

RA 3532 - Helicopter Landing Site - Obstacle Environment

Rationale

The purpose of the Obstacle Limitation Surfaces (OLS) is to define the airspace around Helicopter Landing Sites (HLS) to be maintained free from obstacles so as to permit the intended operations at the HLS to be conducted safely.

Contents

3532(1): Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces (General)

3532(2): Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Non-Instrument Approach

3532(3): Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Precision or Non-Precision Approach

3532(4): Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Visual Approach Slope Indicator

3532(5): ► Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements ◀

3532(6): ► Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements ◀

Regulation 3532(1)

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces (General)

3532(1) Heads of Establishment (HoE) and Aviation Duty Holder-Facing Organizations (ADH-Facing Organizations) **shall** ensure that the OLS are defined to limit the extent to which objects may project into the airspace.

Acceptable Means of Compliance 3532(1)

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces (General)

1. The Approach Surface **should**:
 - a. Be an inclined plane or a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the Safety Area and centred on a line passing through the centre of the Final Approach and Take Off area (FATO). In the case of an approach surface involving a turn, the surface **should** be a complex surface containing the horizontal normal to its centre-line and the slope of the centre-line **should** be the same as that for a straight approach surface (Figure 1);
 - b. Contain no more than one curved portion. 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 **should** be no less than 575m with a minimum radius of 270m (Figure 2);
 - c. Have a slope measured in the vertical plane containing the centre-line of the FATO;
 - d. Have limits comprising:
 - (1) An inner edge horizontal and equal in length to the minimum specified width / diameter of the FATO plus the Safety Area, perpendicular to the centre-line of the approach surface and located at the outer edge of the Safety Area;
 - (2) For a non-instrument or non-precision approach: 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;
 - (3) For a precision approach:

Acceptable Means of Compliance 3532(1)

- (a) 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, to a specified height above the FATO,
 - (b) 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.
- (4) 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.
- e. Have an elevation of the inner edge the same as the elevation of the FATO at the point on the inner edge that is intersected by the centre-line of the approach surface. For HLS 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.

Figure 1. Approach Surface

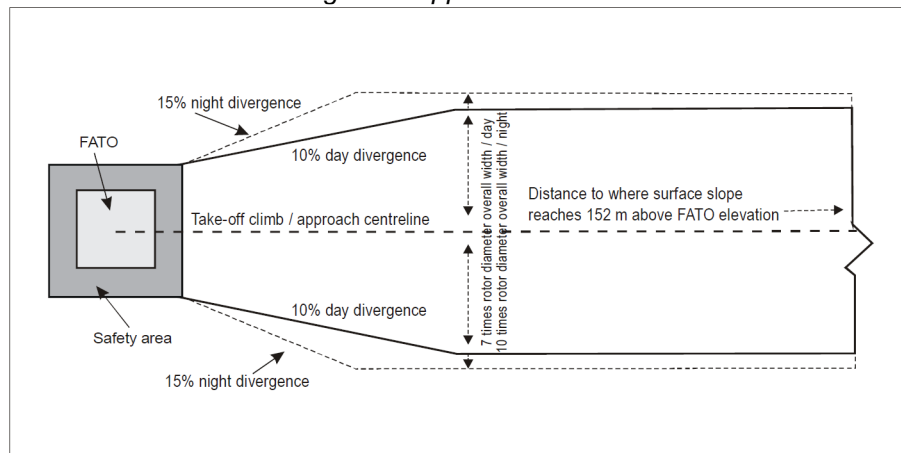
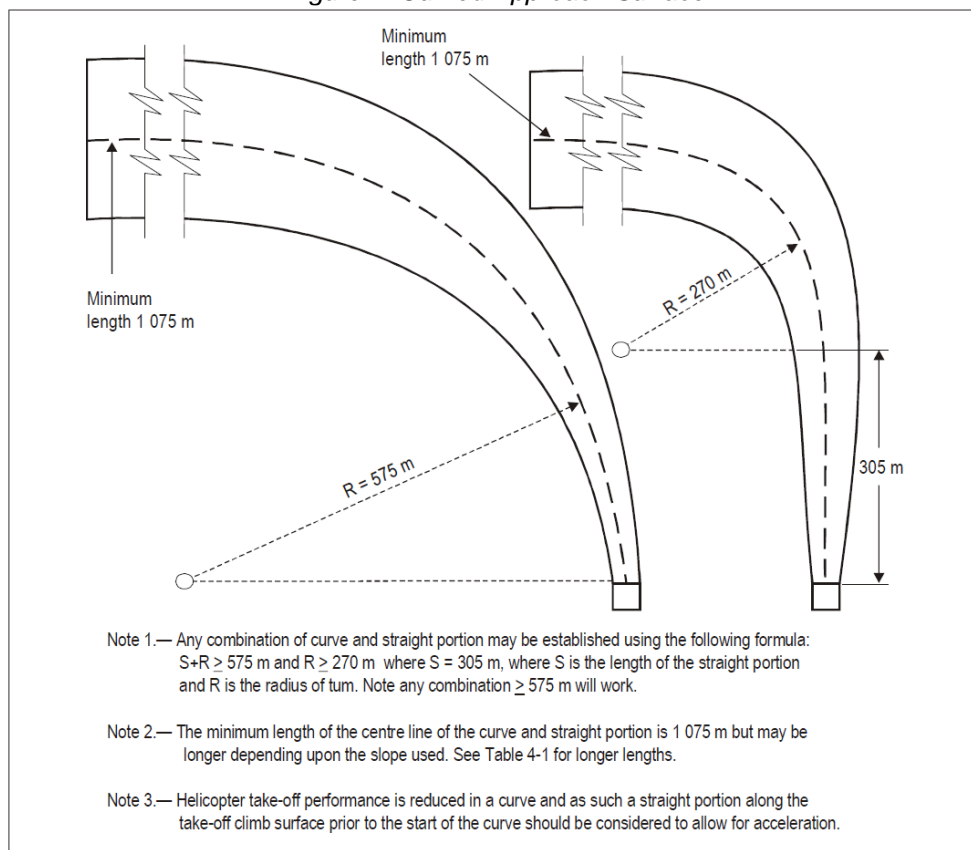


Figure 2. Curved Approach Surface

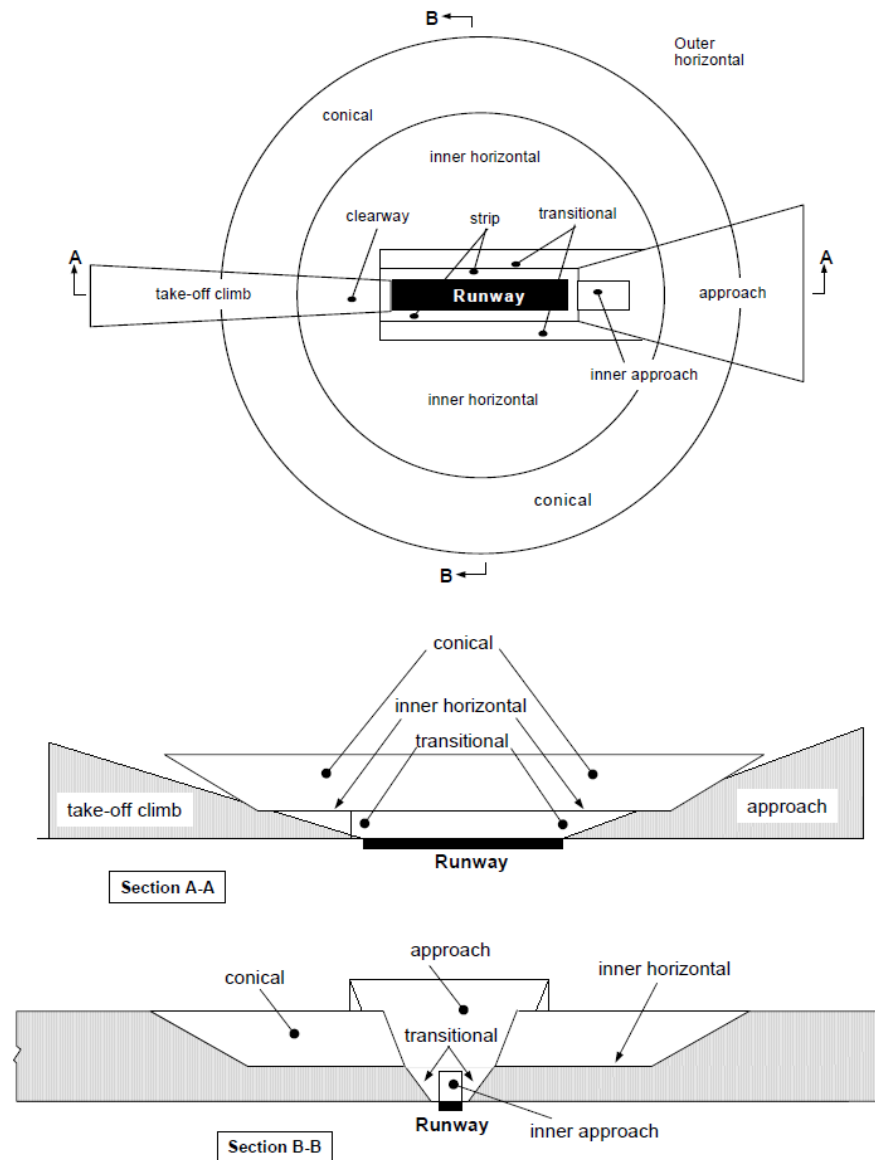


**Acceptable
Means of
Compliance
3532(1)**

2. The Transitional Surface **should**:
 - a. Be a complex surface along the side of the Safety Area and part of the side of the approach / take-off climb surface, that slopes upwards and outwards to a predetermined height of 45m (150ft.);
 - b. Have limits comprising:
 - (1) A lower edge beginning at a point on the side of the approach / take-off climb surface at a specified height above the lower edge extending down the side of the approach / take-off climb surface to the inner edge of the approach / take-off climb surface and from there along the length of the side of the Safety Area parallel to the centre-line of the FATO;
 - (2) An upper edge located at a specified height above the lower edge;
 - c. Have an elevation of a point on the lower edge that:
 - (1) Along the side of the approach / take-off climb surface is equal to the elevation of the approach / take-off climb surface at that point; and
 - (2) Along the Safety Area is equal to the elevation of the inner edge of the approach / take-off climb surface;
 - d. Be measured in a vertical plane at right angles to the centre-line of the FATO.
3. The Take-Off Climb Surface **should**:
 - a. Be an inclined plane, a combination of planes or, when a turn is involved, a complex surface sloping upwards from the end of the Safety Area and centred on a line passing through the centre of the FATO. In the case of a take-off climb surface involving a turn, the surface **should** be a complex surface containing the horizontal normal to its centre-line and the slope of the centre-line **should** be the same as that for a straight take-off climb surface (Figure 3);
 - b. Contain no more than one curved portion. 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 **should** be no less than 575 m with a minimum radius of 270 m;
 - c. Have a slope measured in the vertical plane containing the centre-line of the surface;
 - d. Have limits comprising:
 - (1) An inner edge horizontal and equal in length to the minimum specified width / diameter of the FATO plus the Safety Area, perpendicular to the centre-line of the take-off climb surface and located at the outer edge of the Safety Area;
 - (2) 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
 - (3) An outer edge horizontal and perpendicular to the centre-line of the take-off climb surface and at a specified height of 152 m (500ft.) above the elevation of the FATO.
 - (4) An elevation of the inner edge equal to the elevation of the FATO at the point on the inner edge that is intersected by the centre-line of the take-off climb surface. For HLS 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;
 - e. Where a clearway is provided, have an elevation of the inner edge of the take-off climb surface located at the outer edge of the clearway at the highest point on the ground based on the centre-line of the clearway;

Acceptable
Means of
Compliance
3532(1)

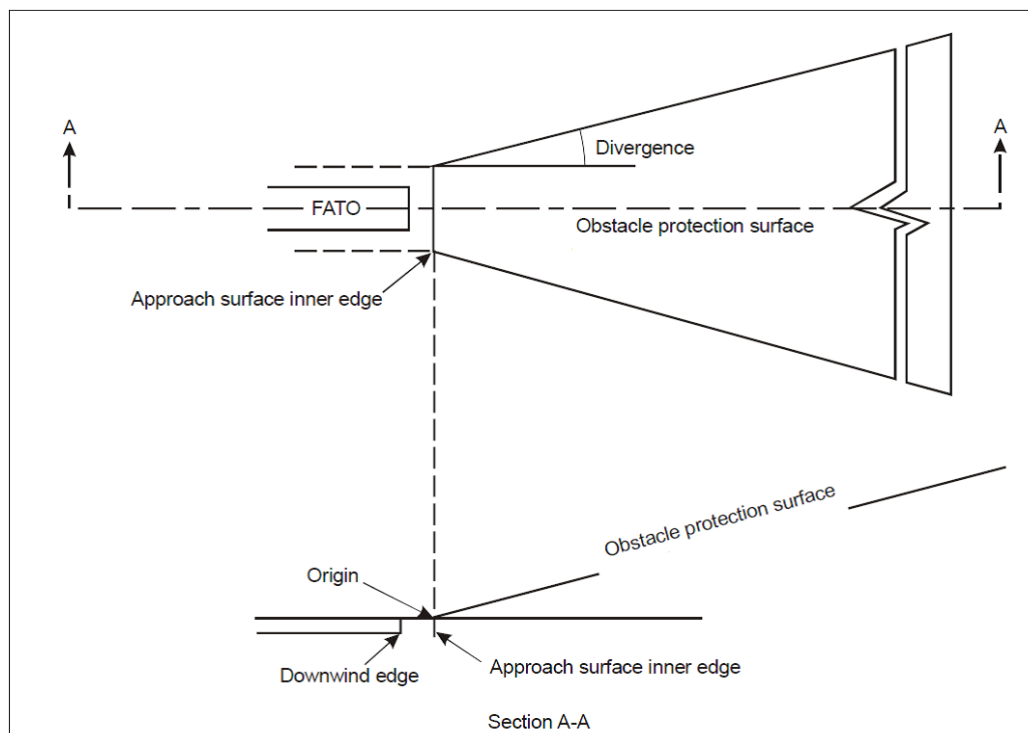
Figure 3. Take off climb surface



4. Surface level HLS **should** have at least two approach and take-off surfaces to avoid downwind conditions, minimize crosswind conditions and permit for a balked landing.
5. Visual Approach Slope Indicator Obstacle Protection Surface **should**:
 - a. Be an inclined plane sloping upwards from the end of the Safety Area and centred on a line through the FATO centre (Figure 4);
 - b. Have 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;
 - c. Have 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;
 - d. Have 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; and
 - e. Have a slope measured in a vertical plane at right angles to the centre-line of the FATO.

**Acceptable
Means of
Compliance
3532(1)**

Figure 4 Visual Approach Slope Indicator Obstacle Protection Surface



6. Where no transitional surface is provided, a protected side slope **should** be provided rising at 45° from the edge of the Safety Area to a distance of 10 m, whose surface **should 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.
7. No fixed object **should** be permitted above the plane of the FATO on a Safety Area, except for frangible objects, which, because of their function, **need to** be located on the area. No mobile object **should** be permitted on a Safety Area during helicopter operations.
- a. Objects whose function requires them to be located on the Safety Area **should not**:
- (1) If located at a distance of less than $0.75D^1$ from the centre of the FATO, penetrate a plane at a height of 5 cm above the plane of the FATO; and
 - (2) If located at a distance of $0.75D$ or more from the centre of the FATO, penetrate a plane originating at a height of 25 cm above the plane of the FATO and sloping upwards and outwards at a gradient of 5%.

**Guidance
Material
3532(1)**

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces (General)

8. 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.
9. For HLS intended to be used by helicopters operated in performance Class 2 and 3 it is good practice for the departure paths to be selected so as to permit safe forced landings or one-engine-inoperative landings such that, as a minimum requirement, injury to persons on the ground or water or damage to property are minimized. The most critical helicopter type for which the HLS is intended and the ambient conditions may be factors in determining the suitability of such areas.

¹ Where D is the largest overall dimension of the helicopter using the HLS.

**Guidance
Material
3532(1)**

10. To support operations with only one approach and take-off climb surface, an aeronautical study may be undertaken by an appropriate authority considering as a minimum, the following factors:
- The area / terrain over which the flight is being conducted;
 - The obstacle environment surrounding the HLS;
 - The performance and operating limitations of helicopters intending to use the HLS; and
 - The local meteorological conditions including the prevailing winds

Civil Equivalence.

11. This Regulation is in line with ICAO Annex 14 Vol II Chapter 4.

**Regulation
3532(2)****Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Non-Instrument Approach**

3532(2) HoEs and ADH-Facing Organizations **shall** ensure that OLS are established for a FATO at HLS with non-instrument approach procedures.

**Acceptable
Means of
Compliance
3532(2)****Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Non-Instrument Approach**

12. Obstacle limitation surfaces indicated in Table 1 **should** be established for a FATO at HLS with non-instrument approach procedures.

Table 1. Dimensions and slopes of obstacle limitation surfaces for all non-instrument FATOs

Surface and Dimensions	Slope Design Categories		
	A	B	C
Approach and Take-Off Climb Surface:			
Length of inner edge	Width of Safety Area	Width of Safety Area	Width of Safety Area
Location of inner edge	Safety Area boundary (Clearway boundary if provided)	Safety Area boundary	Safety Area boundary
Divergence: (1st and 2nd section)			
Day use only	10%	10%	10%
Night use	15%	15%	15%
First Section:			
Length	3386 m	245 m	1220 m
Slope	4.5%	8%	12.5%
	(1:22.2)	(1:12.5)	(1:8)
Outer Width	(b)	N/A	(b)

Acceptable Means of Compliance 3532(2)	Second Section:			
	Length	N/A	830 m	N/A
	Slope	N/A	16% (1:6.25)	N/A
	Outer Width	N/A	(b)	N/A
	Total length from inner edge (a)	3386 m	1075 m	1220 m
	Transitional Surface: (FATOs with a PinS approach procedure with a Visual Segment Surface (VSS))			
	Slope	50% (1:2)	50% (1:2)	50% (1:2)
	Height	45 m	45 m	45 m

Guidance Material 3532(2)

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Non-Instrument Approach Civil Equivalence.

13. This Regulation is in line with ICAO Annex 14 Vol II para 5.3.

Regulation 3532(3)

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Precision or Non-Precision Approach

3532(3) HoEs and ADH-Facing Organizations **shall** ensure that for an instrument FATO with a Precision or Non-Precision Approach the following OLS are established; Take-Off Climb Surface, Approach Surface, and Transitional Surface.

Acceptable Means of Compliance 3532(3)

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Precision or Non-Precision Approach

14. The slopes of the obstacle limitation surfaces **should** be less than, and their other dimensions **should** be greater than those specified in Table 2 for precision FATO and Table 3 for non-precision FATO.

Table 2. Dimensions and slopes of obstacle limitation surfaces: Instrument (Precision) FATO

Surface and dimensions	3° approach Height above FATO				6° approach Height above FATO			
	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							
Distance from end of FATO	60 m							

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Means of
Compliance
3532(3)**

Divergence each side to height above FATO	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	435 m	290 m
Divergence to parallel section	15%							
Distance to parallel section	2793 m	3763 m	4246 m	4733 m	4250 m	4733 m	4975 m	5217 m
Width of parallel section	1 800 m							
Distance to outer edge	5462 m	5074 m	4882 m	4686 m	3380 m	3187 m	3090 m	2993 m
Width at outer edge	1 800 m							
Slope of first section	2.5% (1:40)				5% (1:20)			
Length of first section	3000 m				1500 m			
Slope of second section	3% (1:33.3)				6% (1:16.66)			
Length of second section	10000 m				8500 m			
Total length of surface	13000 m				10000 m			
Take-Off Climb Surface								
Length of inner edge	90 m							
Location of inner edge	Boundary of end of Clearway							
First section divergence	30%							
First section length	2850 m							
First section outer width	1800 m							
First section maximum slope	3.5%							
Second section divergence	Parallel							
Second section length	1510 m							
Second section outer width	1800 m							
Second section maximum slope	3.5%							
Third section divergence	Parallel							
Third section length	7640 m							
Third section outer width	1800 m							
Third section maximum slope	2%							
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

**Acceptable
Means of
Compliance
3532(3)**

Table 3 Dimensions and slopes of obstacle limitation surfaces: Instrument (non-precision) FATO

Surfaces and Dimensions	
Approach Surface	
Width of inner edge	Width of Safety Area
Location of inner edge	Boundary
Frist Section	
Divergence	16%
Length	200 m
Outer width	890 m
Slope (maximum)	3.33%
Second Section	
Divergence	-
Length	-
Outer width	-
Third Section	
Divergence	-
Length	-
Outer width	-
Slope (maximum)	-
Transitional	
Slope	20%
Height	45 m
Take-Off Climb Surface	
Length of inner edge	90 m
Location of inner edge	Boundary of end of Clearway
First Section	
Divergence	30%
Length	2850 m
Outer width	1800 m
Maximum slope	3.5%
Second Section	
Divergence	Parallel
Length	1510 m
Outer width	1800 m

**Acceptable
Means of
Compliance
3532(3)**

Maximum slope	3.5%
Third Section	
Divergence	Parallel
Length	7640 m
Outer width	1800 m
Maximum slope	2%

**Guidance
Material
3532(3)**

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Precision or Non-Precision Approach

Civil Equivalence.

15. This Regulation is in line with ICAO Annex 14 Vol II para 4.2.

**Regulation
3532(4)**

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Visual Approach Slope Indicator

3532(4) HoEs and ADH-Facing Organizations **shall** ensure that an OLS is established for FATOs where visual approach slope indicators are utilized.

**Acceptable
Means of
Compliance
3532(4)**

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Visual Approach Slope Indicator

16. The characteristics of the OLS, ie origin, divergence, length and slope, **should** correspond to those specified in Table 4.

Table 4. Dimensions and slopes of the obstacle protection surface

Surface and Dimensions	FATO	
Length of inner edge	Width of Safety Area	
Distance from end of FATO	3 m minimum	
Divergence	10%	
Total length	2500 m	
Slope	PAPI ²	A ^a – 0.57°
	HAPI ³	A ^b – 0.65°
	APAPI ⁴	A ^a – 0.9°
a. As indicated in ICAO Annex 14, Volume 1, Figure 5-20. b. The angle of the upper boundary of the 'below slope' signal.		

17. New objects or extensions of existing objects **should not** be permitted above the obstacle protection surface except when, in the opinion of the appropriate authority and subject to a Safety Assessment, the new object or extension would be shielded by an existing immovable object.

18. Existing objects above the obstacle protection surface **should** be removed except when, in the opinion of the appropriate authority and subject to a Safety

² Precision Approach Path Indicator.

³ Helicopter Approach Path Indicator.

⁴ Abbreviated Precision Approach Path Indicator.

**Acceptable
Means of
Compliance
3532(4)**

Assessment, the object is shielded by an existing immovable object, or after aeronautical study it is determined that the object would not adversely affect the Safety of operations of helicopters.

19. Where an aeronautical study indicates that an existing object extending above an obstacle protection surface could adversely affect the Safety of operations of helicopters, one or more of the following measures **should** be taken:

- a. Suitably raise the approach slope of the system;
- b. Reduce the azimuth spread of the system so that the object is outside the confines of the beam;
- c. Displace the axis of the system and its associated obstacle protection surface by no more than 5°;
- d. Suitably displace the FATO; or
- e. Install a visual alignment guidance system specified in RA 3535⁵.

**Guidance
Material
3532(4)**

Permanent Helicopter Landing Sites - Obstacle Limitation Surfaces for Visual Approach Slope Indicator

Civil Equivalence.

20. This Regulation is in line with ICAO Annex 14 Vol II para 4.2.

**Regulation
3532(5)**

Domestic Helicopter Landing Sites - Obstacles

3532(5) ► **Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements.** ◀

**Acceptable
Means of
Compliance
3532(5)**

Domestic Helicopter Landing Sites - Obstacles

21. ► **Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements.** ◀

**Guidance
Material
3532(5)**

Domestic Helicopter Landing Sites - Obstacles

22. ► **Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements.** ◀

**Regulation
3532(6)**

Domestic Helicopter Landing Sites - Approaches

3532(6) ► **Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements.** ◀

**Acceptable
Means of
Compliance
3532(6)**

Domestic Helicopter Landing Sites - Approaches

23. ► **Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements.** ◀

**Guidance
Material
3532(6)**

Domestic Helicopter Landing Sites - Approaches

24. ► **Withdrawn – Incorporated into RA 3536(1): Domestic Helicopter Landing Sites – General Requirements.** ◀

⁵ ► Refer to ◀ RA 3535 – Helicopter Landing Sites - ► Lighting. ◀

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