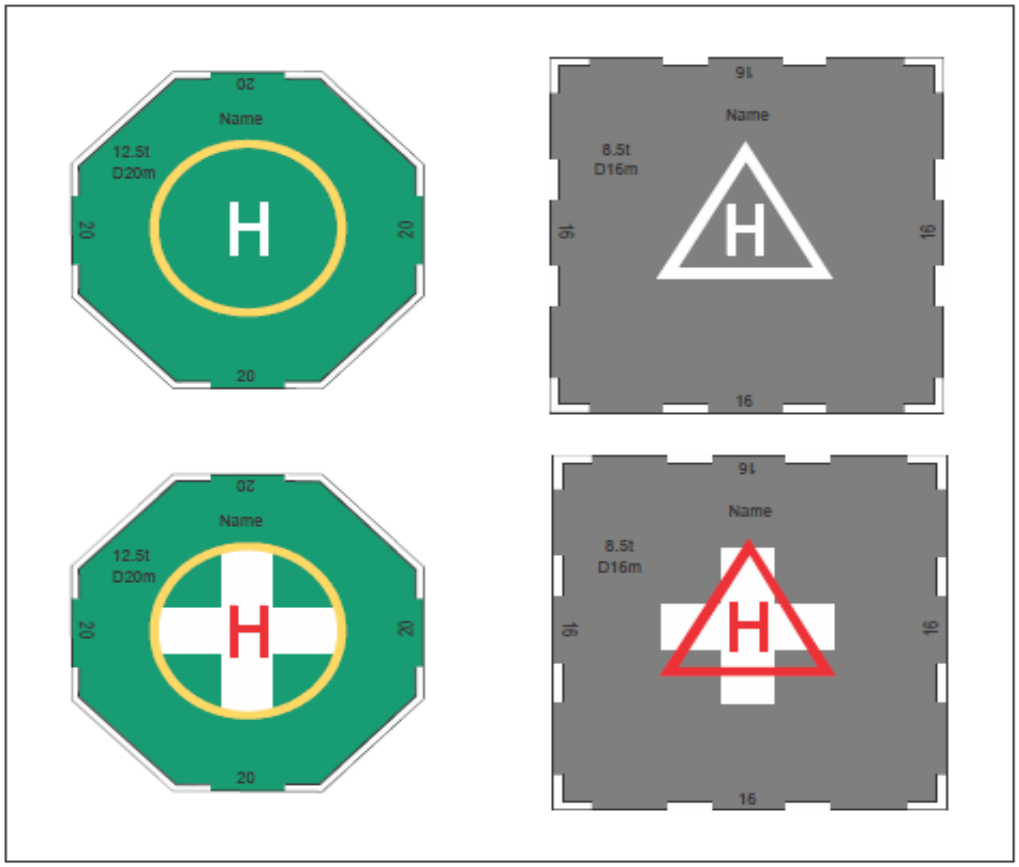


Figure 5-2. Heliport identification markings with TLOF andaiming markings for heliport and hospital heliport

(4) **Location - Runway-type FATOs: 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 5-3.

(5) Characteristics: A heliport identification marking, except for a heliport at a hospital, shall consist of a letter H, white in color. The dimensions of the H marking shall be no less than those shown in Figure 5-2 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 5-3.

(6) A heliport identification marking for a heliport at a hospital shall consist of a letter H, red in color, on a white cross made of squares adjacent to each of the sides of a square containing the H as shown in Figure 5- 2.and 5-4

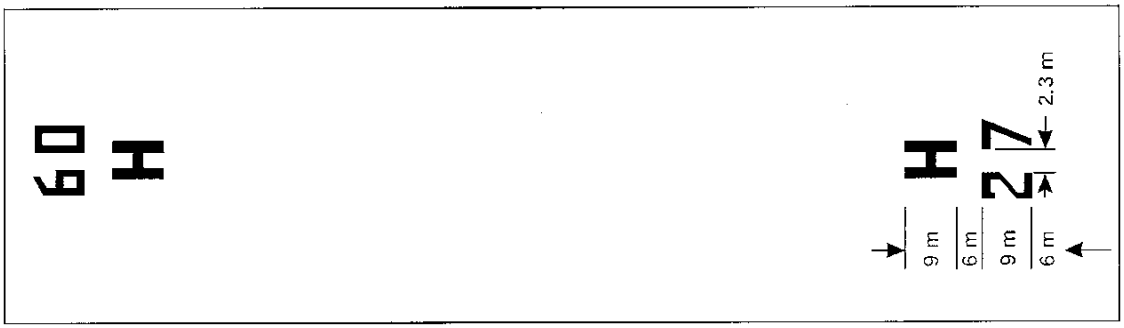


Figure 5-3. FATO designation marking and heliport identification marking for a runway-type FATO

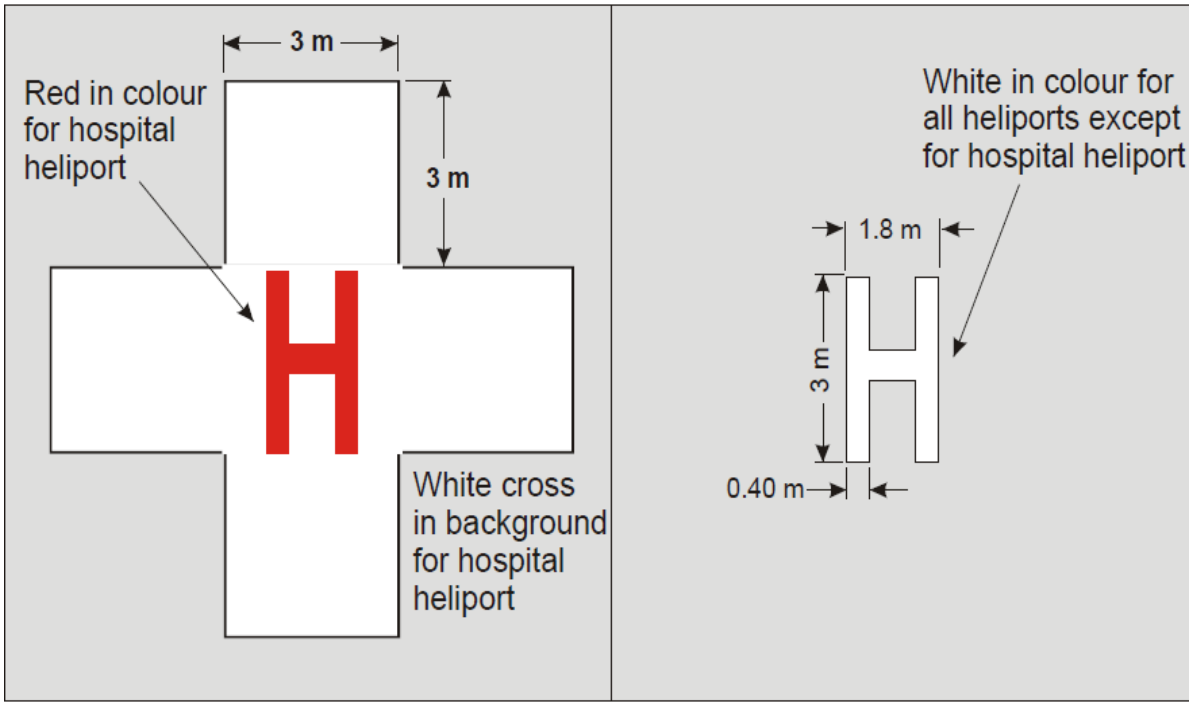


Figure 5-4. Hospital heliport identification and heliport identification marking

(7) A heliport identification marking shall be oriented with the cross arm of the H at right angles to the preferred final approach direction. For a helpdesk the cross arm shall be on or parallel to the bisector of the obstacle-free sector For a non-purpose built shipboard heliport located on a ship's side the cross arm shall be parallel with the side of the ship.

(8) On a helideck or a shipboard heliport where the D value is 16.0 m or larger, the size of the heliport identification H marking should have a height of 4 m with an overall width not exceeding 3 m and a stroke width not exceeding 0.75 m. Where the D value is less than 16.0 m, the size of the heliport identification H marking should have a

height of 3 m with an overall width not exceeding 2.25 m and a stroke width not exceeding 0.5 m.

(c) Maximum allowable mass marking:

(1) Application: A maximum allowable mass marking shall be displayed at an elevated heliport , a helpdeskand shipboard heliport.

(2) A maximum allowable mass marking should be displayed at a surface level heliport.

(3) Location: A maximum allowable mass marking should be located within the touchdown and lift-off area or FATOand so arranged as to be readable from the preferred final approach direction.

(4) Characteristics: A maximum allowable mass marking shall consist of a one, two-or a three- digit number.

(5) The maximum allowable mass shall be expressed in tonnes (1,000 kg) rounded down to the nearest 1000 kg followed by a letter "t". Where use mass in pounds, the maximum allowable mass marking shall indicate the allowable helicopter mass in thousands of pounds rounded down to the nearest 1000 lbs.

Note 1.— The objective of the maximum allowable mass marking is to provide the mass limitation of the heliport suchthat it is visible to the pilot from the preferred final approach direction.

Note 2: Where express the maximum allowable mass in pounds, it is not appropriate to suffix with the letter "t" which is used only to indicate metric tonnes. Guidance on markings where ECAA use imperial units is given in the EAC 139-27.

(6) The maximum allowable mass 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".

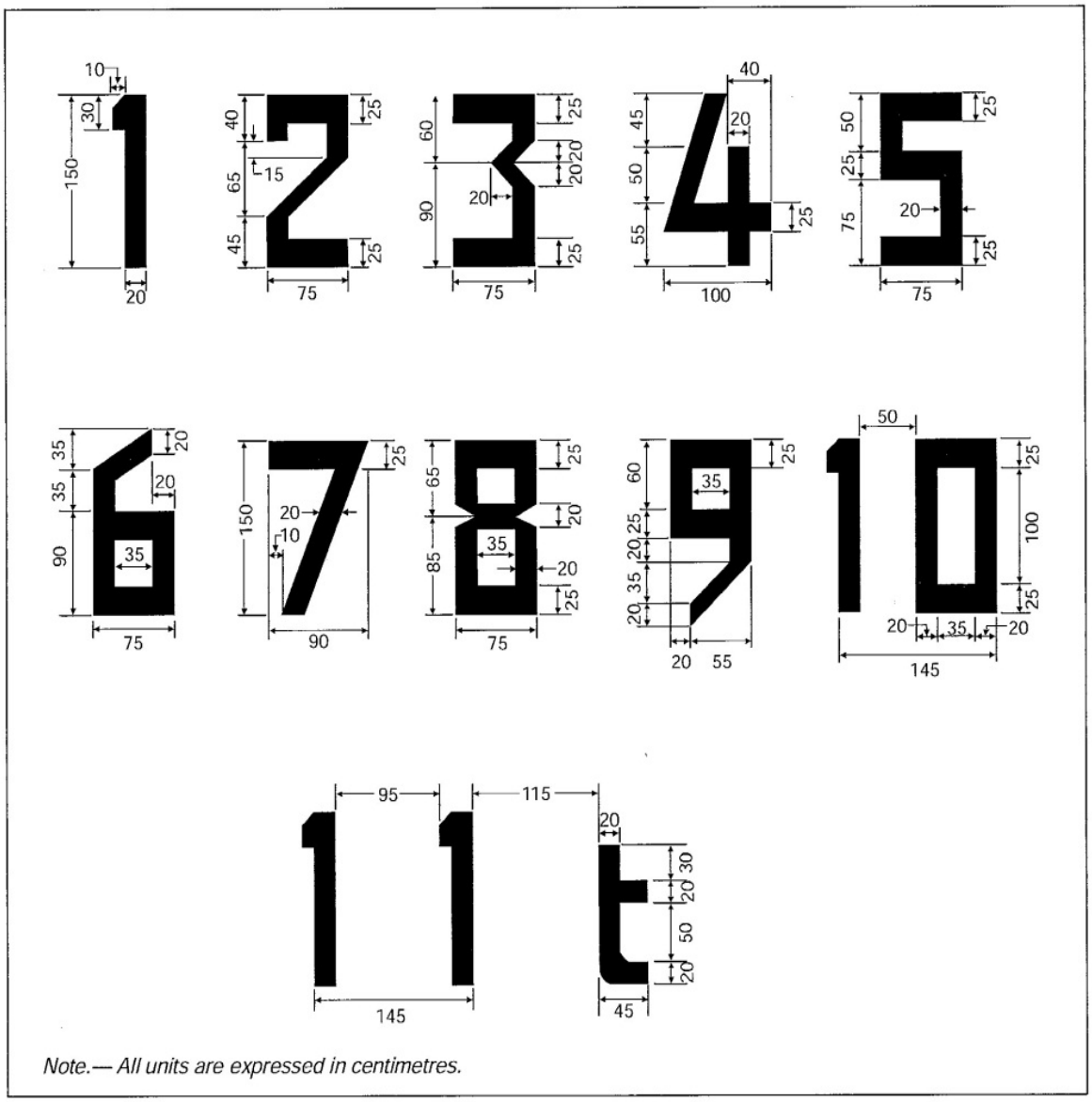


Figure 5-5. Form and proportions of numbers and letters

(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.

(8) All FATOs except runway-type FATOs The numbers and the letter of the marking should have a color contrasting with the background and should be in the form and proportion shown in Figure 5-4. 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.

(9) Runway-type FATOs: 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 5-5.

(d) D-value marking:

(1) Application: All FATOs except runway-type FATOs: The D-value marking shall be displayed at a helideck and at a shipboard heliport.

(2) Runway-type FATOs: The D-value marking should be displayed at surface-level and elevated heliports

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

(3) Location shall be located within the TLOF or FATO and so arranged as to be readable from the preferred final approach direction.

(4) 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. For a non-purpose built heliport located on a ship's side, D value markings should be provided on the perimeter of the D circle at the 2 o'clock, 10 o'clock and 12 o'clock positions when viewed from the side of the ship facing towards the centerline.

(5) Characteristics : The D-value marking shall be white. The D-value markingshall be rounded to the nearest whole meter or foot with 0.5 rounded down.

(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 5-4 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.

(e) Final approach and take-off area perimeter marking or markers for surface levelheliports:

Note.— The objective of final approach and take-off area perimeter marking, or markers, is to provide to the pilot, where the perimeter of the FATO is not self-evident, an indication of the area that is free of obstacles and in which intended procedures, or permitted maneuvering, may take place

(1) Application: FATO perimeter marking or markers shall be provided at a surface level heliport where the extent of a final approach and take-off area with a solid surface is not self-evident.

(2) Location: The FATO perimeter marking or markers shall be located on the edgeof the FATO .

(3) Characteristics: Runway-type FATOs the perimeter of the FATO shall be defined with markings or markers spaced.

(4) A FATO perimeter marking shall be a rectangular stripe with a length of 9 m or one-fifth of the side of the final approach and take-off area which it defines and a width of 1 m.

(5) FATO perimetermarkings shall be white.

(6) A FATO perimeter marker shall have dimensional characteristics as shown in Figure 5-6.

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

(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.

(9) Characteristics - All FATOs except runway-type FATOs: 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.

(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.

(11) FATO perimeter markings and flush in-ground markers shall be white.

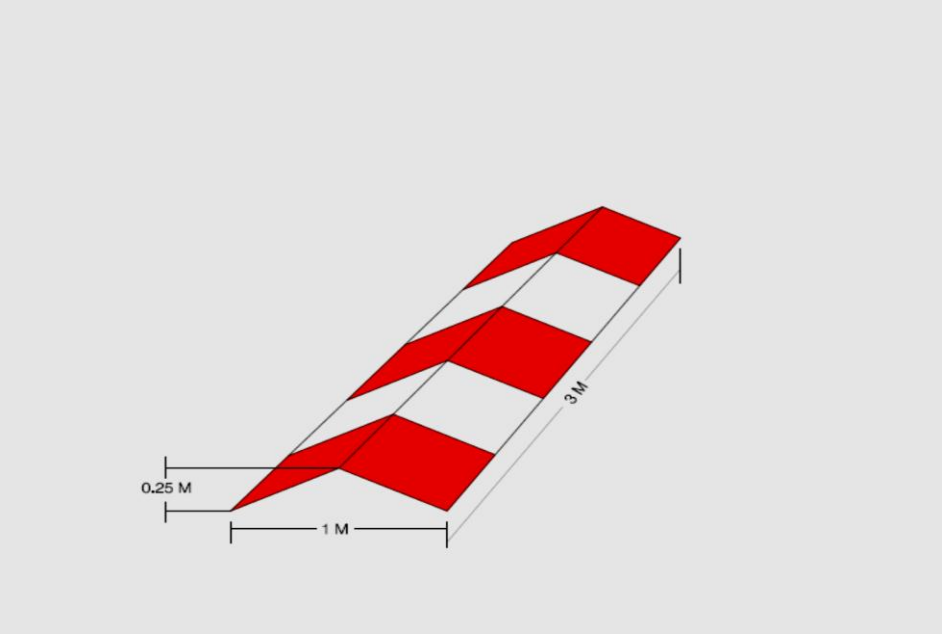


Figure 5-6 Runway-type FATO edge marker

(f) Final approach and take-off area designation markings for runway-type FATOs:
(1) Application: A FATO designation marking should be provided at a heliport where it is necessary to designate the final approach and take-off area to the pilot.
(2) Location: A final approach and take-off area designation marking shall be located at the beginning of the final approach and take-off area as shown in Figure 5-3.
(3) Characteristics: A final approach and take-off area designation marking shall consist of 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 5-3, shall be supplemented by the heliport identification marking.

Note.— The objective of final approach and take-off area designation markings for runway-type FATOs is to provide to the pilot an indication of the magnetic heading of the runway.

(g) Aiming point marking:
(1) Application: 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.
(2) Location-- Runway-type FATOs The aiming point marking shall be located within the final approach and take-off area.
(3) Location - All FATOs except runway-type FATOs: The aiming point marking shall be located at the centre of the FATO as shown in Figure 5-1.
(4)Characteristics: 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, providing a contrast with the background colour, and the dimensions of the marking shall conform to those shown in Figure 5-7.

Note.— The objective of the aiming point marking is to provide a visual cue indicating to the pilot the preferred approach/departure direction; the point to which the helicopter approaches to the hover before positioning to a stand where a touchdown can be made; and that the surface of the FATO is not intended for touchdown.

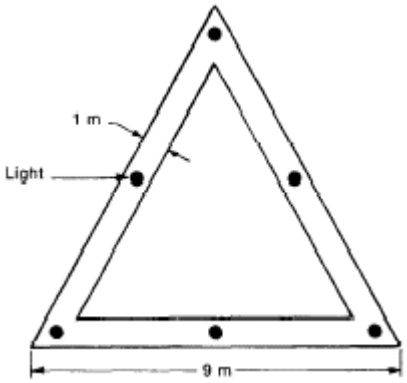


Figure 5-7: Aiming point marking

(h) Touchdown and lift-off area perimeter marking:

(1)Application : 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.

(2) A TLOF perimeter marking shall be displayed on an elevated heliport, a helideck and a shipboard heliport.

(3) Location: TLOF perimeter marking shall be located along the edge of the TLOF.

(4) Characteristics: TLOF perimeter marking shall consist of a continuous white line with a width of at least 30 cm.

Note.— The objective of the touchdown and lift-off area perimeter marking is to provide to the pilot an indication of an area that is free of obstacles; has dynamic load bearing; and in which, when positioned in accordance with the TDPM, undercarriage containment is assured.

(i)Touchdown/Positioning marking:

Note.— The objective of a touchdown/positioning marking (TDPM) is to provide visual cues which permit a helicopter to be placed in a specific position such that, when the pilot's seat is above the marking, the undercarriage is within the load-bearing area and all parts of the helicopter will be clear of any obstacles by a safe margin.

(1) Application : A touchdown/positioning marking shall be provided for a helicopter to touch down or be accurately placed in a specific position.

(2) The touchdown/positioning marking shall be:

i) when there is no limitation on the direction of touchdown/positioning, a touchdown/positioning circle (TDPC) marking; and

ii) when there is a limitation on the direction of touchdown/positioning:

A) for unidirectional applications, a shoulder line with an associated centreline; or

B) for multidirectional applications, a TDPC marking with prohibited landing sector(s) marked

(3) Location : The inner edge/inner circumference of the touchdown/positioning marking shall be at a distance of 0.25 D from the centre of the area in which the helicopter is to be positioned.

(4) On a helideck, the centre of the TDPC marking shall be located at the centre of the FATO, except that the marking may be offset away from the origin of the obstacle-free sector by no more than 0.1 D where an aeronautical study indicates such offsetting is necessary and would not impair safety.

(5) Prohibited landing sector markings, when provided, shall be located on the touchdown/positioning marking, within the relevant headings, and extend to the inner edge of the TLOF perimeter marking.

(6) Characteristics : The inner diameter of the TDPC shall be 0.5 D of the largest helicopter the area is intended to serve.

(7) A touchdown/positioning marking shall have a line width of at least 0.5 m. For a helideck and a purpose-built shipboard heliport, the line width shall be at least 1 m.

(8) The length of a shoulder line shall be 0.5D of the largest helicopter the area is intended to serve.

(9) The prohibited landing sector markings, when provided, shall be indicated by white and red hatched markings as shown in Figure 5-8.

(10) The TDPM shall take precedent when used in conjunction with other markings on the TLOF except for the prohibited landing sector marking.

Note.— The prohibited landing sector (PLS) marking, when provided, is not intended to move the helicopter away from objects around the FATO, but to ensure that the tail is not placed in an orientation that might constitute a hazard. This is achieved by having the helicopter nose clear of the hatched markings during the touchdown.

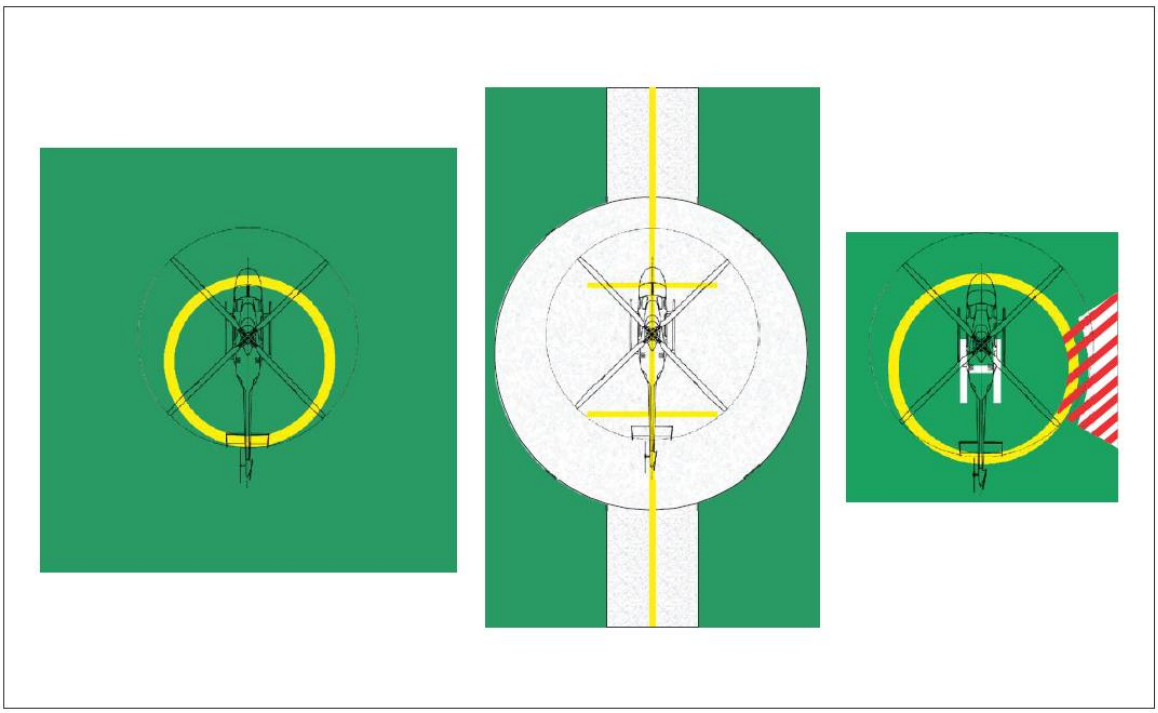


Figure 5-8. Multidirectional TDPC with no limitations (left)Unidirectional marking shoulder line with associated centreline (centre)Multidirectional TDPC with prohibited landing sector marking (right)

(j) Heliport name marking:

Note.— The objective of a heliport name marking is to provide to the pilot a means of identifying a heliport which can be seen, and read, from all directions of approach.

(1) Application: A heliport name marking should be provided at a heliport andhelideck where there is insufficient alternative means of visual identification.

(2) Location: Where a limited obstacle sector (LOS) exists on a helideck, the marking should belocated on that side of the heliport identification marking. For a non-purpose-built heliport located on a ship's side, themarking should be located on the inboard side of the heliport identification marking in the area between the TLOF perimetermarking and the boundary of the LOS.

(3) Characteristics: A heliport name marking shah consists of the name or the alphanumeric designator of the heliport as used in the radio (R/T) communications.

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

(5) Runway-type FATOs: The characters of the marking should be not less than 3 m in height.

(6) All FATOs except runway-type FATOs: 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, helidecks and shipboard heliports. The colour of the marking should contrast with the background and preferably be white.

(k) Helideck obstacle-free sector(chevron) marking:

Note.— The objective of the helideck obstacle-free sector (chevron) marking is to indicate the direction and limits of a sector that is free of obstacles above the level of the helideck for the preferred approach and departure directions.

(1) Application: A helideck with adjacent obstacles that penetrate above the level of the helideck shall have an obstacle free sector marking.

(2) Location: A helideck obstacle-free sector marking shall be located, where practicable, at a distance from the centre of the TLOF equal to the radius of the largest circle that can be drawn in the TLOF or 0.5D, whichever is greater.

Note: Where the Point of Origin is outside the TLOF, and it is not practicable to physically paint the chevron, the chevron is relocated to the TLOF perimeter on the

bisector of the OFS. In this case the distance and direction of displacement, along with the attention getting "WARNING DISPLACED CHEVRON", with the distance and direction of displacement, is marked in a box beneath the chevron in black characters not less than 10cm high – an example Figure is given in the Heliport Manual.

(3) Characteristics: The helideck obstacle-free sector marking shall indicate the location of the obstacle free sector, and the directions of the limits of the sector.

Note: Example figures are given in EAC 138-27 (under preparation)

(4) The height of the chevron shall be less than 30 cm.

(5) The chevron shall be marked in a conspicuous colour.

(6) The colour of the Chevron should be black.

(l) Helideck and shipboard heliport surface marking

(1) Application: A surface marking should be provided to assist the pilot to identify the location of the helideck or shipboard heliport during an approach by day.

(2) Location: A surface marking should be applied to the dynamic load bearing area bounded by the TLOF perimeter marking.

(3) Characteristics: The helideck or shipboard heliport surface, bounded by the /TLOF perimeter marking should be of a dark green using a high friction coating.

Note: Where the application of a surface coating may have a degrading effect on friction qualities the surface might not be painted. In such cases the best operating practice to enhance the conspicuity of markings is to outline deck markings with a contrasting colour.

(m) Helicopter ground taxiway markings and markers

Note 1.— The objective of helicopter taxiway markings and markers is, without being a hazard to the helicopter, to provide to the pilot by day and, if necessary, by night, visual cues to guide movement along the taxiway.

Note 2: The specifications for taxi-holding position markings in ECAR 139, 139.321.j are equally applicable to taxiways intended for ground taxiing of helicopters.

Note 3: Ground taxi-routes and air taxi-routes over a taxiwayare not required to be marked.

Note 4.— Unless otherwise indicated it may be assumed that a helicopter taxiway is suitable for both ground taxiing and air taxiing of helicopters.

Note 5.— Signage may be required on an aerodrome where it is necessary to indicate that a helicopter taxiway is suitable only for the use of helicopters.

(1) Application: The centre line of a helicopter taxiway shall be identified with a marking.

(2) The edges of a helicopter taxiway, if not self-evident, should be identified with markersor markings.

(3) Location: Helicopter taxiway markings shall be along the centre line and, if required, along the edges of a helicopter taxiway.

(4) Helicopter taxiway edge markers shall be located at a distance of 1 m to 3 m beyond the edge of the helicopter

(5) Helicopter taxiway edge markers 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.

(6) Characteristics: On a paved taxiway, a helicopter taxiway centre line marking shall be a continuous yellow line 15 cm in width.

(7) On an unpaved taxiway that will not accommodate painted markings, a helicopter taxiway centre line shall bemarked with flush in-ground 15-cm-wide and approximately 1.5 m in length yellow markers, spaced at intervals of not morethan 30 m on straight sections and not more than 15 m on curves, with a minimum of four equally spaced markers per section.

(8) Helicopter taxiway edge markings shall be a continuous double yellow line, each 15 cm in width, and spaced15 cm apart (nearest edge to nearest edge).

(9) A helicopter taxiway edge marker shall be frangible to the wheeled undercarriage of a helicopter.

Note 1: Guidance on suitable edge markers is given in the EAC 139-27.

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.

(10) A helicopter taxiway edge marker shall not exceed a plane originating at a height of 25 cm above the planeand sloping upwards and outwards ata gradient of 5 per cent to a distance of 3 m beyond the edge of the helicopter taxiway.

(11) A helicopter taxiway edge marker shall be blue.

Note 1.— Guidance on suitable edge markers is given in the EAC139-27

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

(12) If the helicopter taxiway is to be used at night, the edge markers shall be internally illuminated or retro reflective.

(n) Helicopter air taxi-route markings and markers

Note.— The objective of helicopter air taxi-route markings and markers is to provide to the pilot by day and, if necessary,

(1) Application : The centre line of a helicopter air taxi-route shall be identified with markers or markings

(2) Location : A helicopter air taxi-route centre line marking or flush in-ground centre line marker shall be located along the

(3) Characteristics: A helicopter air taxi-route centre line, when on a paved surface, shall be marked with a continuous yellow line15 cm in width.

(4) A helicopter air taxi-route centre line, when on an unpaved surface that will not accommodate paintedmarkings, shall be marked with flush in-ground 15-cm-wide and approximately 1.5 m in length yellow markers, spaced atintervals 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.

(5) If the helicopter air taxi-route is to be used at night, markers shall be either internally illuminated or retroreflective

(o) Helicopter stands markings

Note.— The objective of the helicopter stand markings is to provide to the pilot a visual indication of an area that is free of obstacles and in which permitted manoeuvring, and all necessary ground functions, may take place;identification, mass and D-value limitations, when required; and, guidance for maneuvering and positioning of the helicopter within the stand.

(1) Application: A helicopter stand perimeter marking shall be provided.

(2) A helicopter stand shall be provided with the appropriate TDPM. See Figure 5-8.

(3) Alignment lines and lead-in/lead-out lines should be provided on a helicopter stand.

Note 1: See Figures 3.5 to 3.9.

Note 2: Helicopter stand identification markings may be provided where there is a need to identify individual stands.

Note 3: Additional markings relating to stand size may be provided. See the EAC 139-27.

(4) Location: The TDPM, alignment lines and lead-in/lead-out lines shall be located such that every part of the helicopter can be contained within the helicopter stand during positioning and permitted maneuvering.

(5) Alignment lines and lead-in/lead-out lines shall be located as shown in Figure 5-9.

(6)Characteristics A helicopter stand perimeter marking shall consist of a continuous yellow line and have a line width of 15 cm.

(7) The TDPM shall have the characteristics described in Section 5.2.9 above..

(8) Alignment lines and lead-in/lead-out lines shall be continuous yellow lines and have a width of 15 cm.

(9) 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.

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

Note 1: Where it is intended that helicopters proceed in one direction only, arrows indicating the direction to befollowed may be added as part of the alignment lines

Note 2: The characteristics of markings related to the stand size and alignment and lead-in/lead-out lines areillustrated in Figure 5-9. Examples of stands and their markings can be seen in Chapter 3, Figures 3.5 to 3.9.

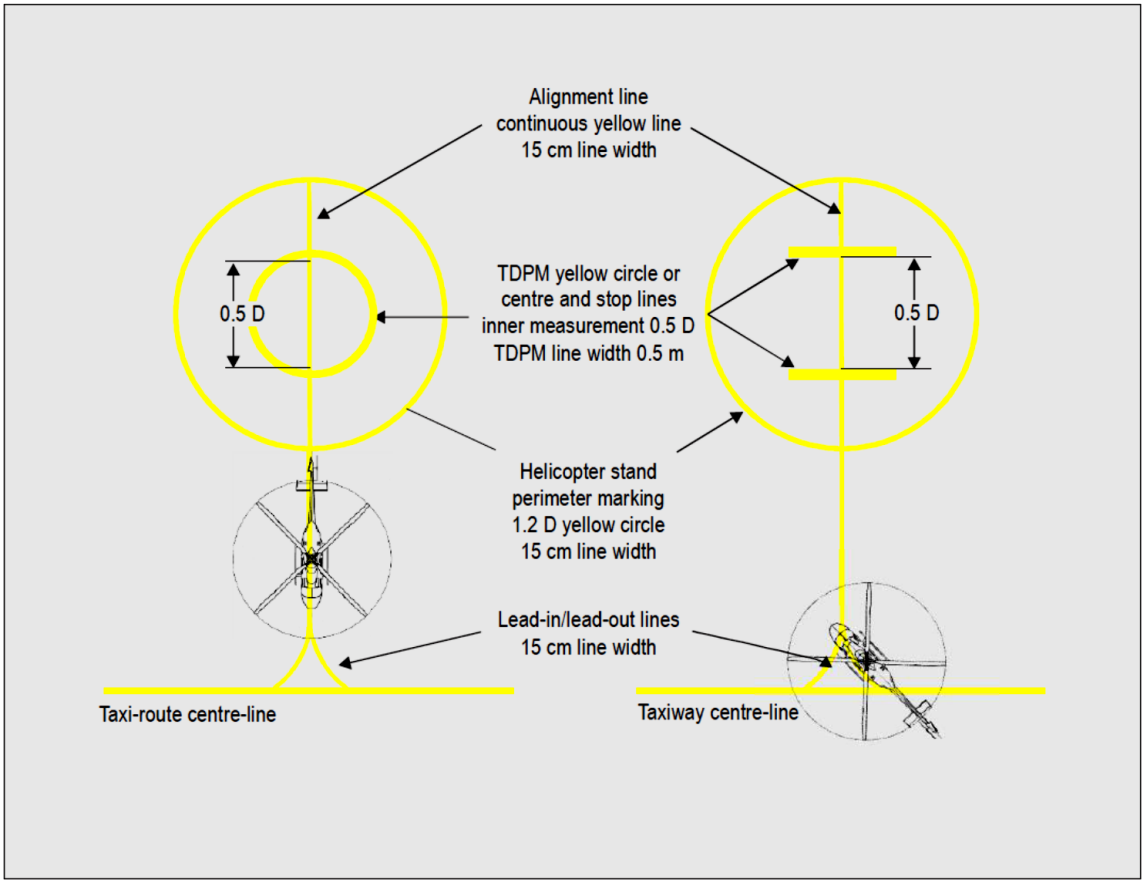


Figure 5-9 Helicopter stand markings

(p) Flight path alignment guidance marking

Note.— The objective of a flight path alignment guidance marking is to provide the pilot with a visual indication of the available approach and/or departure path direction(s)

(1) Application: 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 138.315.d.

(2) Location: 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.

(3) Characteristics: 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 5-10. 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 5-10 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.

(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.

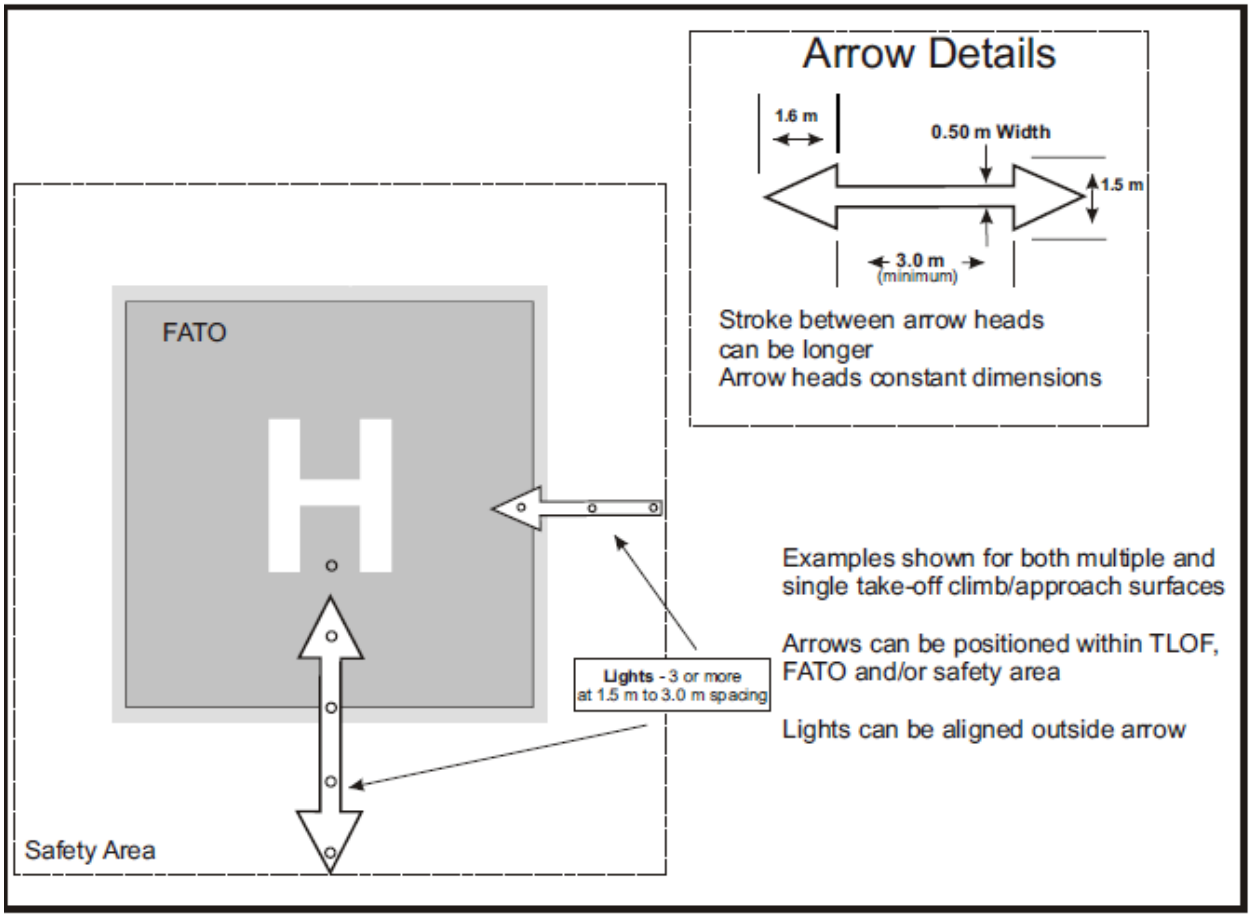


Figure 5-10 Flight path alignment guidance markings and lights

138.315 Lights

(a) General:

Note 1: See ECAR Part 139, 139.323(a) concerning requirements on screening of non-aeronautical ground lights, and design of elevated and inset lights.

Note 2: In the case of helidecks and 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.— Systems addressed in sections 138.315.d, f, g, hare designed to provide effective lighting cues basedon night conditions. Where lights are to be used in conditions other than night (i.e. day or twilight), it may be necessary toincrease the intensity of the lighting to maintain effective visual cues by use of a suitable brilliancy control. Guidance isprovided in the EAC 139-12 Light Intensity Settings.

Note 5.— The specifications for marking and lighting of obstacles included in ECAR 139-SUBPART I , are equally applicable to heliports and winching areas.

Note 6.— In cases where operations into a heliport are to be conducted at night with night vision imaging systems)NVIS), it is important to establish the compatibility of the NVIS with all heliport lighting th rough an assessment by the helicopter operator prior to use.

(b) Heliport beacon:

(1) Application: A heliport beacon should be provided at a heliport where:
   (i) Long-range visual guidance is considered necessary and is not provided by other visual means; or
   (ii) Identification of the heliport is difficult due to surrounding lights.

(2) Location: 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.

(3) Characteristics: The heliport beacon shall emit repeated series of equispaced short duration white flashes in the format in Figure 5-8.

(4) The light from the beacon shall show at all angles of azimuth.

(5) The effective light intensity distribution of each flash should be as shown in Figure 5-9, 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.

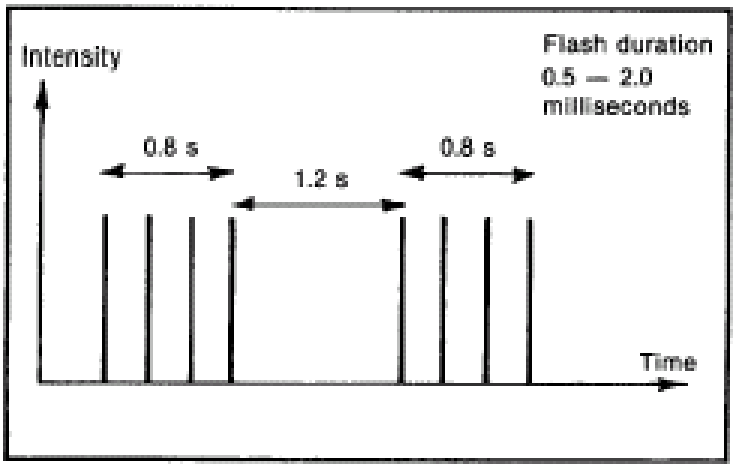


Figure 5-11: Heliport beacon flash characteristics

(c) Approach lighting system:

(1) Application: An approach lighting system should be provided at a heliport where it is desirable and practicable to indicate a preferred approach direction.

(2) Location: The approach lighting system shall be located in a straight line along the preferred direction of approach.

(3) Characteristics: 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 final approach and take-off area as shown in Figure 5-13. 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.

(4) The steady lights shall be Omni directional white lights.

(5) Sequenced flashing lights shall be omni directional white lights.

(6) The flashing lights should have a flash frequency of one per second and their light distribution should be as shown in Figure 5-12, Illustration 3. The flash sequence should commence from the outermost light and progress towards the crossbar.

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

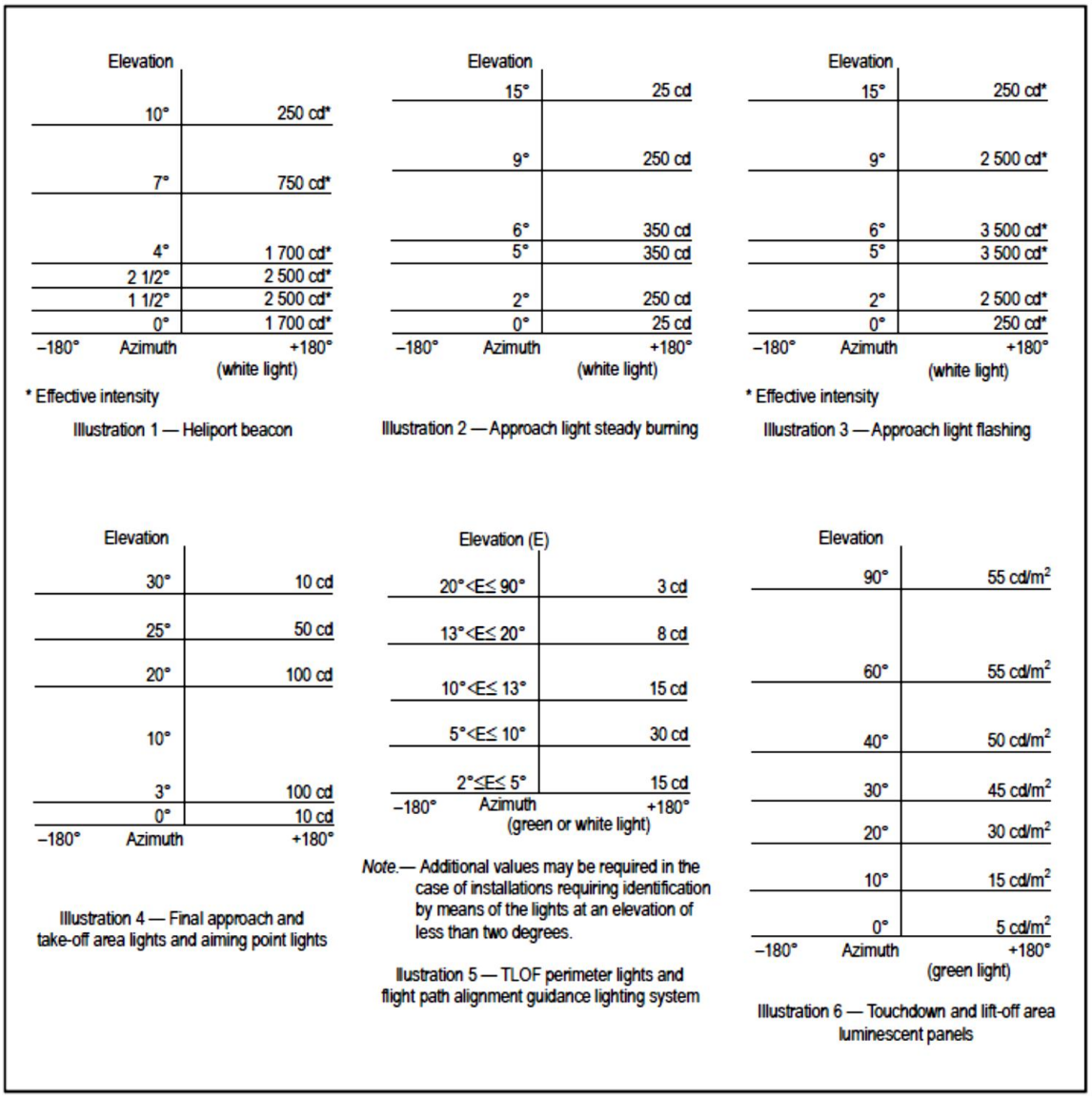


Figure 5-12: ISO candela diagrams

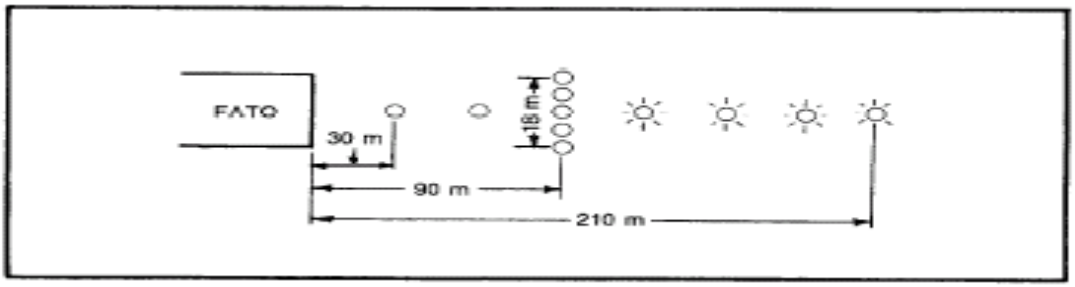


Figure 5- 13: Approach lighting system

(d) Flight path alignment guidance lighting system

(1) **Application:** 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 138.313.r.

(2) **Location:** 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.

(3) If combined with a flight path alignment guidance marking, as far as is practicable the lights should be located inside the 'arrow' markings.

(4) **Characteristics:** 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 5-10.)

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 5-10.

(5) The lights shall be steady unidirectional inset white lights.

(6) The distribution of the lights should be as indicated in Figure 5-12, Illustration 5.

(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

(e) Visual alignment guidance system:

Note.— The objective of a visual alignment guidance system is to provide conspicuous and discrete cues to assist the pilot to attain, and maintain, a specified approach track to a heliport. Guidance on suitable visual alignment guidance systems is given in the Heliport Manual (EAC 139-27) .

(1) Application: 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:

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

(ii) The environment of the heliport provides few visual surface cues; and

(iii) It is physically impracticable to install an approach lighting system.

(f) Visual approach slope indicator:

Note.— The objective of a visual approach slope indicator is to provide conspicuous and discrete colour cues within a specified elevation and azimuth, to assist the pilot to attain and maintain the approach slope to a desired position within a FATO. Guidance on suitable visual approach slope indicators is given in the Heliport Manual (EAC 139-27) .

(1) Application: 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:
   (i) Obstacle clearance, noise abatement or traffic control procedures require a particular slope to be flown;
   (ii) The environment of the heliport provides few visual surface cues; and
   (iii) The characteristics of the helicopter require a stabilized approach.

(g) Final approach and take-off area lighting systems for onshore surface level heliports

Note.— The objective of a final approach and take-off area lighting system for onshore surface-level heliports is to provide to the pilot operating at night an indication of the shape, location and extent of the FATO.

(1) Application: Where a final approach and take-off with a solid surface is established at a surface level heliport intended for use at night, final approach and take-off area lights shall be provided except that they may be omitted where the final approach and take-off area and the touchdown and lift-off area are nearly coincidental or the extent of the final approach and take-off area is self-evident.

(2) Location: Final approach and take-off area lights shall be placed along the edges of the final approach and take-off area. The lights shall be uniformly spaced as follows:
   (i) 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 comer; and
   (ii) For any other shaped area, including a circular area, at intervals of not more than 5 m with a minimum of ten lights.

(3) Characteristics: Final approach and take-off area lights shall be fixed omnidirectional lights showing white. Where the intensity of the lights is to be varied the lights shall show variable white.

(4) The light distribution of final approach and take-off area lights should be as shown in Figure 5-12, Illustration 4.

(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 final approach and take-off area is not meant for lift-off or touchdown, the lights should not exceed a height of 25 cm above ground level.

(h) Aiming point lights:

Note.— The objective of aiming point lights is to provide a visual cue indicating to the pilot by night the preferred approach/departure direction; the point to which the helicopter approaches to a hover before positioning to a TLOF, where a touchdown can be made; and that the surface of the FATO is not intended for touchdown.

(1) Application: Where an aiming point marking is provided at a heliport intended for use at night, aiming point lights should be provided.

(2) Location: Aiming point lights shall be collocated with the aiming point marking.

(3) Characteristics: Aiming point lights shall form a pattern of at least six omni directional white lights as shown in Figure 5-7. The lights shall be inset when a light extending above the surface could endanger helicopter operations.

(4) The light distribution of aiming point lights should be as shown in Figure 5-12, Illustration 4.

(i) Touchdown and lift-off area lighting system:

Note.— The objective of a touchdown and lift-off area lighting system is to provide illumination of the TLOF and required elements within. For a TLOF located in a FATO, the objective is to provide discernibility, to the pilot on a final approach, of the TLOF and required elements within; while for a TLOF located on an elevated heliport, shipboard heliport or helideck, the objective is visual acquisition from a defined range and to provide sufficient shape cues to permit an appropriate approach angle to be established.

(1)Application: A touchdown and lift-off area lighting system shall be provided at a heliport intended for use at night.

Note.— Where a TLOF is located in a stand, the objective may be met with the use of ambient lighting or stand floodlighting.

(2) For a surface level heliport , lighting for the TLOF in a FATO shall consist of one or more of the following:

(i) Perimeter lights;
(ii) Floodlighting;
(iii) Arrays of segmented point source lighting (ASPSL) or Luminescent panel (LP) lighting to identify the touchdown and lift-off area when (i) and (ii) are not practicable and final approach and take-off area lights are available.

(3) For an elevated heliport , shipboard heliport or helideck, lighting of the TLOF in a FATO shall consist of:
(i) Perimeter lights; and
(ii) ASPSL and/or LPs to identify TDPM the and/or floodlighting to illuminate the touchdown and lift-off area.

Note: At elevated heliports, shipboard 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) and inset lights to identify the TDPM and heliport identification markings.

(4) Touchdown and lift-off area ASPSL and/or LPs to identify the touchdown TDPM and/or floodlighting should be provided at a surface-level heliport intended for use at night when enhanced surface texture cues are required.

(5) Location: Touchdown and lift-off area perimeter lights shall be placed along the edge of the area designated for use as the touchdown and lift-off area or within a distance of 1.5 m from the edge. Where the touchdown and lift-off area is a circle the lights shall be:
(i) Located on straight lines in a pattern which will provide information to pilots on drift displacement; and
(ii) Where (i) is not practicable, evenly spaced around the perimeter of the touchdown and lift-off area at the appropriate interval except that over a sector of 45º the lights shall be spaced at half spacing.

(6) Touchdown and lift-off area 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 comer. For a circular touchdown and lift-off area, where lights are installed in accordance with 138.315(h)(5)(ii) there shall be a minimum of fourteen lights.
Note: Guidance on this issue is contained in EAC139-27.

(7) The touchdown and lift-off area 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 touchdown and lift-off area.

(8) The touchdown and lift-off area perimeter lights shall be installed on a moving helideck, or shipboard heliport such that the pattern cannot be seen by the pilot from below the elevation of the touchdown and lift-off area when the helideck or shipboard heliport is level.

(9) On surface level heliports, ASPSL or LPs, if provided to identify the touchdown and lift-off area, shall be placed along the marking designating the edge of the touchdown and lift-off area. Where the touchdown and lift-off area is a circle they shall be located on straight lines circumscribing the area.

(10) On surface level heliports the minimum number of LPs on a touchdown and lift-off area 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 touchdown and lift-off area including a panel at each comer. LPs shall be uniformly spaced with a distance between adjacent panel ends of not more than 5 m on each side of the touchdown and lift-off area.

(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 or coincident with heliport identification marking.

(12) Touchdown and lift-off area 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 TDPM 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 requirements contained within 138.315 (h).

(13) Characteristics: The touchdown and lift-off area perimeter lights shall be fixed omni directional lights showing green.

(14) At a surface level heliport, ASPSL or LPs shall emit green light when used to define the perimeter of the touchdown and lift-off area..

(15) The chromaticity and luminance of colours of luminescent panels should conform to ECAR Part 139, Appendix 1, 3.4.

(16) A LP shall have a minimum width of 6 cm. The panel housing shall be the same color as the marking it defines.

(17) For a surface level or elevated heliport, the TLOF perimeter lights located in a FATO should not exceed a height of 5 cm and should be inset when a light extending above the surface could endanger helicopter operations.

(18) For a helideck or shipboard heliport, the TLOF perimeter lights shall not exceed a height of 5 cm, or for a FATO/TLOF, 15 cm

(19) When located within thesafety area of a surface level or elevated heliport or the touchdown and lift-off area floodlights should not exceed a height of 25 cm.

(20) For a helideck or shipboard heliport, the TLOF floodlights shall not exceed a height of 5 cm, or for a FATO/TLOF, 15 cm.

(21) The LPs shall not extend above the surface by more than 2.5 cm.

(22) The light distribution of the perimeter lights should be as shown in Figure 5-12, Illustration 5.

(23) The light distribution of the LPs should be as shown in Figure 5-12, Illustration8.

(24) The spectral distribution of touchdown and lift-off area floodlights shall be such that the surface and obstacle marking can be correctly identified.

(25) The average horizontal luminance of the floodlighting should be at least 10 lux, with a uniformity ratio (average to minimum) of not more than 8:l measured on the surface of the touchdown and lift-off area.

(26) Lighting used to identify the *TDPC* should comprise a segmented circle of omni directional 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.

(27) If utilized, the heliport identification marking lighting should be omni directional showing green.

(j) Helicopter stand floodlighting

Note.— The objective of helicopter stand floodlighting is to provide illumination of the stand surface and associated markings to assist the maneuvering and positioning of a helicopter and facilitation of essential operations around the helicopter.

(1) **Application**: Floodlighting should be provided on a helicopter stand intended to be used at night.

Note.— Guidance on stand floodlighting is given in the apron floodlighting section in the EAC139-12

(2) **Location** : Helicopter stand floodlights should be located so as to provide adequate illumination, with a minimum of glare to the pilot of a helicopter in flight and on the ground, and to personnel on the stand. The arrangement and aiming of floodlights should be such that a helicopter stand receives light from two or more directions to minimize shadows.

(3) **Characteristics**: The spectral distribution of stand floodlights shall be such that the colours used for surface and obstacle marking can be correctly identified.

(4) Horizontal and vertical illuminance shall be sufficient to ensure that visual cues are discernible for required maneuvering and positioning, and essential operations around the helicopter can be performed expeditiously without endangering personnel or equipment.

(k) Winching area floodlighting:

Note.— The objective of winching area floodlighting is to provide illumination of the surface, obstacles and visual cues to assist a helicopter to be positioned over, and

retained within, an area from which a passenger or equipment can be lowered or raised.

(1) Application: Winching area floodlighting shall be provided at a winching area intended for use at night.

(2) Location: Winching area 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.

(3) Characteristics: The spectral distribution of winching area floodlights shall be such that the surface and obstacle markings can be correctly identified.

(4) The average horizontal luminance should be at least 10 lux, measured on the surface of the winching area.

(I) Taxiway lights:

Note.— The specifications for taxiway center line lights and taxiway edge lights in ECAR139 subpart H are equally applicable to taxiways intended for ground taxiing of helicopters.

(m) Visual aids for denoting obstacles:

Note.— Arrangements for an aeronautical study of objects outside the obstacle limitation surface and for other objects are addressed in ECAR 139 subpart G

(1) Where an aeronautical study indicates that obstacles in areas outside and below the boundaries of the obstacle limitation surface established for a heliport constitute a hazard to helicopters, they should be marked and lit, except that the marking may be omitted when the obstacle is lighted with high-intensity obstacle lights by day.

(2) Where an aeronautical study indicates that overhead wires or cables crossing a river, waterway, valley or highway constitute a hazard to helicopters, they should be marked, and their supporting towers marked and lit.

(n) Floodlighting of obstacles:

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

(2) Location: 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.

(3) Characteristics: Obstacle floodlighting should be such as to produce a luminance of at least 10 cd/m^2.

SUBPART F
Heliport Emergency Response

138.317Heliport Emergency Response

(a) Heliport Emergency 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 minimize the impact of an emergency by saving lives and maintaining helicopter operations. The heliport emergency plan sets out the procedures for coordinating the response of heliport agencies or services (air traffic services unit, firefighting services, heliport administration, medical and ambulance services, aircraft operators, security services and police) and the response of agencies in the surrounding community (fire departments, police, medical and ambulance services, hospitals, military, and harbor patrol or coast guard) that could be of assistance in responding to the emergency.

(1) A heliport emergency plan shall be established commensurate with the helicopter operations and other activities conducted at the heliport.

(2) The plan shall identify agencies which could be of assistance in responding to an emergency at the heliport or in its vicinity.

(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.

(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 the event of a helicopter ditching and indicate how to contact that agency.

(5) The plan should include, as a minimum, the following information:

(i) the types of emergencies planned for;

(ii) how to initiate the plan for each emergency specified;

(iii) the name of agencies on and off the heliport to contact for each type of emergency with telephone numbers or other contact information;

(iv) the role of each agency for each type of emergency;

(v) a list of pertinent on-heliport services available with telephone numbers or other contact information;

(vi) copies of any written agreements with other agencies for mutual aid and the provision of emergency services; and

(vii) a grid map of the heliport and its immediate vicinity.

(6) All agencies identified in the plan should be consulted about their role in the plan.

(7) The plan should be reviewed and the information in it updated at least yearly or, if deemed necessary, after an actual emergency, so as to correct any deficiency found during actual emergency.

(8) A test of the emergency plan should be carried out at least once every three years.

(b) Rescue and firefighting

General — Introductory Notes

The content of this section has been extensively revised and updated for Amendment 9. With new concepts and terms now to consider, it is important that section 6.2 be read in conjunction with the appropriate detailed guidance on rescue and firefighting options given in the Heliport Manual (EAC 139-27).

Provisions described in this section are intended to address incidents or accidents within the heliport response area only. No dedicated firefighting provisions are included for helicopter accidents or incidents that may occur outside the response area, such as on an adjacent roof near an elevated heliport.

Complementary agents are ideally dispensed from one or two extinguishers (although more extinguishers may be permitted where high volumes of an agent are specified, e.g. H3 operations). The discharge rate of complementary agents needs to be selected for optimum effectiveness of the agent used. When selecting dry chemical powders for use with foam, care needs to be exercised to ensure compatibility. Complementary agents need to comply

with the appropriate specifications of the International Organization for Standardization (ISO).

Where a fixed monitor system (FMS) is installed, trained monitor operators, where provided, be positioned on at least the upwind location to ensure primary media is directed to the seat of the fire. For a ring-main system (RMS) practical testing has indicated that these solutions are only guaranteed to be fully effective for TLOFs up to 20 m diameter. If the TLOF is greater than 20 m a RMS should not be considered unless supplemented by other means to distribute primary media (e.g. additional pop-up nozzles are installed in the centre of the TLOF).

The International Convention for the Safety of Life at Sea (SOLAS) sets forth provisions on rescue and firefighting (RFF) arrangements for purpose-built and non-purpose-built shipboard heliports, in SOLAS regulations II-2/18, II-2-Helicopter Facilities, and the SOLAS Fire Safety Systems Code.

It may therefore be assumed that this chapter does not include RFF arrangements for purpose-built or non-purpose-built shipboard heliports or for winching areas.

(1) Applicability:

i. The following specifications shall apply to new builds or replacement of existing systems or part thereof from 1 January 2023: 138.317.b.2.i , 138.317.b.3.iii,iv,vi,vii,ix,x,xii,xiii and 138.317.b.4.ii.

Note.— For areas for the exclusive use of helicopters at aerodromes primarily for the use of aeroplanes, distribution of extinguishing agents, response time, rescue equipment and personnel have not been considered in this section; see ECAR 139 Subpart L.

ii. Rescue and firefighting equipment and services shall be provided at helidecks and at elevated heliports located above occupied structures.

iii. A safety risk assessment should be performed to determine the need for rescue and firefighting equipment and services at surface level heliports and elevated heliports located above unoccupied structures.

Note.— Further guidance on factors to inform the safety risk assessment, including staffing models for heliports with only occasional movements and examples of unoccupied areas that may be located beneath elevated heliports, are given in the Heliport Manual (EAC 139-27).

(2) Level of protection provided

i) For the application of primary media the discharge rate (in litres/minute) applied over the assumed practical critical area (in m2) shall be predicated on a requirement to bring any fire which may occur on the heliport under control within one minute, measured from activation of the system at the appropriate discharge rate.

ii) Practical critical area calculation where primary media is applied as a solid stream :The practical critical area should be calculated by multiplying the helicopter fuselage length (m) by the helicopter fuselage width (m) plus an additional width factor (W1) of 4 m. Categorization from H0 to H3 should be determined on the basis of the fuselage dimensions in Table 6-1 below.

Note.— This section is not applicable to helidecks regardless of how primary media is being delivered.

Table 6-1. Heliport firefighting category

Category (1)	Maximum fuselage length (2)	Maximum fuselage width (3)
H0	up to but not including 8 m	1.5 m
H1	from 8 m up to but not including 12 m	2 m
H2	from 12 m up to but not including 16 m	2.5 m
H3	from 16 m up to 20 m	3 m

Note 1.— For helicopters which exceed one or both of the dimensions for a category H3 heliport, it will be necessary to recalculate the level of protection using practical critical area assumptions based on the actual fuselage length and the actual fuselage width of the helicopter plus an additional width factor (W1) of 6 m.

Note 2.— The practical critical area may be considered on a helicopter type-specific basis by using the formula in 1328.317.b.2.ii. Guidance on practical critical area in relation to the heliport firefighting category is given in the Heliport Manual (EAC 139-27) where a discretionary 10 per cent tolerance on fuselage dimension "upper limits" is applied.

iii) Practical critical area calculation where primary media is applied in a dispersed pattern: For heliports, except helidecks, the practical critical area should be based on an area contained within the heliport perimeter, which always includes the TLOF, and to the extent that it is load-bearing, the FATO.

iv) For helidecks the practical critical area should be based on the largest circle capable of being accommodated within the TLOF perimeter.

Note.— Recommendation 138.317.b.2.iv, is applied for the practical critical area calculation for helidecks regardless of how primary media is being delivered.

(3) Extinguishing agents

Note.1— Throughout this section the discharge rate of a performance level B foam is assumed to be based on an application rate of 5.5 L/min/m2, and for a performance level C foam and for water, is assumed to be based on an application rate of 3.75 L/min/m2. These rates may be reduced if, through practical testing, a State demonstrates that the objectives of 138.317.b.2.i can be achieved for a specific foam use at a lower discharge rate (l/min).

Note 2 Information on the required physical properties and fire extinguishing performance criteria needed for a foam to achieve an acceptable performance level B or C rating is given in the EAC139-18

i) Surface level heliports with primary media applied as a solid stream using a portable foam application system (PFAS) :Where an RFFS is provided at a surface level heliport, the amount of primary media and complementary agents should be in accordance with Table 6-2.

Note.1— The minimum discharge duration in Table 6-2 is assumed to be two minutes. However, if the availability of back-up specialist fire services is remote from the heliport, consideration may need to be given to increasing the discharge duration from two minutes to three minutes.

Note.2— Except for a limited-sized surface level heliport, the assumption is made that foam dispensing equipment will be transported to the incident or accident location on an appropriate vehicle (a PFAS).

Table 6-2 Minimum usable amounts of extinguishing agents for surface-level heliports

Category	Foam meeting performance level B		Foam meeting performance level C		Complementary agents	
	Water (L)	Discharge rate foam solution/minute (L)	Water (L)	Discharge rate foam solution/minute (L)	Dry chemical powder (kg)	and Gaseous media (kg)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
H 0	500	250	330	165	23	9
H 1	800	400	540	270	23	9
H 2	1 200	600	800	400	45	18
H 3	1 600	800	1 100	550	90	36

ii) Elevated heliports with primary media applied as a solid stream using a fixed foam application system (FFAS) : Where an RFFS is provided at an elevated heliport, the amount of foam media and complementary agents should be in accordance with Table 6-3.

Note.1— The assumption is made that primary media (foam) will be delivered through a fixed foam application system such as a fixed monitor system (FMS).

Note.2— The minimum discharge duration in Table 6-3 is assumed to be five minutes.

Category	Foam meeting performance level B		Foam meeting performance level C		Complementary agents	
	Water (L)	Discharge rate foam solution/minute (L)	Water (L)	Discharge rate foam solution/minute (L)	Dry chemical powder (kg)	and Gaseous media (kg)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
H 0	1 250	250	825	165	23	9
H 1	2 000	400	1 350	270	45	18
H 2	3 000	600	2 000	400	45	18
H 3	4 000	800	2 750	550	90	36

Table 6-3. Minimum usable amounts of extinguishing agents for elevated heliports

Note.3— For guidance on the provision of additional hand-controlled foam branches for the application of aspirated foam, see the(EAC 139-27).

iii) Elevated heliports/ limited-sized surface level heliports with primary media applied in a dispersed pattern through a fixed foam application system (FFAS) – a solid plate heliport: The amount of water required for foam production should be predicated on the practical critical area (m2) multiplied by the appropriate application rate (L/min/m2), giving a discharge rate for foam solution (in L/min). The discharge

rate should be multiplied by the discharge duration to calculate the amount of water needed for foam production

iv) The discharge duration should be at least three minutes.

v) Complementary media should be in accordance with Table 6-3, for H2 operations.

Note.— For helicopters with a fuselage length greater than 16 m and/or a fuselage width greater than 2.5 m, complementary media in Table 6-3 for H3 operations may be considered.

vi) Purpose-built elevated heliports/limited-sized surface level heliport with primary media applied in a dispersed pattern through a fixed application system (FAS) – a passive fire retarding surface with water-only DIFFS : The amount of water required should be predicated on the practical critical area (m2) multiplied by the appropriate application rate (3.75 L/min/m2) giving a discharge rate for water (in L/min). The discharge rate should be multiplied by the discharge duration to determine the total amount of water needed.

vii) The discharge duration should be at least two minutes.

viii) Complementary media should be in accordance with Table 6-3, for H2 operations.

Note.— For helicopters with a fuselage length greater than 16 m and/or a fuselage width greater than 2.5 m, complementary media for H3 operations may be considered.

ix) Purpose-built helidecks with primary media applied in a solid stream or a dispersed pattern through a fixed foam application system (FFAS) – a solid plate heliport : The amount of water required for foam media production should be predicated on the practical critical area (m2) multiplied by the application rate (L/min/m2) giving a discharge rate for foam solution (in L/min). The discharge rate should be multiplied by the discharge duration to calculate the amount of water needed for foam production.

x) The discharge duration should be at least five minutes.

xi) Complementary media should be in accordance with Table 6-3, H0 levels for helidecks up to and including 16.0 m and to H1/H2 levels for helidecks greater than 16.0 m. Helidecks greater than 24 m should adopt H3 levels.

Note.— For guidance on the provision of additional hand-controlled foam branches for the application of aspirated foam, see the Heliport Manual (EAC 139-27)

xii) Purpose-built helidecks with primary media applied in a dispersed pattern through a fixed application system (FAS) – a passive fire-retarding surface with water-only DIFFS: The amount of water required should be predicated on the practical critical area (m2) multiplied by the application rate (3.75 L/min/m2) giving a discharge rate for water (in L/min). The discharge rate should be multiplied by the discharge duration to calculate the amount of water needed.

Note.— Sea-water may be used.

xiii) The discharge duration should be at least three minutes.

xiv) Complementary media should be in accordance with Table 6-3, to H0 levels for helidecks up to and including 16.0 m and to H1/H2 levels for helidecks greater than 16.0 m. Helidecks greater than 24 m should adopt H3 levels.

(4) Response Time

i) At surface level heliports, the operational objective of the rescue and firefighting response should be to achieve response times not exceeding two minutes in optimum conditions of visibility and surface conditions.

Note.— Response time is considered to be the time between the initial call to the rescue and firefighting service and the time when the first responding vehicle(s) (the service) is (are) in position to apply foam at a rate of at least 50 per cent of the discharge rate specified in Table 6-2.

ii) At elevated heliports, limited-sized surface level heliports and helidecks, the response time for the discharge of primary media at the required application rate should be 15 seconds measured from system activation. If rescue and firefighting personnel are needed, they should be immediately available on or in the vicinity of the heliport while helicopter movements are taking place.

(5) Rescue arrangements

i) Rescue arrangements commensurate with the overall risk of the helicopter operation should be provided at the heliport.

Note.— Guidance on the rescue arrangements, e.g. options for rescue and for personal protective equipment to be provided at a heliport, is given in the Heliport Manual (EAC 139-27).

(6) Communication and alerting system

i) A suitable alerting and/or communication system should be provided in accordance with the emergency response plan.

(7) Personnel

Note.— The provision of rescue and firefighting personnel may be determined by use of a task/resource analysis. Guidance is given in the Heliport Manual (EAC 139-27).

i) Where provided, the number of rescue and firefighting personnel shall be sufficient for the required task.

ii) Where provided, rescue and firefighting personnel shall be trained to perform their duties, and maintain their competence.

iii) Rescue and firefighting personnel shall be provided with protective equipment.

(8) Means of escape

i) Elevated heliports and helidecks shall be provided with a main access and at least one additional means of escape.

ii) Access points should be located as far apart from each other as is practicable.

Note.— The provision of an alternative means of escape is necessary for evacuation and for access by rescue and firefighting personnel. The size of an emergency access/egress route may require consideration of the number of passengers and of special operations like Helicopter Emergency Medical Services (HEMS) that require passengers to be carried on stretchers or trolleys.

138.319 Noncom plying conditions

(a) Unless otherwise authorized by the ECAA, whenever the requirements of this Part cannot be met to the extent that uncorrected unsafe conditions exist on the heliport, the heliport certificate holder shall limit helicopter operations to those portions of the heliport not rendered unsafe by those conditions.

(b) The heliport certificate holder shall notify the ECAA of any condition which do not meet the standards prescribed in this Part immediately.

APPENDIX
INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES FOR INSTRUMENT HELIPORTS WITH NON-PRECISION AND/OR PRECISION APPROACHES AND INSTRUMENT DEPARTURES

1-GENERAL

Introductory Note.- ECAR 138 contains Standards and Recommended Practices (specifications) that prescribe 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.
Note 1.– The specifications in this appendix describe additional conditions beyond those found in the main sections of ECAR 138, that apply to instrument heliports with non-precision and/or precision approaches. All specifications contained within the main chapters of ECAR 138 are equally applicable to instrument heliports, but with reference to further provisions described in this Appendix.

2 HELIPORT DATA

2.1 Heliport Elevation

2.1.1 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-halfmetre 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.

2.2 Heliport dimensions and related information

2.2.1 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 elevation antenna of a microwave landing system (MLS) in relation to the associated TLOF or FATO extremities.

3-PHYSICAL CHARACTERISTICS

3.1 Surface-level and elevated heliports

Safety Areas

3.1.1 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.
Note.- See Figure A-1.

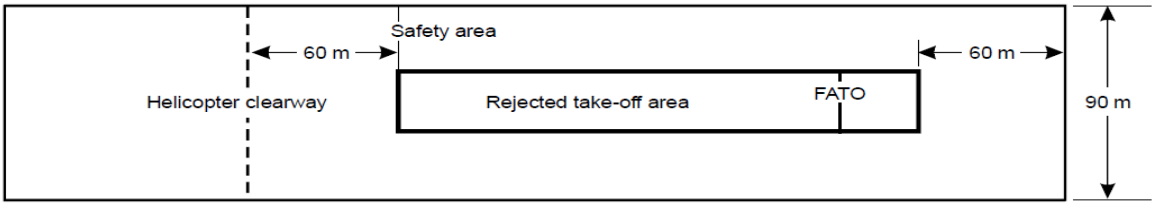


Figure A-1. Safety Area for Instrument FATO

4-OBSTACLE ENVIRONMENT

4.1 Obstacle limitation surfaces and sectors

Approach surface

4.1.1 Characteristics. 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.

4.2 Obstacle Limitation Requirements

4.2.1 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 A-2 to A-5

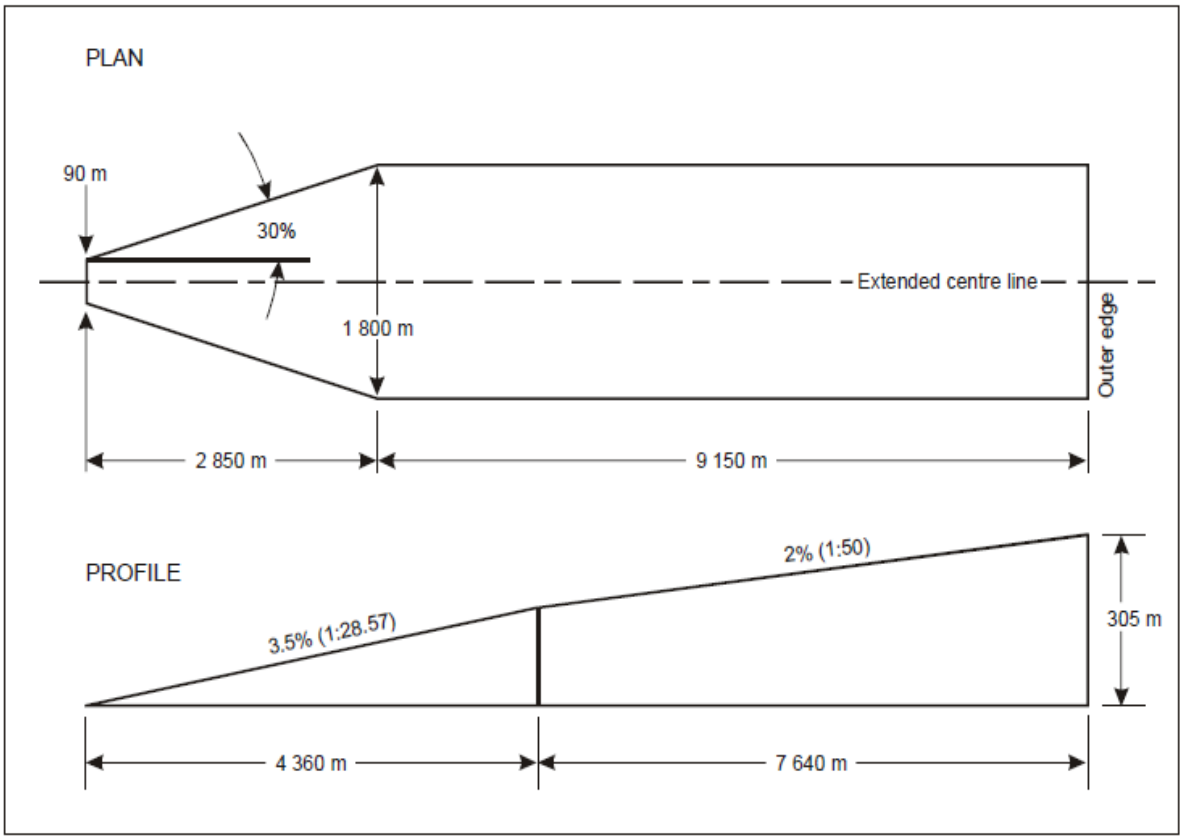


Figure A-2. Take-off climb Surface for Instrument FATO

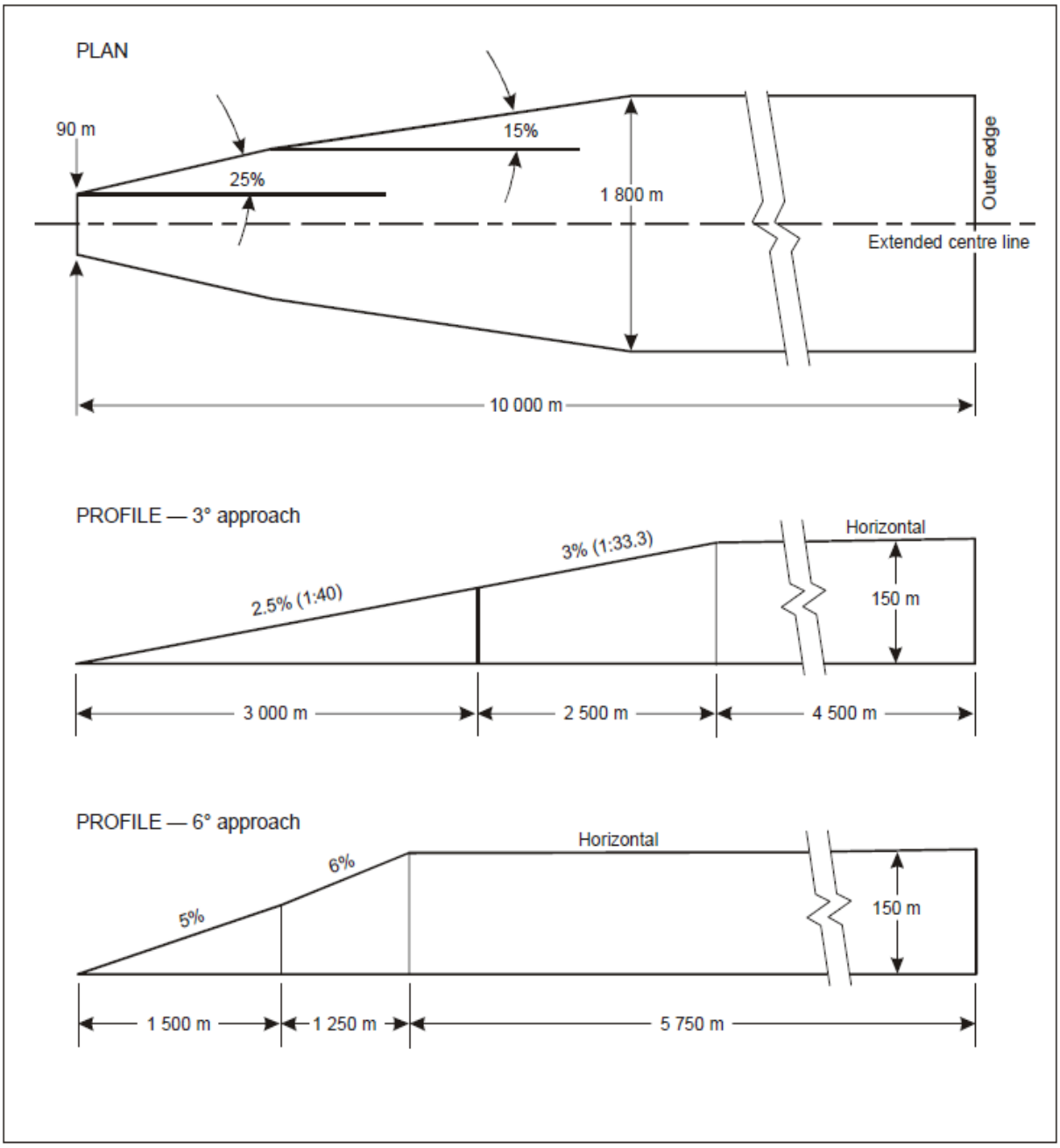


Figure A-3. Approach surface for Precision Approach FATO

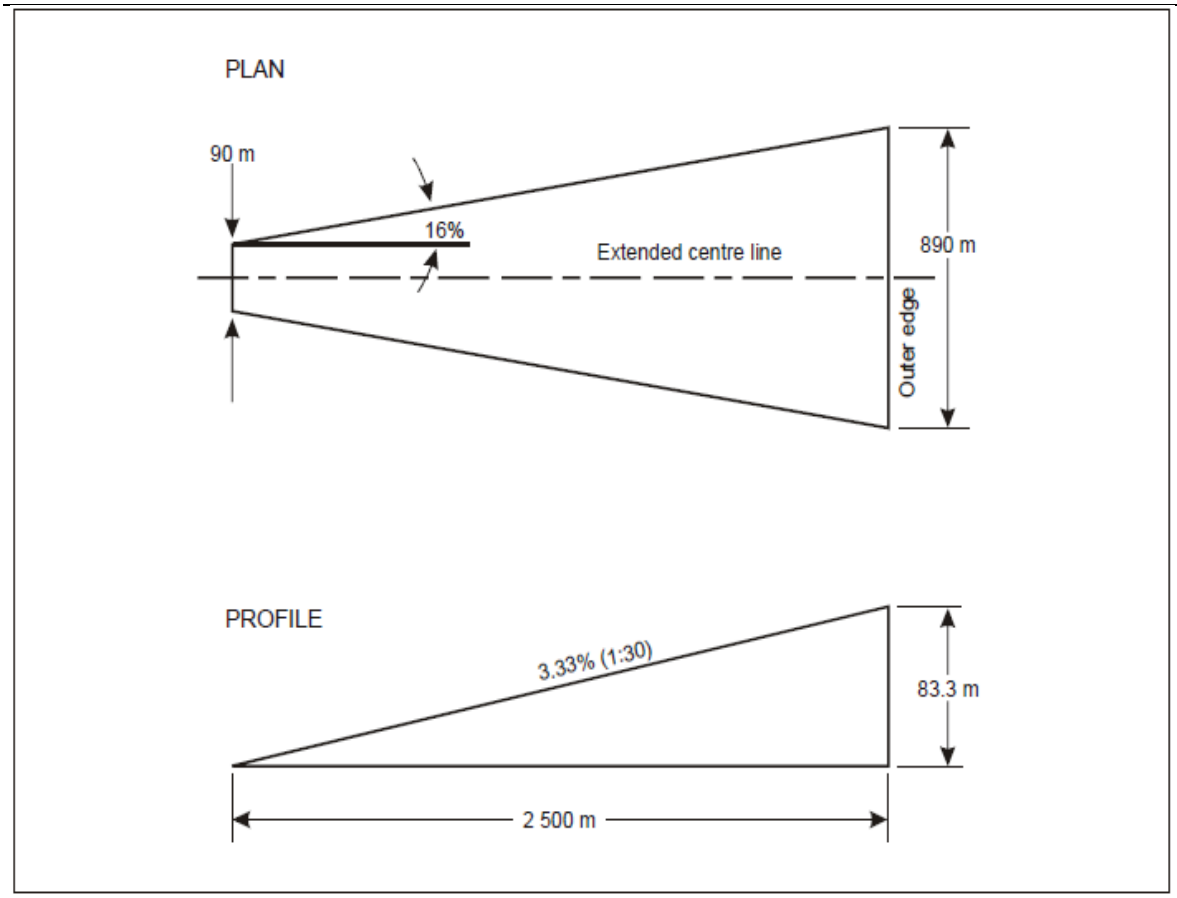


Figure A-4. Approach surface for Non-precision Approach FATO

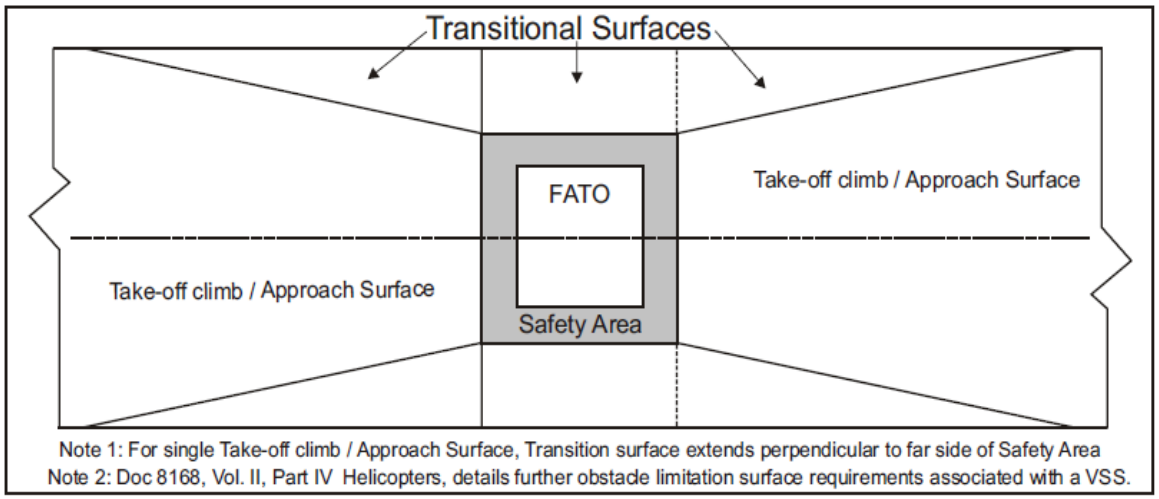


Figure A-5. Transitional surfaces for an instrument FATO with a non-precision and/or precision approach

4.2.2 The slopes of the obstacle limitation surfaces shall not be greater than, and their other dimensions not less than, those specified in Tables A-1 to A-3.

Table A-1: Dimensions and slopes of obstacle limitation surfaces
INSTRUMENT (NON-PRECISION) FATO

Surface and dimensions		
APPROACH SURFACE		Width of safety area boundary
Width of inner edge		
Location of inner edge		
First section		
Divergence	— day	16%
	— night	
Length	— day	2 500 m
	— night	
Outer width	— day	890 m
	— night	
Slope (maximum)		3.33%
Second section		
Divergence	— day	—
	— night	
Length	— day	—
	— night	
Outer width	— day	—
	— night	
Slope (maximum)		—
Third Section		
Divergence		—
Length	— day	—
	— night	
Outer width	— day	—
	— night	
Slope (maximum)		—
TRANSITIONAL		
Slope		20%
Height		45 m

Table A-2: Dimensions and slopes of obstacle limitation surfaces

INSTRUMENT (PRECISION APPROACH) FATO

	3º approach				6º approach			
	Height above FATO				Height above FATO			
	90 m	60 m	45 m	30 m	90 m	60 m	45 m	30 m
Surface and dimensions	(300 ft)	(200 ft)	(150 ft)	(100 ft)	(300 ft)	(200 ft)	(150 ft)	(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	2793m	3 763 m	4 246 m	4 733 m	4250m	4733 m	4975 m	5217 m
Width of parallel section	1800m	1800m	1800m	1800m	1800m	1800m	1800m	1800m
Distance to outer edge	5 462 m	5 074 m	4882m	4686m	3380m	3187m	3090m	2993 m
Width at outer edge	1800m	1800m	1800m	1800m	1800m	1800m	1800m	1800m
Slope of first section	2.5%	2.5%	2.5%	2.5%	5%	5%	5%	5%
	(1:40)	(1:40)	(1:40)	(1:40)	(1:20)	(1:20)	(1:20)	(1:20)
Length of first section	3000m	3000m	3000m	3000m	1500m	1500m	1500m	1500m
Slope of second section	3%	3%	3%	3%	6%	6%	6%	6%
	(1:33.3)	(1:33.3)	(1:33.3)	(1:33.3)	(1:16.66)	(1:16.66)	(1:16.66)	(1:16.66)
Length of second section	2500m	2500m	2500m	2500m	1250m	1250m	1250m	1250m
Total length of surface	10000m	10000m	10000m	10000m	8500m	8500m	8500m	8500m
CONICAL								
Slope	5%	5%	5%	5%	5%	5%	5%	5%
Height	55 m	55 m	55 m	55 m	55 m	55 m	55 m	55 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

TableA-3: Dimensions and slopes of obstacle limitation surfaces
Straight take-off

Surface and dimensions		*Instrument*
TAKE-OFF CLIMB		
Width of inner edge		90 m
Location of inner edge		Boundary of end of clearway
First section		
Divergence	— day	30%
	— night	
Length	— day	2 850 m
	— night	
Outer width	— day	1 800 m
	— night	
Slope (maximum)		3.5%
Second section		
Divergence	— day	parallel
	— night	
Length	— day	1 510 m
	— night	
Outer width	— day	1 800 m
	— night	
Slope (maximum)		3.5%*
Third Section		
Divergence		parallel
Length	— day	7 640 m
	— night	
Outer width	— day	1 800 m
	— night	
Slope (maximum)		2%

* *This slope exceeds the maximum mass one-engine-inoperative climb gradient of many helicopters which are currently operating.*

5- VISUAL AIDS

5.1 Lights

5.1.1 Approach Lighting Systems

5. 1.1.1 Where an approach lighting system is provided for a non-precision FATO, the system should not be less than 210 m in length.

5.1.1.2 The light distribution of steady lights should be as indicated in Figure 5-12, Illustration 2 except that the intensity should be increased by a factor of 3 for a non-precision FATO.

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	2 500 m	
Slope	PAPI	A[a] – 0.57°
	HAPI	A[b] – 0.65°
	APAPI	A[a] – 0.9°

a. As indicated in ECAR 139 figure 5-19
b. The angle of the upper boundary or the below slop signal

Table A-4. Dimensions and slopes of the obstacle protection surface