Point-in-space (PinS) GNSS helicopter approaches to visual heliports (PANSOPS & Annex 14 Volume II)

Instrument Heliports (Appendix 2, Annex 14 Volume II)

- Physical characteristics, Obstacle Environment, Visual Aids
- Precision & Non-precision approaches

Definitions and General Notes

Point-in-space approach (PinS). The Point-in-space approach is based on GNSS and is an approach procedure designed for helicopter only. It is aligned with a reference point located to permit subsequent flight manoeuvring or approach and landing using visual manoeuvring in adequate visual conditions to see and avoid obstacles.

Point-in-space (PinS) visual segment. This is the segment of a helicopter PinS approach procedure from the MAPt to the landing location for a PinS "proceed visually" procedure. This visual segment connects the Point-in-space (PinS) to the landing location.

Note.— The procedure design criteria for a PinS approach and the detailed design requirements for a visual segment are established in the Procedures for Air Navigation Services — Aircraft Operations, (PANS-OPS, Doc 8168).

Descent point (DP). A point defined by track and distance from the MAPt to identify the point at which the helicopter may descend below the OCA/H on a visual descent to the heliport/landing location.

Direct visual segment (Direct-VS). A visual segment designed as:

a) a leg in a PinS approach, which may contain a single turn, from the MAPt direct to the heliport or landing location or via a descent point to the heliport or landing location; or
b) a straight leg from the heliport or landing location to the IDF in a PinS departure.

Height above surface (HAS). The difference in height between the OCA and the elevation of the highest terrain, water surface or obstacle within a radius of at least 1.5 km (0.8 NM) from the MAPt in a PinS "Proceed VFR" procedure.

Minimum instrument meteorological conditions airspeed (Vmini). The minimum indicated airspeed at which a specific helicopter is certified to operate in instrument meteorological conditions.

Missed approach point (MAPt). That point in an instrument approach procedure at or before which the prescribed missed approach procedure must be initiated in order to ensure that the minimum obstacle clearance is not infringed.

Visual segment descent angle (VSDA). The angle between the MDA/H at the MAPt/DP and the heliport crossing height.

Visual segment design gradient (VSDG). The gradient of the visual segment in a PinS departure procedure. The visual segment connects the heliport or landing location with the initial departure fix (IDF) minimum crossing altitude (MCA).

Note 1.— The term “proceed VFR”, implies that the pilot can comply with VFR in the visual segment to see and avoid obstacles and can cross the IDF at or above the MCA.

Note 2.— The term “proceed visually” implies that pilots can navigate by visual reference and see and avoid obstacles, with visibility sufficient to return to the heliport if they cannot continue visually to cross the IDF at or above the IDF MCA. Visual flight may be conducted below minima required for VFR.

Various Types of PinS Approaches with a Visual Segment

- ***Direct-Visual Segment (VS) without DP and without course change***
- ***Direct-VS without DP and with 30 deg course change at MAPt***
- ***Direct-VS with DP and without course change***
- ***Direct-VS with DP and with 30 deg course change at MAPt***
- ***Direct-VS with DP and with 30deg course change at DP***

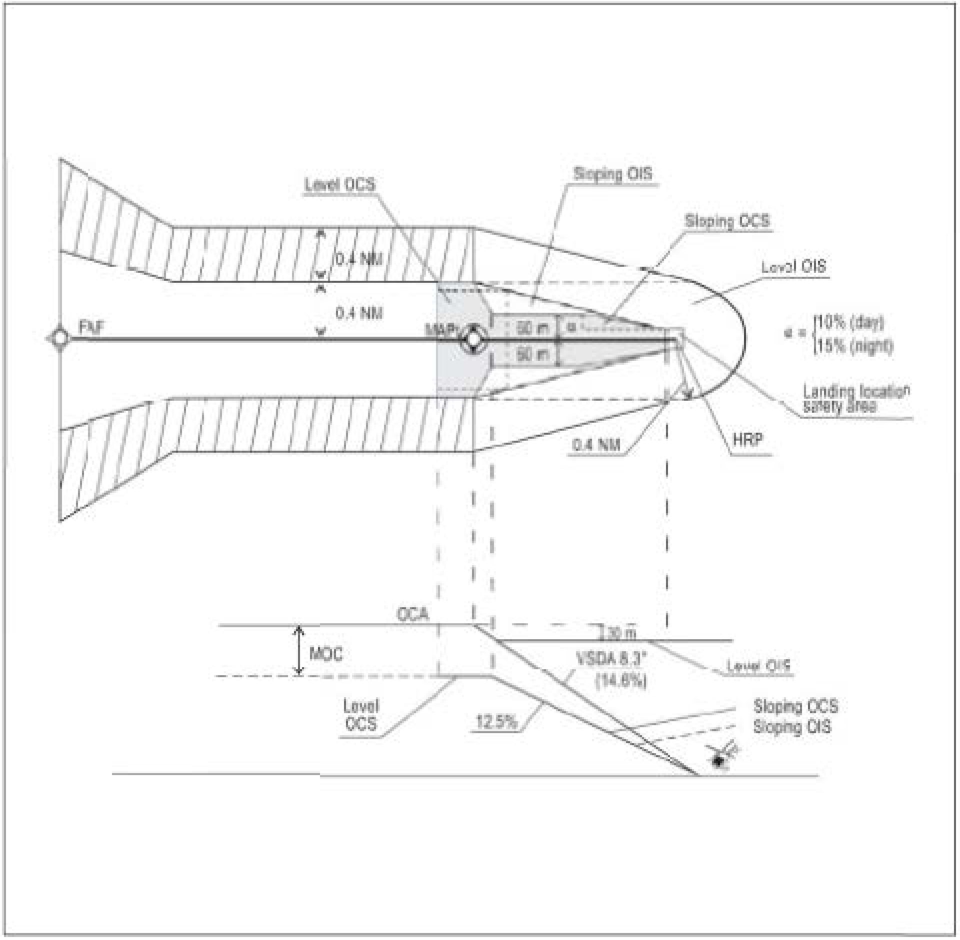


Figure IV-2-5. Direct-VS without DP and without course change

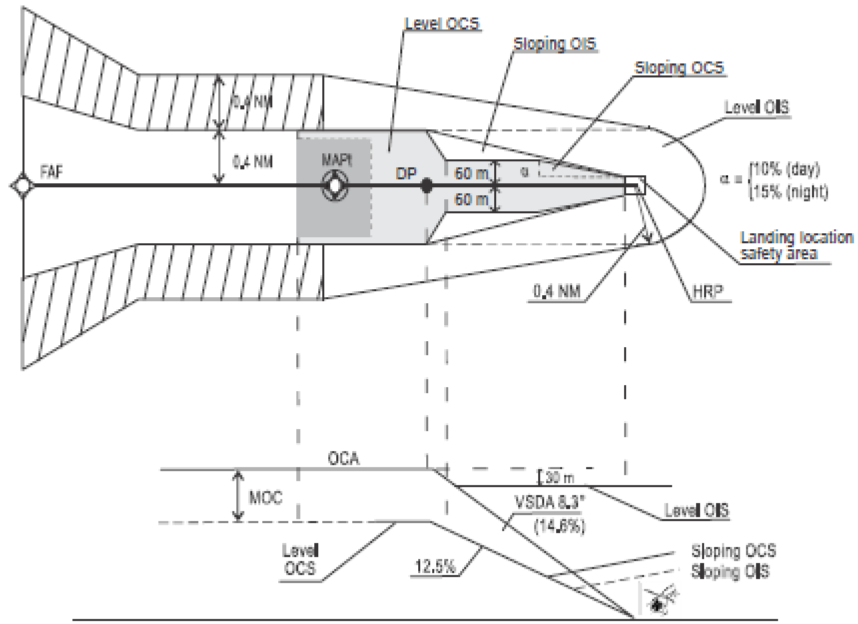


Figure IV-2-7. Direct-VS with DP and without course change

Surface level and Elevated Instrument Heliports

A safety area surrounding an instrument FATO shall extend:

a) laterally to a distance of at least 45 m on each side of the centre line; and
b) longitudinally to a distance of at least 60 m beyond the ends of the FATO.

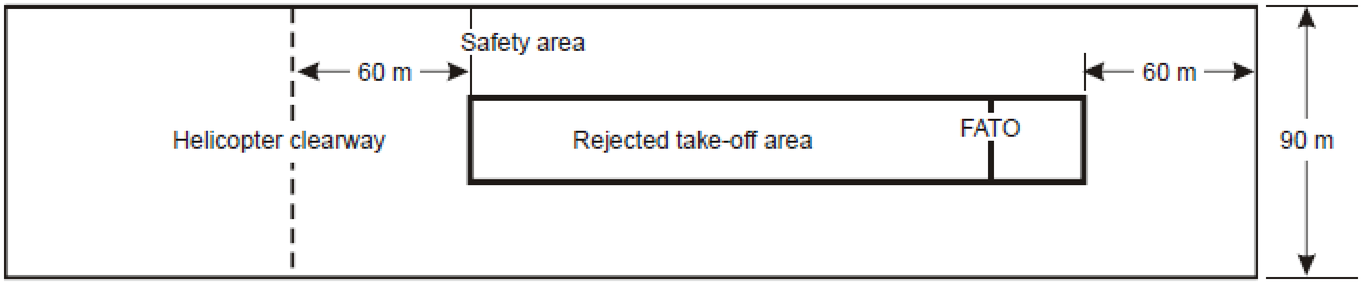


Figure A2-1. Safety area for instrument FATO

The dimensions of the TLOF, FATO, rejected take-off area and clear way (if applicable) are the same as required for non-instrument surface level and elevated heliports.

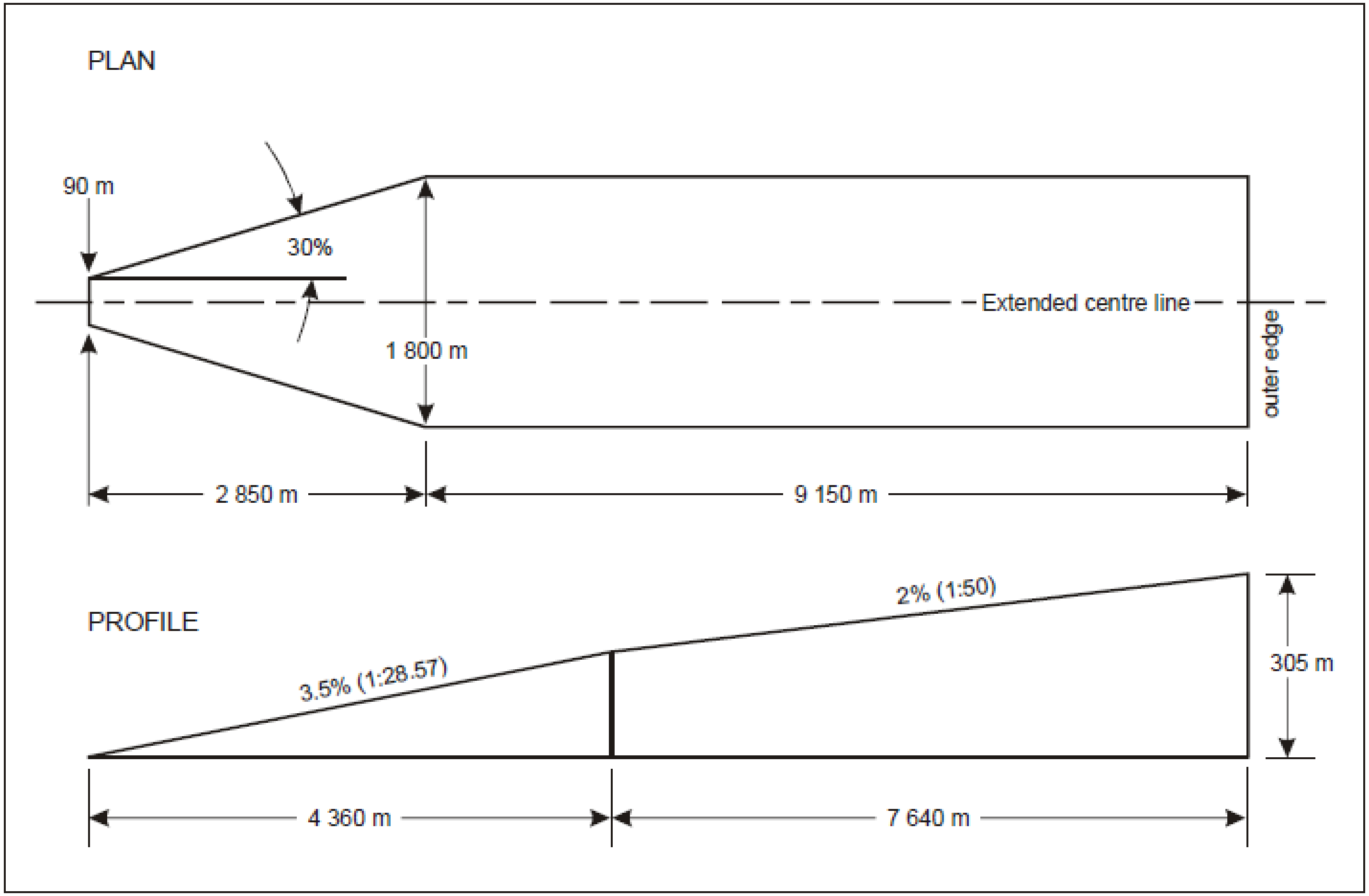


Figure A2-2. Take-off climb surface for instrument FATO

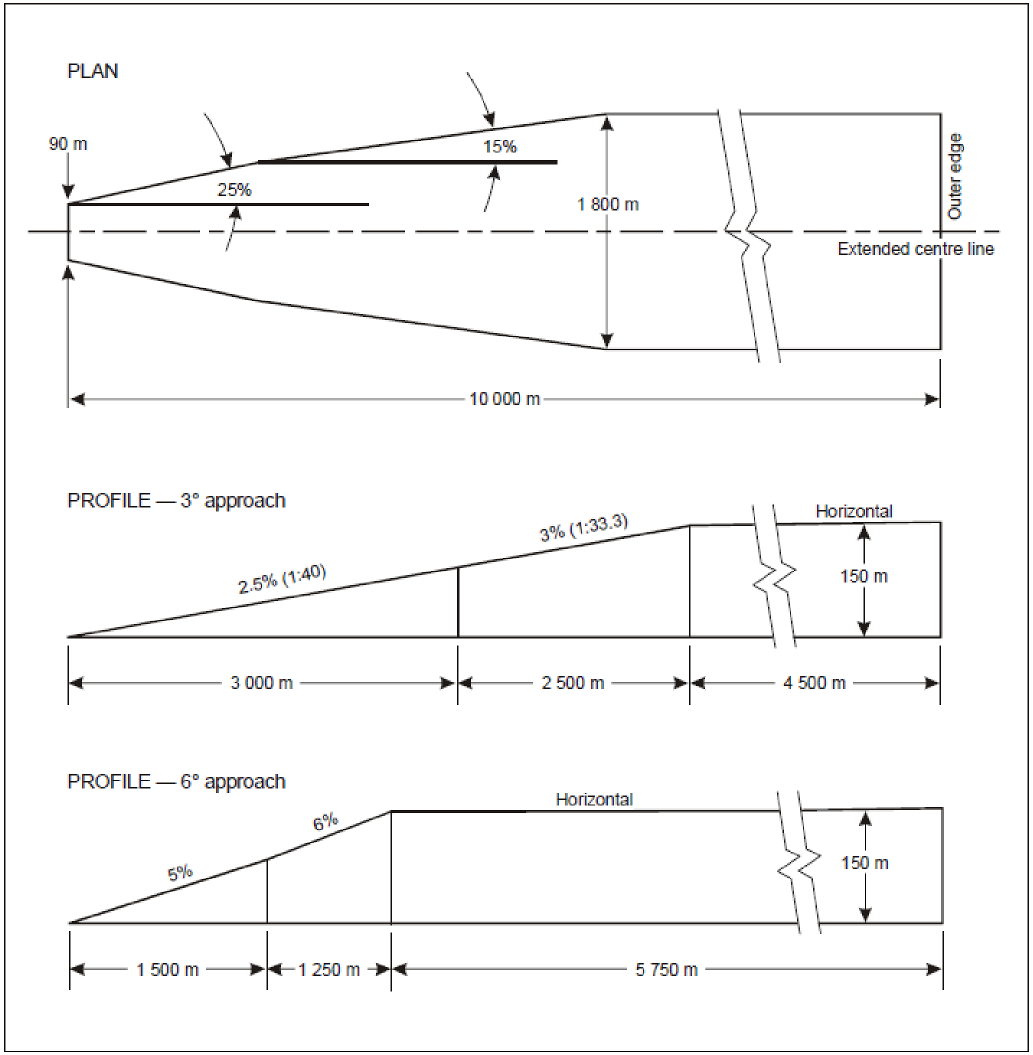


Figure A2-3. Approach surface for precision approach FATO

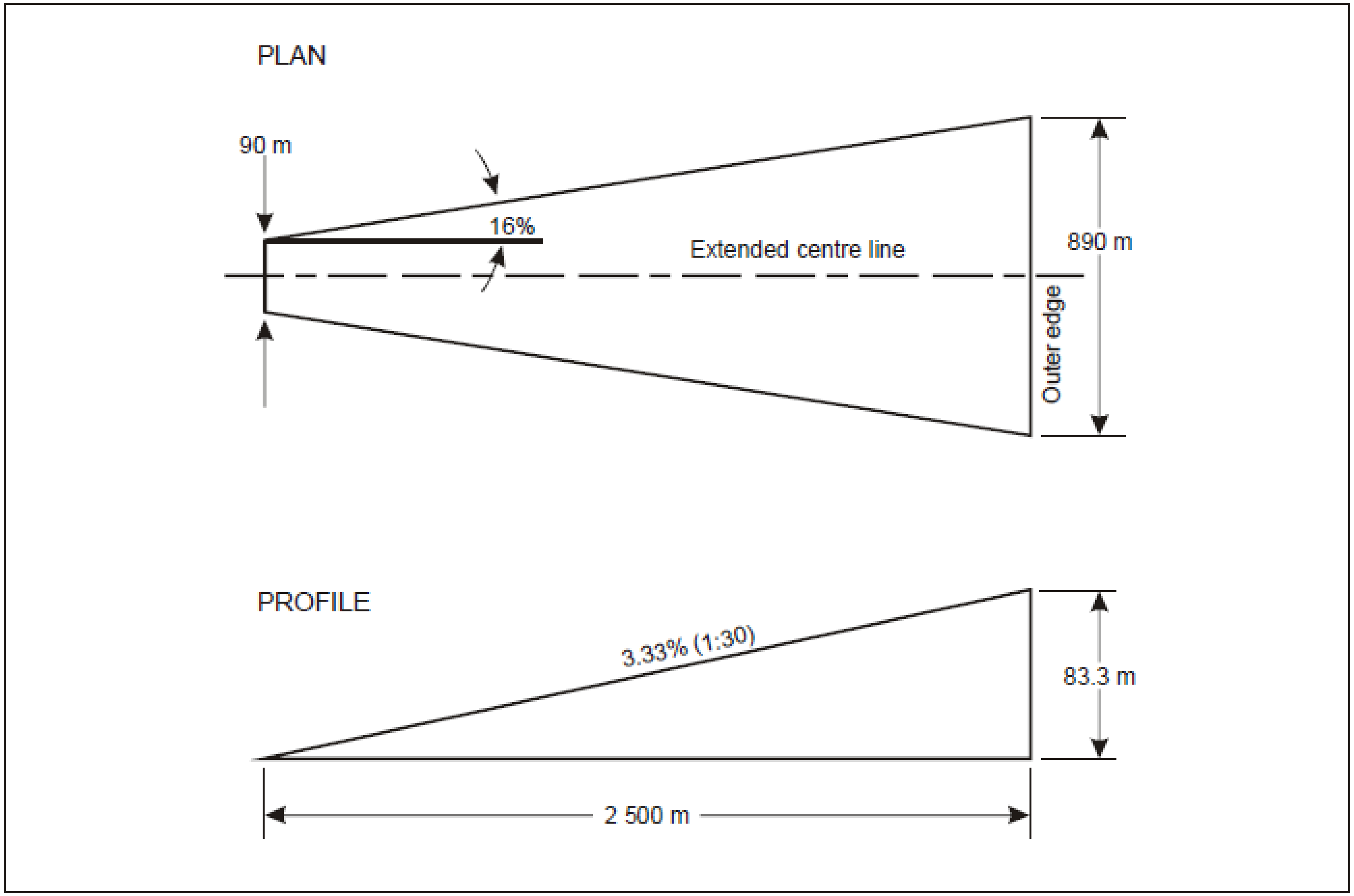
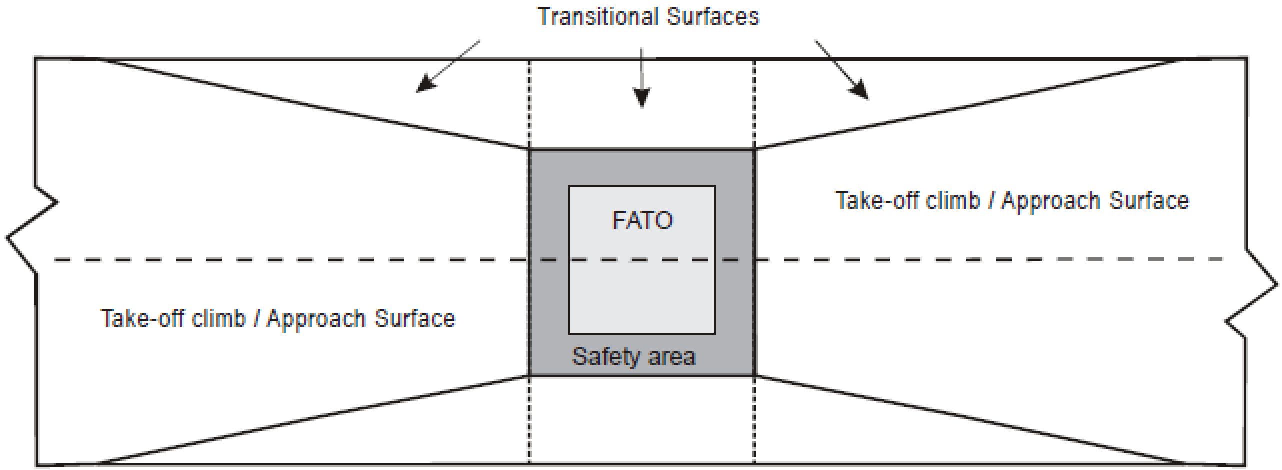


Figure A2-4. Approach surface for non-precision approach FATO



Note 1.— For single Take-off climb / Approach Surface. Transition surface extends perpendicular to far side of Safety Area.
Note 2.— Doc 8168, Vol II, Part IV, Helicopters, details further obstacle limitation surface requirements associated with a VSS.

Figure A2-5. Transitional surfaces for an instrument FATO with a non-precision and/or precision approach

Table A2-1. Dimensions and slopes of obstacle limitation surfaces Instrument (Non-precision) FATO

SURFACE and DIMENSIONS			
APPROACH SURFACE			
Width of inner edge			Width of safety area boundary
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 A2-2. Dimensions and slopes of obstacle limitation surfaces Instrument (Precision) FATO

	3° approach				*6° approach*			
	Height above FATO				*Height above FATO*			
Surface and dimensions	*90 m (300 ft)*	*60 m (200 ft)*	*45 m (150 ft)*	*30 m (100 ft)*	*90 m (300 ft)*	*60 m (200 ft)*	*45 m (150 ft)*	*30 m (100 ft)*
APPROACH SURFACE								
Length of inner edge	90 m	90 m	90 m	90 m	90 m	90 m	90 m	90 m
Distance from end of FATO	60 m	60 m	60 m	60 m	60 m	60 m	60 m	60m
Divergence each side to height above FATO	25%	25%	25%	25%	25%	25%	25%	25%
Distance to height above FATO	1 745 m	1 163 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	2 793 m	3 763 m	4 246 m	4 733 m	4 250 m	4 733 m	4 975 m	5 217 m
Width of parallel section	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m
Distance to outer edge	5 462 m	5 074 m	4 882 m	4 686 m	3 380 m	3 187 m	3 090 m	2 993 m
Width at outer edge	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m	1 800 m
Slope of first section	2.5% (1:40)	2.5% (1:40)	2.5% (1:40)	2.5% (1:40)	5% (1:20)	5% (1:20)	5% (1:20)	5% (1:20)
Length of first section	3 000 m	3 000 m	3 000 m	3 000 m	1 500 m	1 500 m	1 500 m	1 500 m
Slope of second section	3% (1:33.3)	3% (1:33.3)	3% (1:33.3)	3% (1:33.3)	6% (1:16.66)	6% (1:16.66)	6% (1:16.66)	6% (1:16.66)
Length of second section	2 500 m	2 500 m	2 500 m	2 500 m	1 250 m	1 250 m	1 250 m	1 250 m
Total length of surface	10 000 m	10 000 m	10 000 m	10 000 m	8 500 m	8 500 m	8 500 m	8 500 m
TRANSITIONAL								
Slope	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%	14.3%
Height	45 m	45 m	45 m	45 m	45 m	45 m	45 m	45 m

Table A2-3. 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.

Table A2-4. Dimensions and slopes of the obstacle protection surface

SURFACE AND DIMENSIONS	NON-PRECISION FATO	
Length of inner edge	Width of safety area	
Distance from end of FATO	60 m	
Divergence	15%	
Total length	2 500 m	
Slope	PAPI	A[a] – 0.57°
	HAPI	A[b] – 0.65°
	APAPI	A[a] – 0.9°

a. As indicated in Annex 14, Volume I, Figure 5-19.
b. The angle of the upper boundary of the "below slope" signal.

Lights

Approach Lighting Systems

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

5.1.2 Recommendation.—The light distribution of steady lights should be as indicated in Figure 5-11, Illustration 2 except that the intensity should be increased by a factor of three for a non-precision FATO.

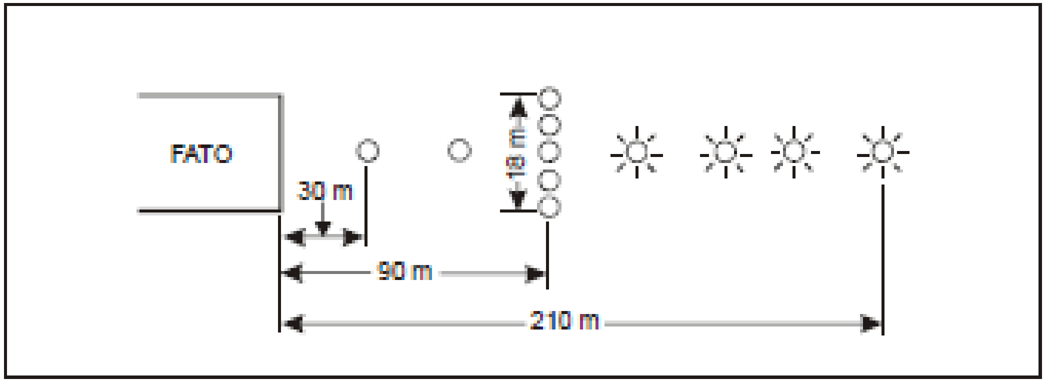


Figure 5-12. Approach lighting system

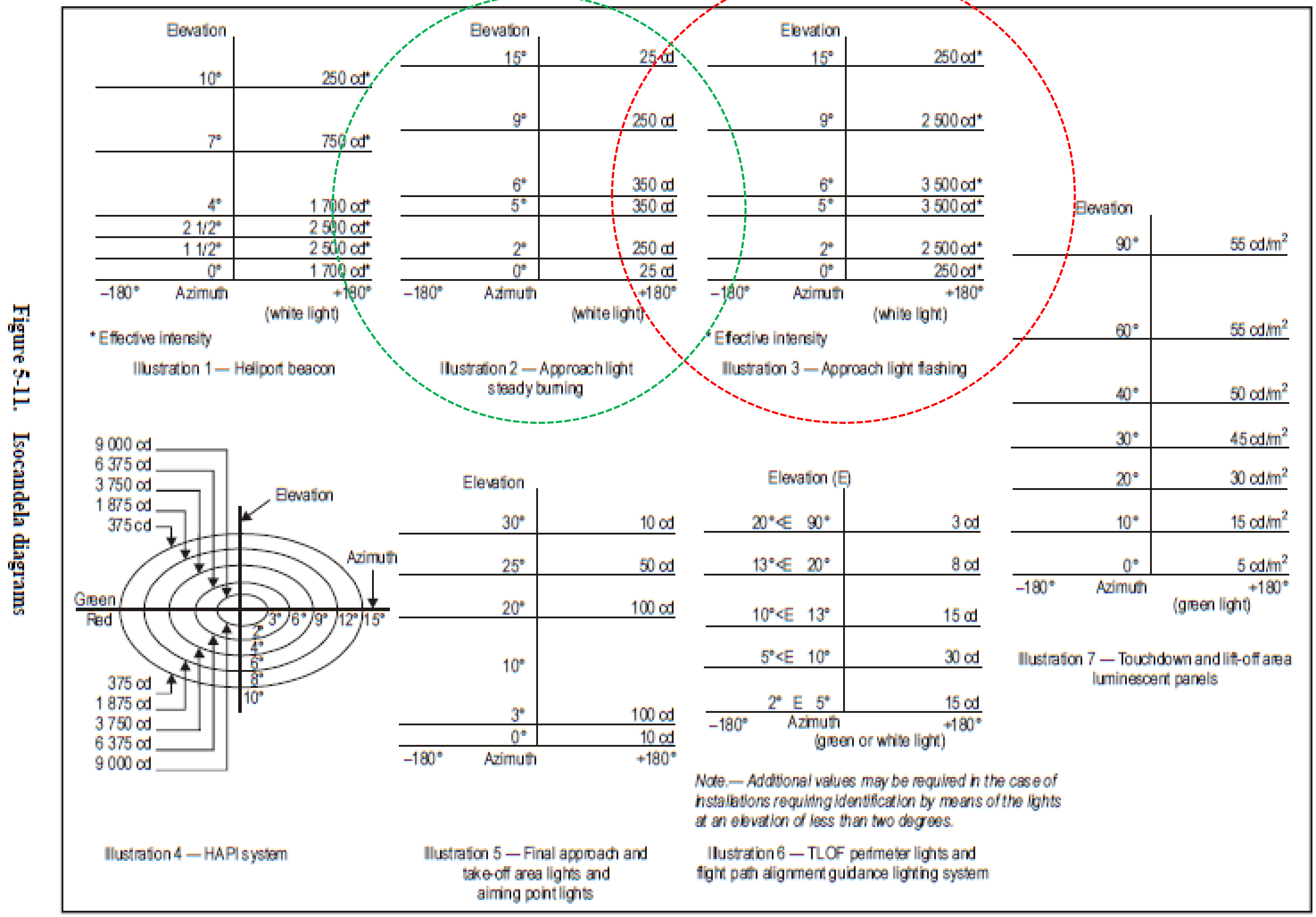


Figure 5-11. Isocandela diagrams
Elevation
10° 250 cd*
7° 750 cd*
4° 1 700 cd*
2 1/2° 2 500 cd*
1 1/2° 2 500 cd*
0° 1 700 cd*
–180° Azimuth +180°
(white light)
* Effective intensity
Illustration 1 — Heliport beacon
Elevation
15° 25 cd
9° 250 cd
6° 350 cd
5° 350 cd
2° 250 cd
0° 25 cd
–180° Azimuth +180°
(white light)
Illustration 2 — Approach light steady burning
Elevation
15° 250 cd*
9° 2 500 cd*
6° 3 500 cd*
5° 3 500 cd*
2° 2 500 cd*
0° 250 cd*
–180° Azimuth +180°
(white light)
* Effective intensity
Illustration 3 — Approach light flashing
Elevation
90° 55 cd/m2
60° 55 cd/m2
40° 50 cd/m2
30° 45 cd/m2
20° 30 cd/m2
10° 15 cd/m2
0° 5 cd/m2
–180° Azimuth +180°
(green light)
Illustration 7 — Touchdown and lift-off area luminescent panels
9 000 cd
6 375 cd
3 750 cd
1 875 cd
375 cd
Elevation
Azimuth
Green
Red
3° 6° 9° 12° 15°
2° 4° 6° 8° 10°
375 cd
1 875 cd
3 750 cd
6 375 cd
9 000 cd
Illustration 4 — HAPI system
Elevation
30° 10 cd
25° 50 cd
20° 100 cd
10°
3° 100 cd
0° 10 cd
–180° Azimuth +180°
Illustration 5 — Final approach and take-off area lights and aiming point lights
Elevation (E)
20°<E 90° 3 cd
13°<E 20° 8 cd
10°<E 13° 15 cd
5°<E 10° 30 cd
2° E 5° 15 cd
–180° Azimuth +180°
(green or white light)
Note.— Additional values may be required in the case of installations requiring identification by means of the lights at an elevation of less than two degrees.
Illustration 6 — TLOF perimeter lights and flight path alignment guidance lighting system

Questions?


STARS
STAR-1
C-GBNH


Baillie & Associates
International Aviation Regulations & Standards Development
Christopher J. F. Baillie
Managing Director
Ottawa, Ontario, Canada
chrisbaillie@storm.ca