Instrument Procedure Design Helicopters criteria

LU LI
2026

Background

- Today, most rotorcraft operations are flown under VFR conditions
  - Flexibility
  - No need of specific ground infrastructure (except the FATO)
  - Minimum on-board equipment required

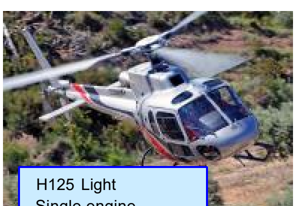
- Drawbacks of flying VFR
  - No operation in adverse weather conditions
  - Very restrictive for night (high visibility needed)
  - Difficult to integrate in dense airspace, in busy airports

- IFR advantages
  - Flight safety in bad conditions
  - Continuity of service
  - Increase safety and mission regularity

- Note : In France, per year , between 1000 and 2000 operations cannot be flown because of meteorological bad conditions

IFR Helicopters

- Machines used in IFR may be very different
  - Size
  - Equipment
  - Performance
  - …



H125 Light
Single engine
Rotor diameter 10,7m
1 pilot 5 pax
Max weight 2,2T
IAS 132 kt

In 2005, the H125 broke the world record for the highest-altitude landing and takeoff, performed on Mount Everest at 8,848 metres (29,029 feet), a title still held today.

H145 Light
Twin-engine
Rotor diameter 11m
1 or 2 pilots 9 pax
Max weight 3,6T
IAS 133 kt

Agusta 109 Light
Twin-engine
Rotor diameter 11m
Max Weight 3T
1/2 pilots 7/6 pax
IAS 154 kt

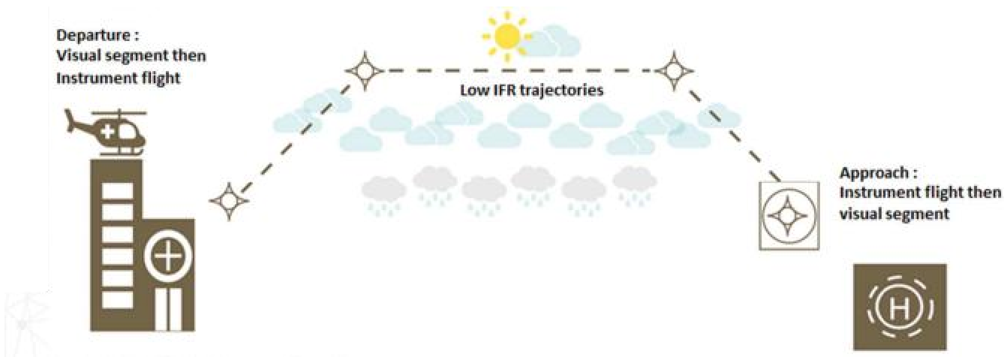
H155 Medium
Twin-engine
Rotor diameter 12,6m
Max Weight 4,9T
1/2 pilots 13/12 pax
IAS 150 kt

H135 Light
Twin-engine
Rotor diameter 10,2m
1/2 pilots 6/5 pax)
Max weight 2,9T
IAS 141 kt

H225 : Heavy
Twin-engine
Rotor diameter 16,2m
Max Weight 11T
2 pilots 19 pax
IAS 142 kt

Needs exist

- Absolute necessity of approaches and departures to and from hospitals FATO
- IFR trajectories have to be created for IMC
- Low trajectories to avoid icing and to avoid hypoxia for transported patients



Current state of IFR trajectories

- En-Route: Existing en-route paths are not adapted to rotorcraft especially for HEMS (Helicopter Emergency Medical Service)
  - Unusable because short distance between hospitals
  - High trajectories are dangerous for patients
- STAR (Europe) : RNAV1 operations are based on Air Traffic Service radar surveillance. It is not applicable to rotorcraft operations (which fly inside uncontrolled airspace and rich-obstacle environment)
  - Interest for RNP 1 or RNP 0.3 operations
- RNP APCH procedures (LNAV, LNAV/VNAV and LPV minima) mainly defined for fixed-wing aircraft:
  - Speed, segment length, slopes and vertical profile not fully adapted to rotorcraft performances
  - Not implemented at non IFR aerodromes and heliports

Point-in-Space concept

- Fly under IMC to/from a PinS in the vicinity of the landing/departure site
- The IFR procedure part can be located anywhere all around the site;
  - The flexibility that offers the free positioning of the PinS is the main asset of this concept
- The segment between the PinS and the landing/departure site is flown visually. Depending on the case, during this phase, the pilot will :
  - Proceed VFR
  - Proceed visually
- PinS procedures allow IFR flights to/from non IFR sites

IFR Helicopter Procedures

- Helicopter Procedures to Runways
  - Procedures promulgated for Category A aircrafts
  - Helicopter only procedures (CAT H)
- Helicopter PinS Procedures
  - Helicopter PinS Approach
    - PinS approach is an instrument RNP APCH procedure flown to a point-in-space. It may be published with LNAV minima or LPV minima
  - Helicopter PinS Departure
    - PinS departure is an instrument RNAV procedure flown from a point-in-space.

Main Texts

- Doc 8168 Vol I
  - Part II Section 7
- Doc 8168 Vol II
  - Specific values for helicopters in all chapters
  - Part IV deal with PinS approach and departure

- ICAO Doc 9613, Performance-based Navigation (PBN) Manual

- Annex 6 Part III - International Operation of Helicopters
- Annex 8 part IV - Airworthiness of Helicopters

- Annex 14, Volume II - Heliports

IFR procedures for helicopters

Cat H

Contents

- Use of Cat A instrument flight procedu
- Cat H instrument flight procedures (specific criteria)
  - Departure
  - Approach, general criteria
  - Non Precision approach
  - Precision Approach
  - Holding
  - RNAV

Use of Cat A instrument flight procedures

- Without Cat H approach, helicopters can use procedures flown from and to RWYs, designed for airplanes operating at Category A speeds and using the published Cat A minima

- Helicopter using the Cat A procedures, the essential condition is to manoeuver the helicopter within the limits of the speed tolerances of Cat A aircraft prescribed for the phase of flight . A helicopter which would not keep to the minimum speed could risk to go outside of protection areas due to a bigger drift

Use of Cat A : Departure criteria

- **Straight departures**
  - Helicopters have to cross the DER within 150 m laterally of the runway centre line

- **Departures with turns**
  - Straight flight has to be performed until reaching a height of at least 120m above the elevation of the DER
  - For a turn at an altitude, earliest turn location for helicopter high vertical speed can be reached before aircraft earliest turn (600m from the beginning of the RWY or at the DER if this information has been charted)

9

Use of Cat A : Approach criteria

- **IAS in final**

  The minimum final approach for Cat A is 70kt. A helicopter using a lower speed in final can be critical when the MAPt is specified by a distance from the FAF. This lower speed combined with the wind can result that the helicopter will reach the MAPt outside the tolerance computed for Cat A . So, the missed approach could be affected (helicopter outside the protection area and bad margins over obstacles).

  Speed should be reduced below 70kt only after the visual references necessary for landing have been acquired and the missed approach will not be performed

- **Rate of descent in final (after fixes)**

  For aircrafts, obstacles close from Step Down Fixes can be neglected if they don't penetrate a 15% plan. Helicopters are able to use gradient of descent more than those used for aircrafts.

  So, pilots should limit rates of descent used after crossing final approach and any stepdown accordingly.

Use of Cat A : Circling

- Circling are not applicable to helicopters. The pilot should manoeuvre the helicopter visually to a suitable landing area

- Pilots using a Cat A procedure which authorizes both straight-in and circling minima may manœuvre at the straight-in MDH if visibility permits

  However, the pilots needs to be awared of all operational notes regarding ATS requirements while manoeuvring and needs to remain within the Category A circling area

Cat H instrument flight procedures Specific criteria

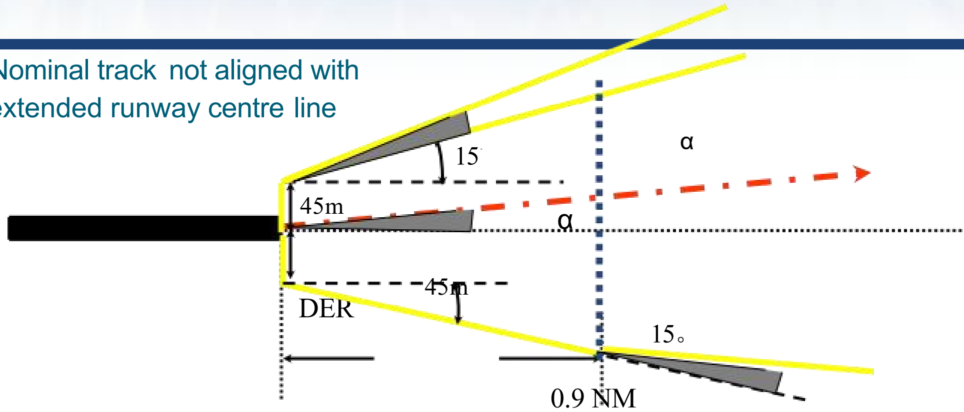
Helicopter instrument flight is relatively new when compared to airplane instrument flight. Helicopter instrument approach procedures have to be developed to take advantage of advances in both avionics and helicopter technology

Departure (I-3-2)

- The DER is the end of the runway or clearway or the end of the final approach and take-off (FATO)
- Width of the protection area at DER: 90m (± 45 m)
- Standard Procedure Design Gradient (PDG): 5%
- Gradient of OIS: 4.2%
- Before turning the minimum height of turn is 90 m (295ft) above the FATO
  - The track adjustment is located at 0.9NM from the DER
- For a turn greater than 15 , minimum MOC: 65m (213ft)

Departure

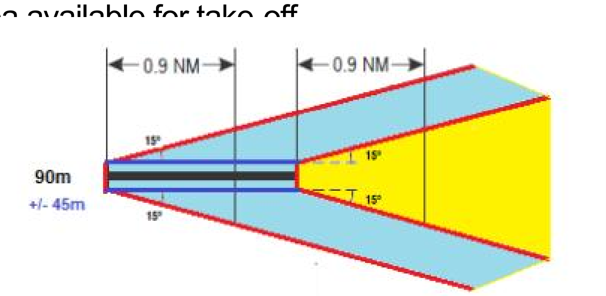
Nominal track not aligned with extended runway centre line



Any track adjustements will take place no further than a point corresponding to 90m (295ft) above the DER

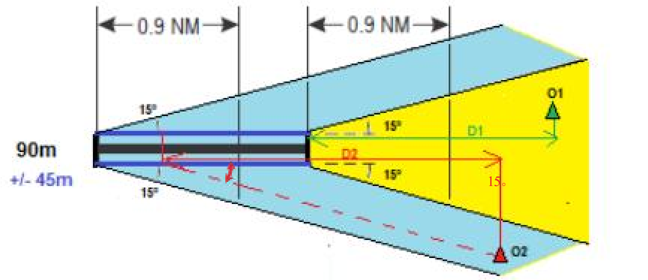
Departure

To take into account the climb performance of helicopters, the protected area commences at the beginning of the runway or area available for take off



Note.— The elevation of the DER is the higher of the elevations of the beginning and end of the runway/FATO.

Departure



PDG1 = (HO1 + MOC) / D1 with HO1=ALT O1-ALTDER-5m and MOC=0,8%D1

PDG2 = (HO2 + MOC) / D2 with HO2=ALT O2-ALTDER-5m and MOC=0,8%D2

PDG = MAX [5% , PDG1, PDG2]

Approach : Step Down Fix (I-2-2)

- The slope of the plane to take into account for neglecting obstacles is the greater value between :
  - 15%
  - Descent gradient of the nominal track x 2.5

Speeds

En-route and approach

Phase of flight	IAS in kt Min / Max
En-route	175
Initial approach	70 / 120
Reversal and racetrack procedures up to and including 6 000 ft	100
Reversal and racetrack procedures above 6 000 ft	110
Final approach	60 / 90
Intermediate missed approach	90
Final missed approach	90

Organization of minimum stabilization distance tables

Units	*Type of waypoint*	*Bank angle*	*Table number*
Aeroplane			
(SI)	Fly-by	15°	III-2-1-1
		20°	III-2-1-2
		25°	III-2-1-3
	Flyover	15°	III-2-1-4
		20°	III-2-1-5
		25°	III-2-1-6
(Non-SI)	Fly-by	15°	III-2-1-7
		20°	III-2-1-8
		25°	III-2-1-9
	Flyover	15°	III-2-1-10
		20°	III-2-1-11
		25°	III-2-1-12
Helicopter			
(SI)	Fly-by	15°	III-2-1-13
		20°	III-2-1-14
	Flyover	15°	III-2-1-15
		20°	III-2-1-16
(Non-SI)	Fly-by	15°	III-2-1-17
		20°	III-2-1-18
	Flyover	15°	III-2-1-19
		20°	III-2-1-20

Bank Angle

(for initial / intermediate / final)

Nothing specific in the general criteria related to cat H but considering the table below (MSD), the max bank angle to consider is 20.

Initial approach (I-4-3)

- Minimum DME arc radius: 5 NM
- Descent gradient
  - Optimum: 6.5%
  - Maximum: 10%
    - If speed restriction of 90kt , the maximum can be 13.2%
- 45。/180。 procedure turn: the straight leg without guidance is 1 minute
- Maximum rate of descent on a reversal or racetrack procedure
  - Outbound track: 365m/min (1197ft/min)
  - Inbound track: 230m/min (755ft/min)

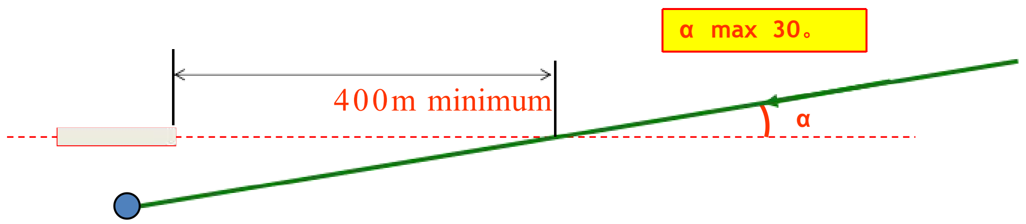
Intermediate approach (I-4-4)

- Length of the intermediate :
  - Minimum : 2NM
  - If turn at IF
    - Between 61/90。 : 3NM
    - Between 91/120。 : 4NM
  - Optimum : 5NM
  - Maximum : 5NM
- If a descent is necessary, maximum gradient: **10%**

Final approach (I-4-5): Alignment

- Straight-in approach

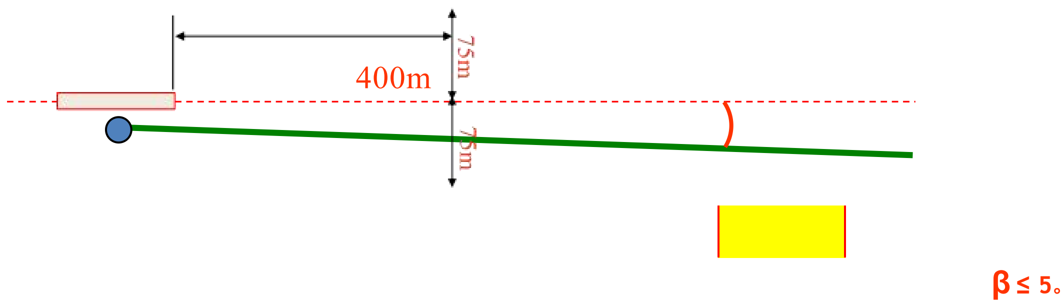
Final approach track **intersects** axis **before** FATO



Final approach: Alignment

- Straight-in approach

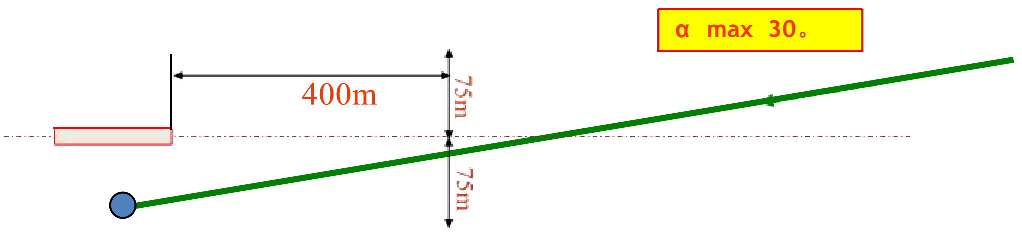
Final approach track **does not intersect** runway axis **before** FATO



Final approach (I-4-5): Alignment (FRANCE)

- Straight-in approach

Final approach track **intersects** axis **before** FATO



Final approach: Alignment

- Circling are not provided for helicopters

If the axis does not allow a straight-in approach, the instrument approach is followed by visual manoeuvring in adequate weather conditions to see and avoid obstacles around the FATO.

The OCH shall not be less than **75m** (246ft)

Final approach: Minimum length

Maximum angle between intermediate and final: **60**。

Magnitude of turn over FAF	10 or less	20。	30。	60。
Cat H	1,9km (1.0 NM)	2,8km (1.5 NM)	3,7km (2.0 NM)	5,6km (3.0 NM)

The values in this table may be interpolated.

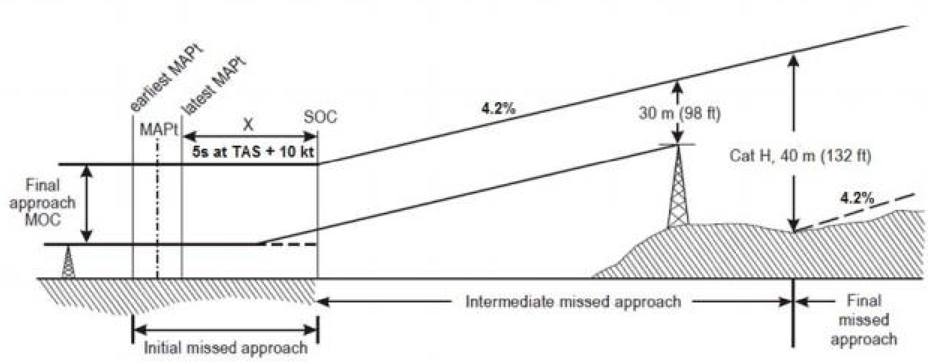
Final approach: Descent gradient and rate of descent

- Minimum descent gradient: 5.2%
- Maximum descent gradient: 10%
  - However, where an operational need exists and the magnitude of turn at the FAF is less than or equal to 30 , a gradient of as much as 13.2 per cent may be authorized, provided the final approach speed is restricted to a maximum of 130 km/h IAS (70 kt IAS), and provided the gradient used is depicted on approach charts
- Descent gradient in final is computed by taking a height of 10.7 m (35 ft) over the threshold of the FATO
- Maximum rate (procedure without FAF): 755 ft/min

Missed approach (I-4-6)

- Transitional distance (X) : **5 seconds** of flight
  - Max IAS of the final
  - at aerodrome elevation
  - ISA + 15
  - Tailwind of 10kt
- Minimum climb gradient: **4.2%**
- MOC of the final missed approach: **40m** (132ft)

Missed Approach phases



Missed approach, Turn

- IAS
  - Normal speed: 90kt
  - Can be limited to 70kt « MAX IAS 70kt » written on the chart

- Turn angle more than 15
  - In turn area MOC: 40m

Precision approach (II-1-1)

Intermediate segment :

- Optimum length : 2 NM
- Minimum distance between localizer and glide path interceptions
  - Intercept angle with localizer
    - 0 – 15 1.5 NM
    - 16 – 60 2.0 NM
    - 61 – 90 2.0 NM

  (or within racetrack or reversal procedure)

Precision approach (II-1-1)

- Standard conditions
  - semi-wingspan: **15m**
  - Vertical distance between the flight paths of the wheels (or skids) and the GP antenna : **3m**
- When a descent fix is provided at FAP to ignore obstacles located close to the Fix, the slope of the plane to take into account is the greater value between :
  - 15%
  - Descent gradient of the nominal track x 2.5

Precision approach, OCA/H calculation

- Origin of GP' plan is located at -700 m from the FATO threshold or from the RWY threshold

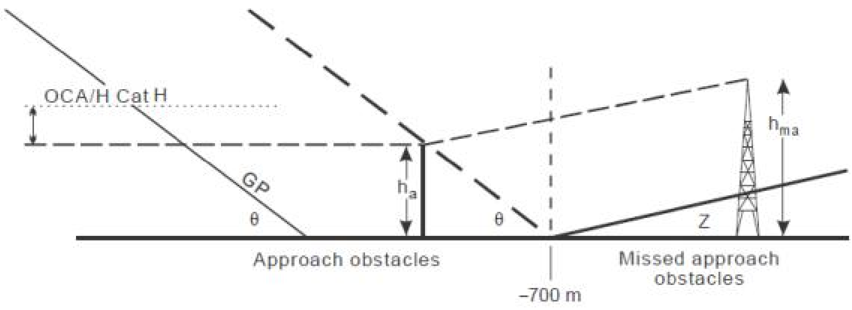
$$H_{eq} = \frac{h_{ma} \cot Z + (x - x_z)}{\cot Z + \cot \theta}$$

x_z = -700m (abscissa of the origin of Z surface)

Note : Be careful in the regulation : $h_{ma} \cot Z + (x_z + x)$

x_z = distance from threshold to origin of Z surface (700 m)

Precision approach, OCA/H calculation



Precision approach, Height Loss

- HL using:
  - Radio altimeter : 8m (25ft)
  - Pressure altimeter: 35m (115ft)
- Vat concept is not applicable to compute a specific HL

Precision approach
Turn in Missed Approach

- For turns protection
  - MOC: 30m if turn angle less than 15。
  - MOC: 40m (132 ft) if turn angle more than 15。

Holding pattern (II-4-1)

- IAS:
  - 100kt (normal conditions up to 6000ft)
  - 170kt (more than 6000ft)
- Buffer area ：
  - 2NM (decreasing MOC from 300m to 0) at or below 6000ft
  - 5 buffer zones more than 6000ft

Phase of flight	BV in NM
En-route, SIDs and STARs (greater than or equal to 56 km (30 NM) from departure or destination ARP)	1.0
Terminal (STARs, initial and intermediate approaches less than 56 km (30 NM) of the ARP; and SIDs and missed approaches less than 56 km (30 NM) of the ARP but more than 28 km (15 NM) from the ARP)	0.7
Final approach	0.35
Missed approaches and SIDs up to 28 km (15 NM) from the ARP	0.35

RNP 0.3

STAR / SID > 30 NM ARP			STAR / SID / IF / IAF / missed Approach < 30 NM ARP			SID / Missed Approach < 15 NM ARP		
XTT	ATT	½ AW	XTT	ATT	½ AW	XTT	ATT	½ AW
0.3	0.24	1.45	0.3	0.24	1.15	0.3	0.24	0.80

RNP 1

STAR / SID / missed approach > 30 NM ARP			STAR / IF / IAF / SID / missed approach < 30 NM ARP			SID / missed approach < 15 NM ARP		
XTT	ATT	½ AW	XTT	ATT	½ AW	XTT	ATT	½ AW
1	0.8	2.5	1	0.8	2.2	1	0.8	1.85

RNP APCH

IF /IAF / missed approach < 30 NM ARP			FAF			MAPT			missed Approach < 15 NM ARP		
XTT	ATT	½ AW	XTT	ATT	½ AW	XTT	ATT	½ AW	XTT	ATT	½ AW
1	0.8	2.2	0.3	0.24	1.15	0.3	0.24	0.8	1	0.8	1.85

RNAV, GNSS

RNAV 1 / RNAV2								
En-Route/STAR / SID / missed approach > 30 NM ARP			STAR / IF / IAF / SID / missed approach < 30 NM ARP			SID / missed approach < 15 NM ARP		
XTT	ATT	½ AW	XTT	ATT	½ AW	XTT	ATT	½ AW
2	1.6	4	1	0.8	2.2	1	0.8	1.85

RNAV 5		
En-Route/STAR / SID > 30 NM ARP		
XTT	ATT	½ AW
2.51	2.01	5.77 (see note)

Note : aeroplane ICAO value (BV=2NM) - for helicopter the ½ AW should have been reduced at 4,77 NM (BV=1NM)

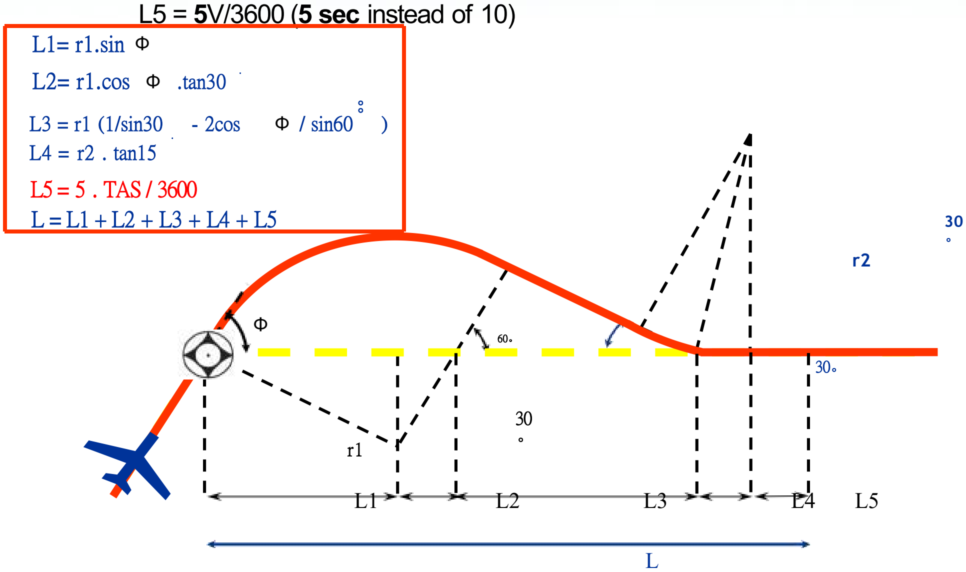
RNAV, minimum stabilization distance (III-2-1)

- FlyOver WP
  - L5 segment = **5**V/3600 (**5 sec** instead of 10s)
  - For Cat H, **30** is the minimum turn angle to take into account (instead of 50)
- WP en FlyBy
  - L2 segment = **3**V/3600 (**3 sec** instead of 5s)
  - For Cat H, **30** is the minimum turn angle to take into account (instead of 50)
- Tables : from **3.2.1.13 to 20**

RNAV, minimum stabilization distance

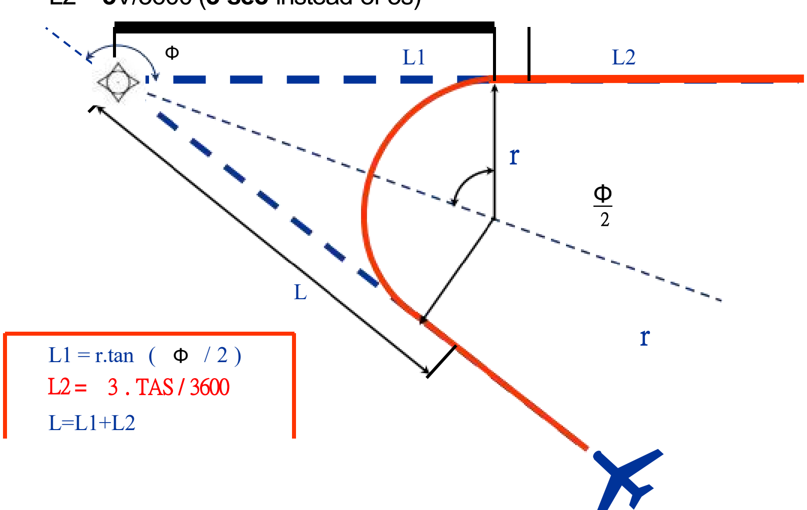
- FlyOver WP

L5 = **5**V/3600 (**5 sec** instead of 10)



RNAV, minimum stabilization distance

- FlyBy WP
  - L2 = **3**V/3600 (**3 sec** instead of 5s)



Example

Table III-2-1-17. Minimum stabilization distance between fly-by waypoints (Non-SI units, 15° bank angle*)

*Course change** (degrees)*	*True airspeed (kt)* ≤ 70	80	90	100	110	120	130
30	0.16	0.18	0.20	0.23	0.27	0.31	0.35
35	0.18	0.20	0.23	0.25	0.30	0.35	0.40
40	0.19	0.22	0.25	0.28	0.33	0.39	0.44
45	0.21	0.24	0.27	0.31	0.36	0.42	0.49
50	0.23	0.26	0.30	0.34	0.40	0.47	0.54
55	0.25	0.29	0.32	0.37	0.43	0.51	0.59
60	0.27	0.31	0.35	0.40	0.47	0.55	0.64
65	0.29	0.34	0.38	0.43	0.51	0.60	0.69
70	0.32	0.36	0.41	0.46	0.55	0.65	0.75
75	0.34	0.39	0.44	0.50	0.60	0.70	0.81
80	0.37	0.42	0.48	0.54	0.64	0.76	0.88
85	0.40	0.46	0.51	0.58	0.69	0.82	0.95
90	0.43	0.49	0.55	0.63	0.75	0.88	1.03
95	0.46	0.53	0.60	0.68	0.81	0.95	1.11
100	0.50	0.57	0.64	0.73	0.88	1.03	1.20
105	0.54	0.62	0.70	0.79	0.95	1.12	1.31
110	0.59	0.67	0.76	0.86	1.03	1.22	1.42
115	0.64	0.73	0.82	0.94	1.12	1.33	1.55
120	0.70	0.80	0.90	1.03	1.23	1.46	1.70

* 15° or 3°/s
** Use the value 30° for course changes lower than 30°

RNAV, initial and intermediate and final segment (III-3-2)

- Initial segment
  - for GNSS the optimum length is 3 NM
- Intermediate segment
  - Should be aligned with the final.
    - For NPA, if a turn at FAF is required it shall not exceed **60**
    - For BaroVNAV, if a fly-by turn at FAF is required it shall not exceed **30**

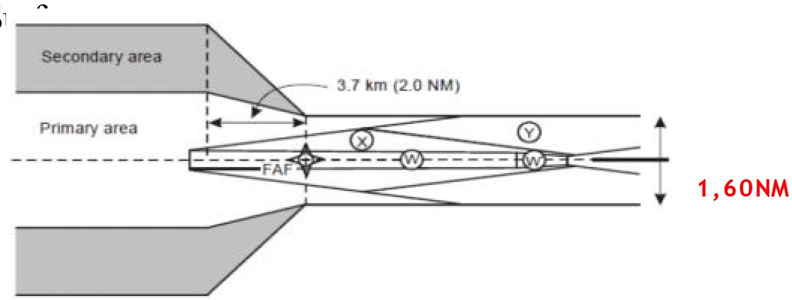
RNAV, intermediate and final segment (III-2-3)

- Final segment
  - Optimum length: 2 NM
  - Minimum length if turn at FAF:

10。 or less	20。	30。	60。
1 NM	**1.5** NM	**2** NM	**3** NM
Values may be interpolated			

RNAV, SBAS criteria (III-3-5)

- Standard conditions
  - Wingspan: **30 m**
  - Vertical distance between the flight paths of the wheels (or skids) and the GP antenna : **3 m**
- S



RNAV, SBAS

- Equivalent obstacle formula

  - APV I $x_z = -1000$ m
  - SBAS CAT I $x_z = -700$ m

$$H_a = \frac{H_{ma} \cot Z + (x - x_z)}{\cot Z + \cot \theta}$$

RNAV, SBAS, Steep angle (III-3-5-Appendix)

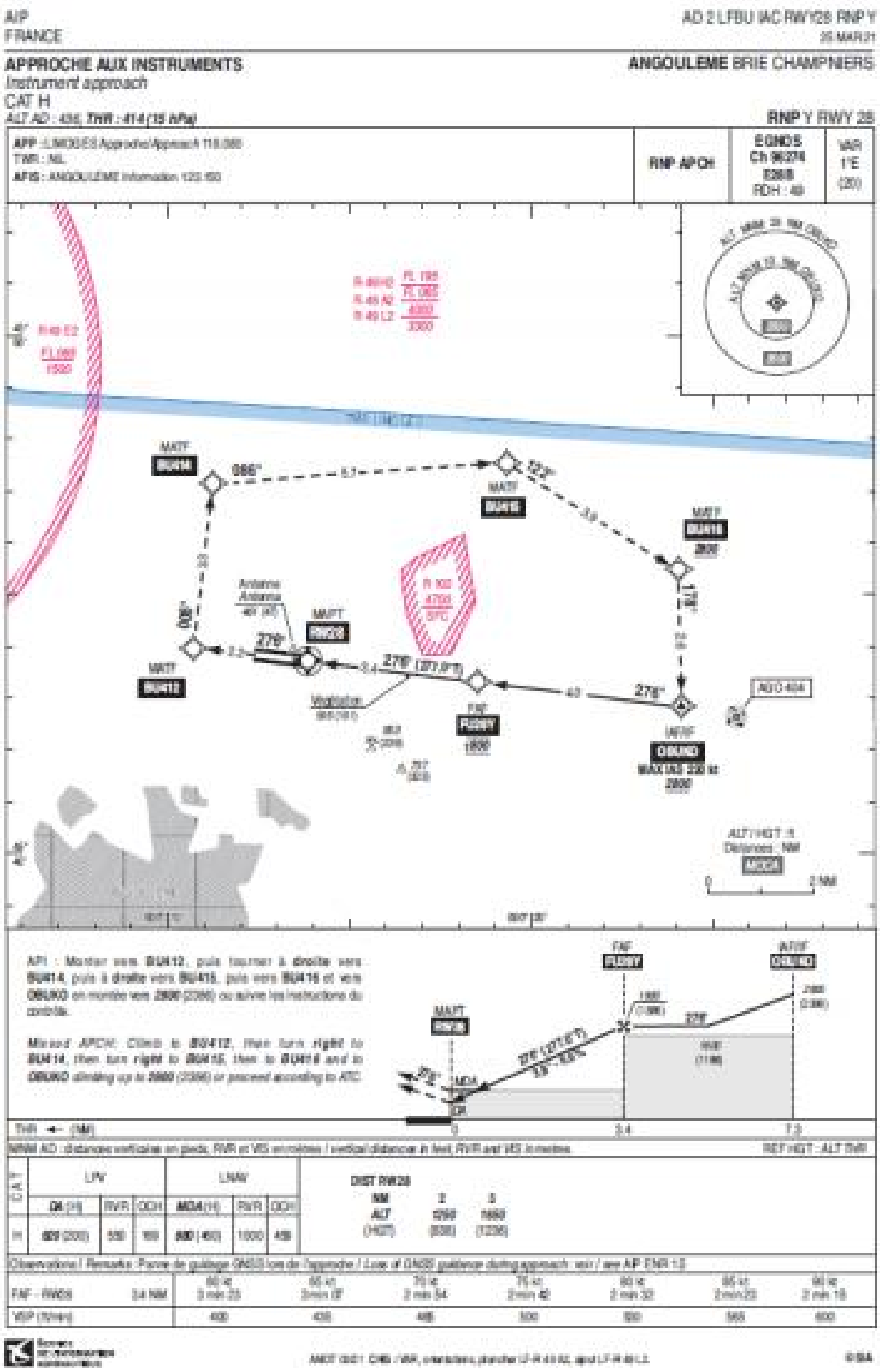
- For aircraft, steep glide path angles more than 3,5 are non-standard and require special approval. This limitation doesn't apply to helicopters
- For **helicopter procedures**, glide path angles **above 5.7** (10 per cent) or **7.5** (13.2 per cent), when authorized and provided the speed is restricted to a **maximum of 130 km/h IAS (70 kt IAS)**, are non-standard and require **special approval**.

~~Abscissa of X~~

$\bullet$ $\_$ z

~~- APV 1: $X_z = -(700 + (38/tg\,\theta) + 50(\theta - 3.5^\circ)/0.1^\circ)$~~

~~- SBAS CATI : $X_z = -(700 + 50(\theta - 3.5^\circ)/0.1^\circ)$~~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FRANCE
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APPROCHE AUX INSTRUMENTS
Instrument approach
CAT H
ANGOULEME BRIE CHAMPNIERS
RNP Y RWY 28
RNP APCH
EGNOS
MAPT
FAF
IAF/IF

IFR procedures for helicopters

APPROACH

« PinS Approach »

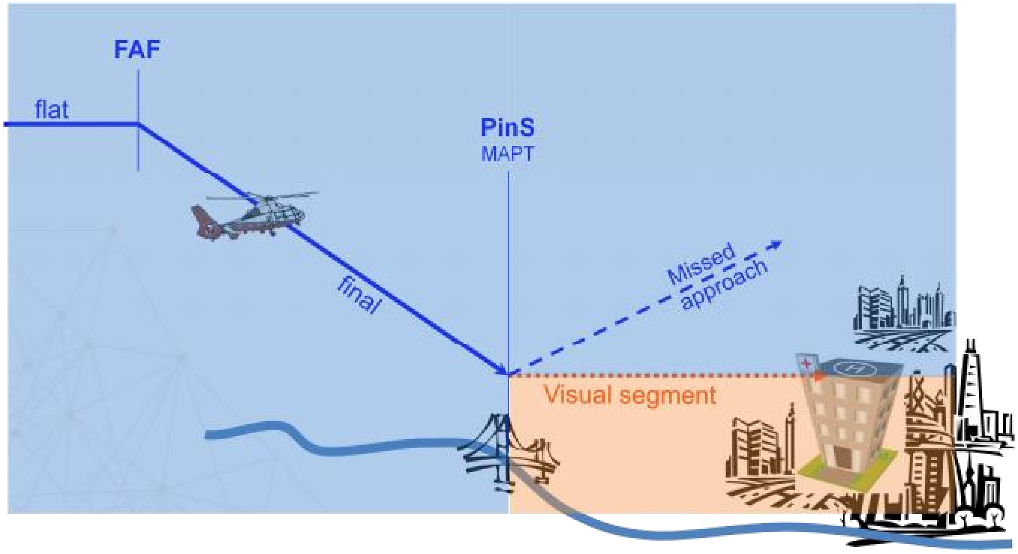
Contents

- The PinS concept
- En route phase
- PinS Approach segments
- Visual segment
  - Proceed visually
    - Direct VS
    - Manoeuvring VS
  - Proceed VFR

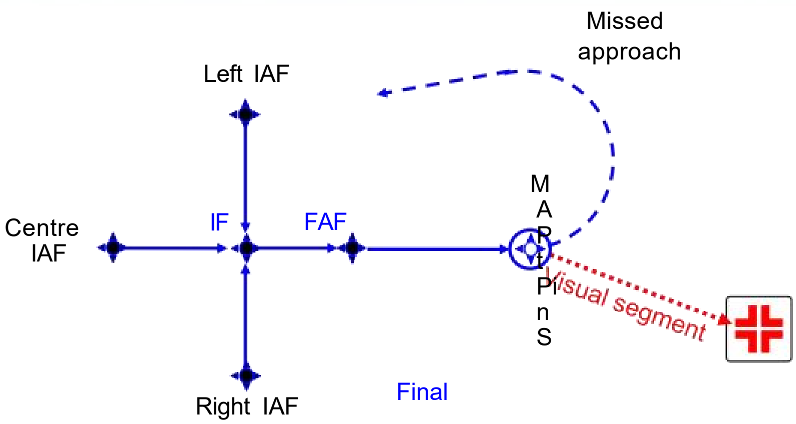
PinS concept : Approach to a «Point-In-Space» **PinS**

- The PinS approach procedure consists of an instrument segment followed by a visual segment.
- The point-in-space approach is based on a basic GNSS non-precision approach procedure. The final approach segment ends at a reference point located to allow landing using visual manoeuvres.
  - Procedures are flown by aircraft equipped with Basic GNSS receivers that have been approved by the national authority for the operator for RNP APCH operations.
  - The reference point is called **PinS**. To fly beyond this PinS, conditions of visibility must be satisfactory allowing to see and avoid obstacles. This visual segment connects the point-in-space (PinS) to the landing location.
  - The flexibility that offers the free positioning of the MAPT is the main advantage of this concept.

PinS approach

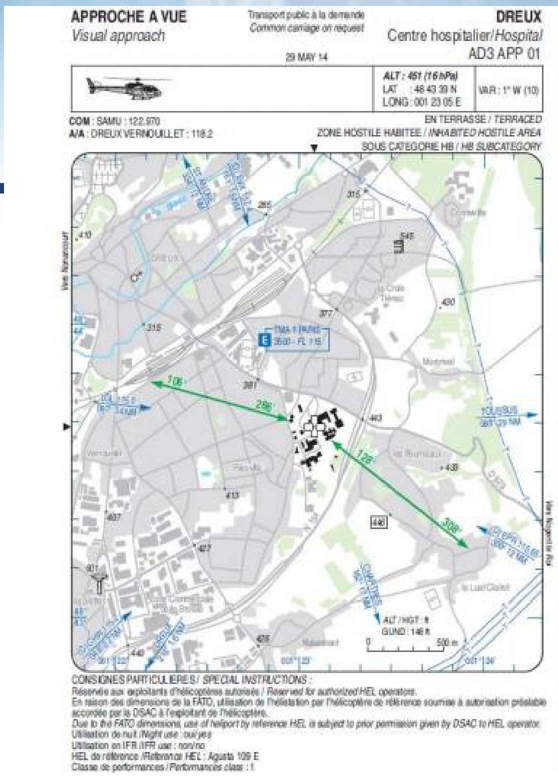


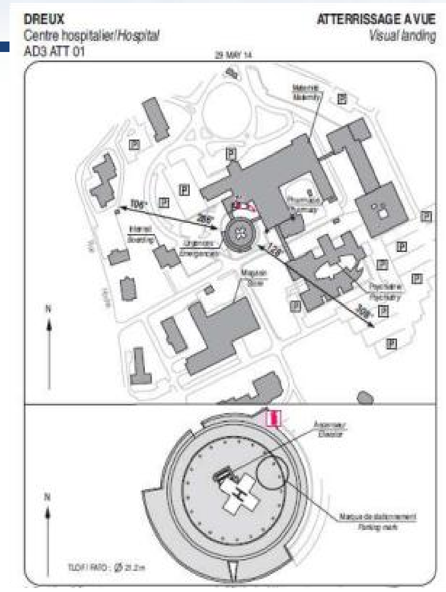
General geometry of PinS approach



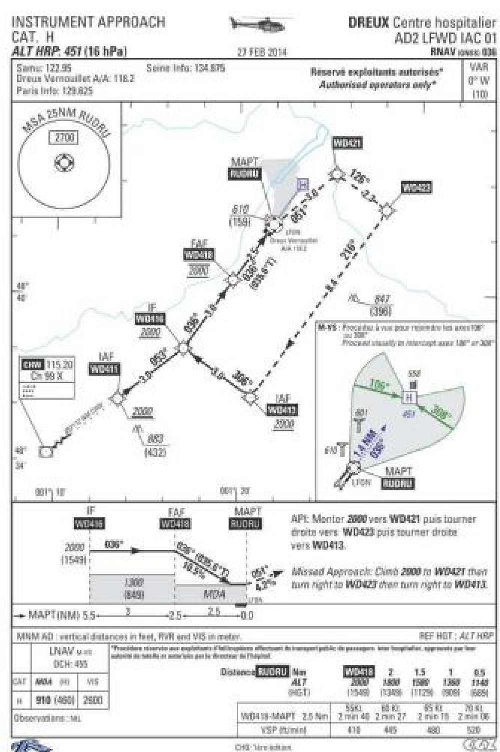
Example :

DREUX procedures



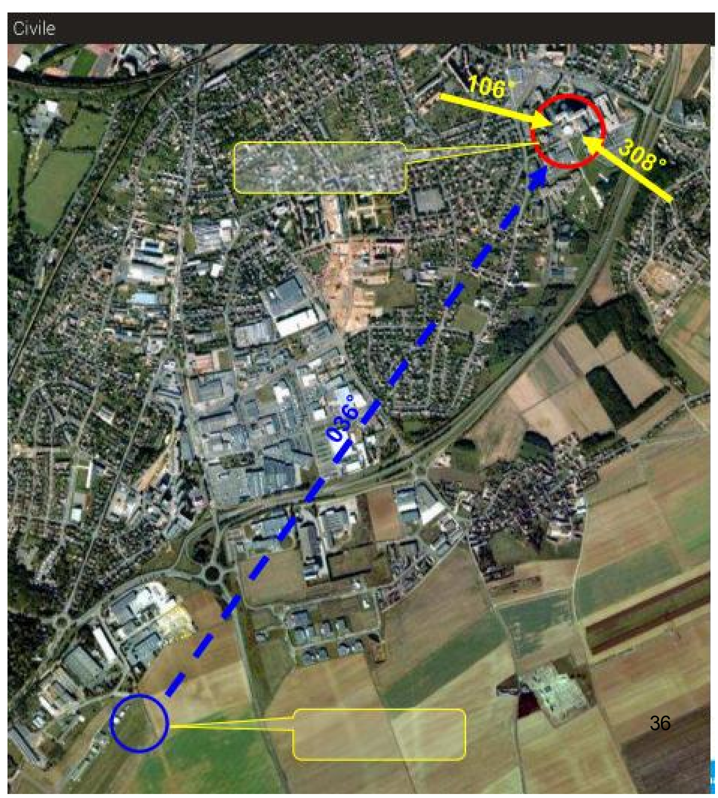


Approach chart
Dreux



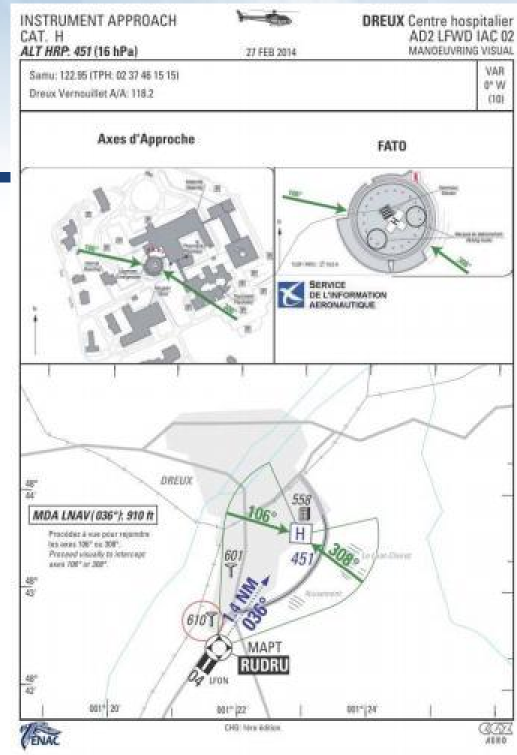
PinS Dreux

Visual Segment Dreux



Approach chart
Dreux

Visual phase



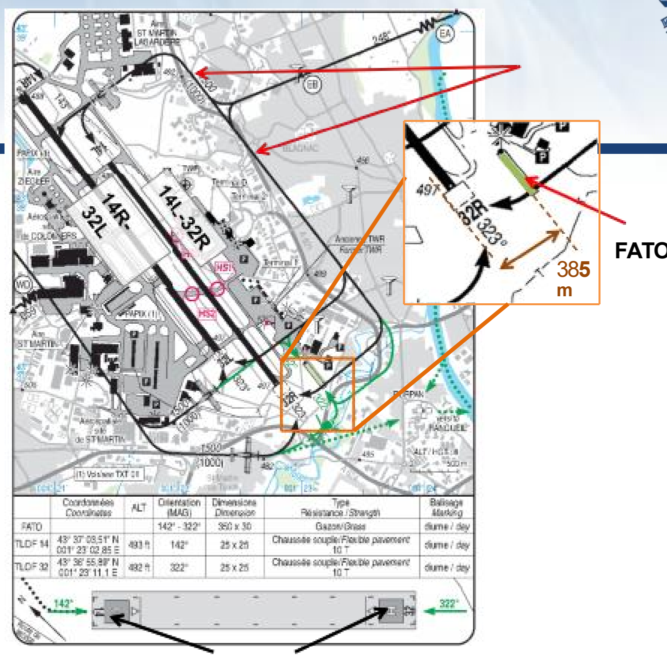
Example :

Procedures in TOULOUSE

Simultaneous Non Interfering procedures

Photo Patrick PENA (c) Eurocopter — Collection Charles SCHMITT

V.A.C.
TOULOUSE



Toulouse Blagnac

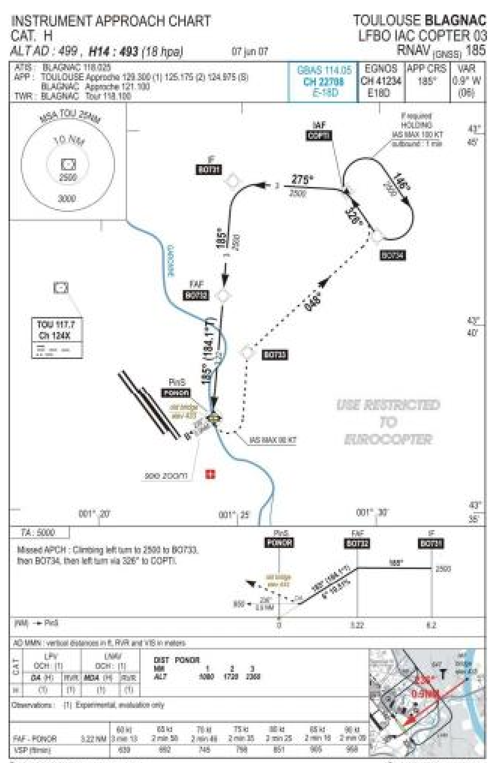
RNAV GNSS 185

(PinS = bridge = MAPt)

2007 : 1st project

LNAV

LPV



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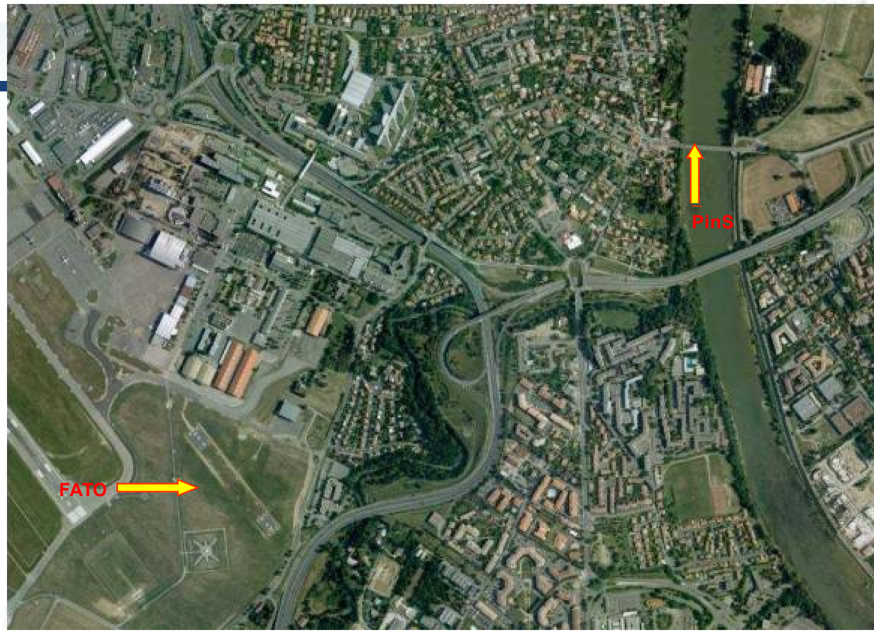
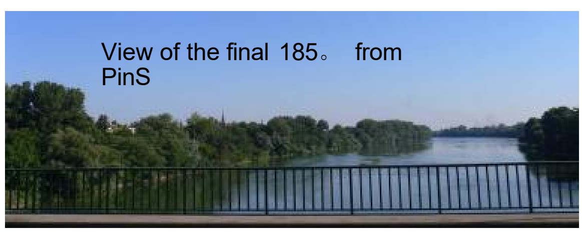
Toulouse Blagnac PinS 185

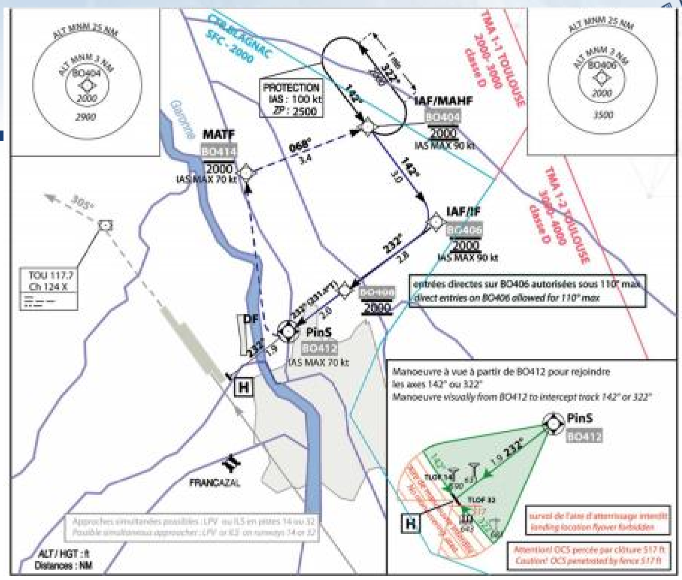




Toulouse Blagnac
PinS 185

Toulouse Blagnac
RNAV GNSS 232

2015 : 2nd project
LPV only

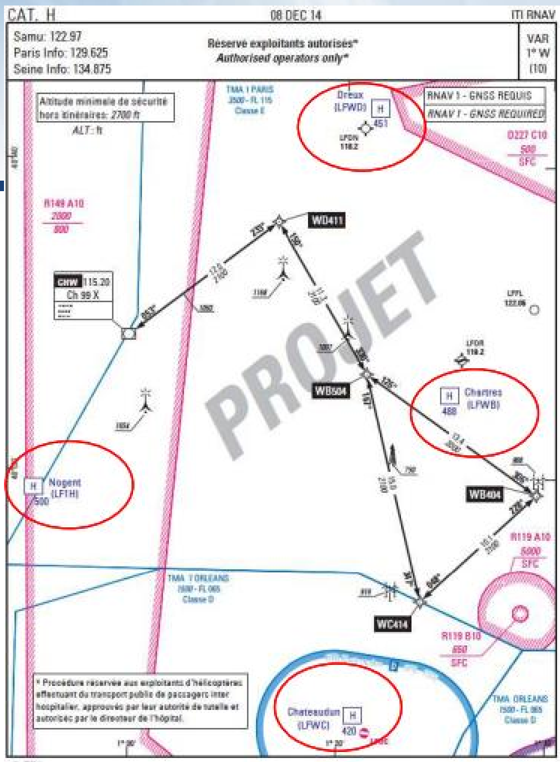


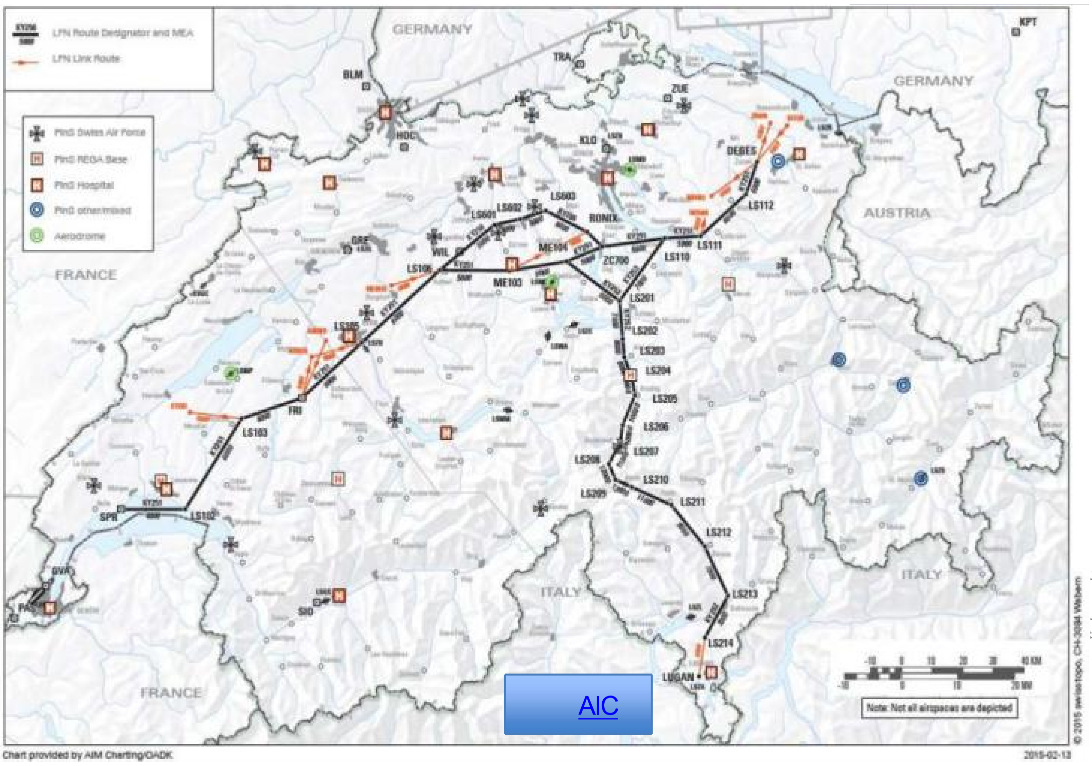
- Low level IFR routes optimized helicopter operations.
- These routes integrated into the airspace system utilizes flight levels where icing conditions are not normally experienced and where a pressurized cabin or oxygen would not be required.

En-Route Phase, HEMS connection:

- Dreux
- Chartres
- Châteaudun
- Nogent

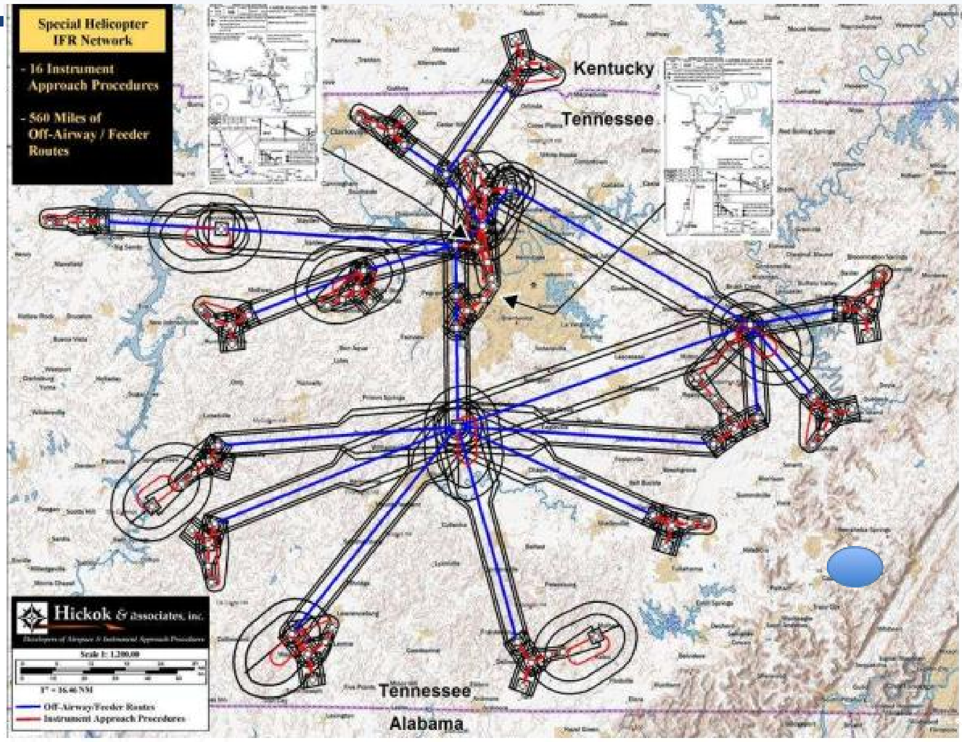
TMA class E
Temporary creation





AIC

En-Route Phase, connection in U.S.



PinS Approach

- PinS approach is an IFR approach. This approach is an RNP APCH procedure for helicopter only. It may be published with LNAV or LPV minima. All approaches will be flown to a point in space where the pilot should have sufficient visual reference to continue to the intended landing site or initiate a missed approach. This visual segment connects the MAPt (PinS) to the heliport or landing location.

- Two types of visual segment : ⇨
  - with mention « **proceed visually** ⇨ » in the plan view. 3 types :
    - Direct visual segment **Direct - VS**
    - Manœuvring visual segment **Manoeuvring – VS**
    - Route Visual segment (prescribed track, no criteria for the moment)
  - with mention « **proceed VFR** » in the plan view

Protection Area

Protection area : RNAV GNSS

Protection area : ½ AW = 1.5 XTT + BV

- PRP (PinS Reference Point) is the origin of distances, instead of ARP
- BV : helicopters Buffer Value

Example : RNP APCH (CAT H)											
IAF / IF/API < 30 NM from PRP			FAF			MAPT / Initial straight Missed Approach			Missed Approach < 15 NM from PRP		
XTT	ATT	½AW	XTT	ATT	½AW	XTT	ATT	½AW	XTT	ATT	½AW
1	0.8	**2.2**	0.3	0.24	**1.15**	0.3	0.24	**0.8**	1	0.8	**1.85**

BV = **0,7** BV = **0,7** BV = **0,35** BV = **0,35**

Arrival

- MSA
  - The sectors are centred on the PRP/MAPt
- TAA
  - General criteria of TAA are applied (III-2-4)

The PRP/MAPt must be provided in the database as the reference point serving the same purpose as the ARP in approaches to aerodromes

Holding

- The track specified for the inbound leg should be the same as:
  - the track for the initial segment if the holding fix is the IAF
  - the intermediate segment if the holding fix is the IF
  - the track for the inbound leg should not differ by more than 30° from the initial or the intermediate track
- Speed :
  - IAS 100 kt up to 6000 Ft
  - IAS 170 kt more than 6000 ft
- Buffer area :
  - 2NM (decreasing MOC from 300m to 0) at or below 6000ft
  - 5 buffer zones more than 6000ft

Initial approach segment

- Use as much as possible T or Y bar configuration
- Check minimum stabilization distances
- Maximum angle between initial and intermediate: 120°
- Maximum length : should not exceed 10 NM
- IAS 120 Kt, speed limitation of 90 kt is possible (operational requirement)
- Descent gradient :
  - Optimum: 6.5%
  - Maximum: 10%
    - Operational requirement: 13.2% (max IAS: 90 Kt)

Intermediate approach segment

- Should be aligned with the final segment. Maximum angle between intermediate and final: 60

  Note : Some on-board systems will not switch into the approach mode when the track change at the FAF is >30

- Length:
  - Max 10 NM
  - Optimum 3 NM
  - Minimum 2 NM

- IAS 120 Kt, speed limitation of 90 kt is possible (operational requirement)

- Descent gradient if necessary:
  - Maximum: 10%
  - Optimum: 6,5%
    - Operational requirement: 13.2% (max IAS: 90 Kt)

Final approach segment

- Max IAS in final
  - 90 kt or 70 kt ;

  The max speed for which the final and missed approach segments are designed must be clearly annotated on the chart

  Note : If the airspeeds above are not adequate, different airspeeds may be chosen for the design of procedures (airspeeds used in the design are annotated on the chart)

- No alignment requirements

- Descent gradient in final
  - Optimum 6,5% (3,7。)
  - Maximum 10,0% (5,7。)
  - If an operational imperative 13.2% (7,5。) magnitude of turn at FAF is less than 30。 and Max IAS : 70kt

- Optimum length of final *(FAF-MAPt)*
  - 3.2 NM
    - Minimum length is governed by the magnitude of turn at FAF (see CAT H chapter)

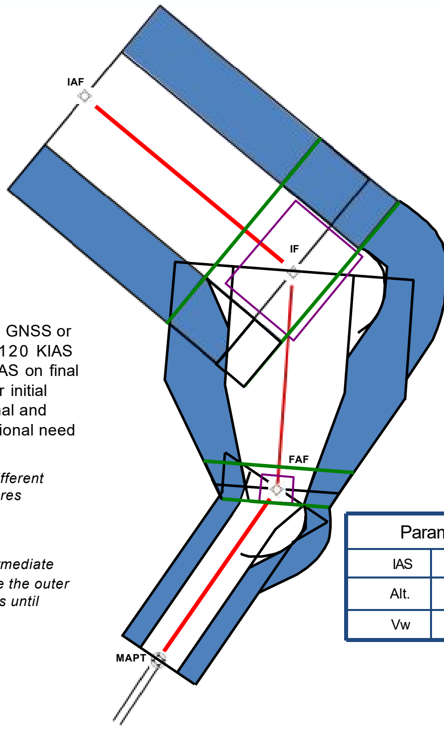
Interface INA/INT/FNA

Turn at IF
Turn at FAF

Helicopter point-in-space procedures based on GNSS or SBAS are designed using maximum speeds of 120 KIAS for initial and intermediate segments and 90 KIAS on final and missed approach segments, or 90 KIAS for initial and intermediate segments and 70 KIAS on final and missed approach segments based on operational need

Note1 : If the airspeeds above are not adequate, different airspeeds may be chosen for the design ofprocedures

Note2: If RNP 0.3 is used on all segments, the intermediate segment width applies until the nominal FAF, where the outer edges of the protection area converge at 30 degrees until reaching the final approach segment width



RNP APCH

½ AW	
INA	2.20 NM
FAF	1.15 NM
FNA	0.80 NM
API	1.85 NM

Paramètres	
IAS	90 kt
Alt.	2000 ft
Vw	39 kt

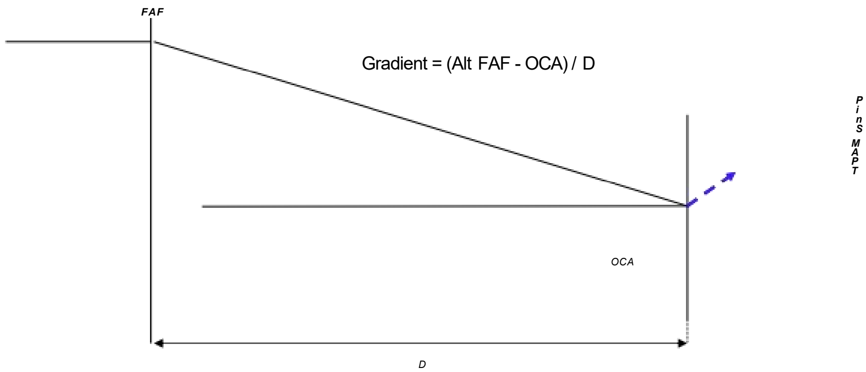
Final

- Optimum length: 3.2 NM
  - Max 10 NM
  - Minimum length :

Magnitude of turn over FAF The values in this table may be interpolated			
10° or less	20°	30°	60°
1	1.5	2	3

Computation of descent gradient in final

- To compute the descent gradient :
  - Vertical distance between FAF altitude and OCA
  - Horizontal distance between FAF and MAPt



Missed approach

- General criteria:
  - Missed approach segment begins at the earliest MAPt (flyover) position and ends at a holding point designated by an MAHF (flyover). Optimum routing is straight ahead to a direct entry into holding at the MAHF.
  - The transitional tolerance is 5s at IAS: 70 or 90 Kt (distance computed at TAS + 10 Kt)
  - Nominal missed approach climb gradient: 4.2%
  - MOC is 40m for final missed approach

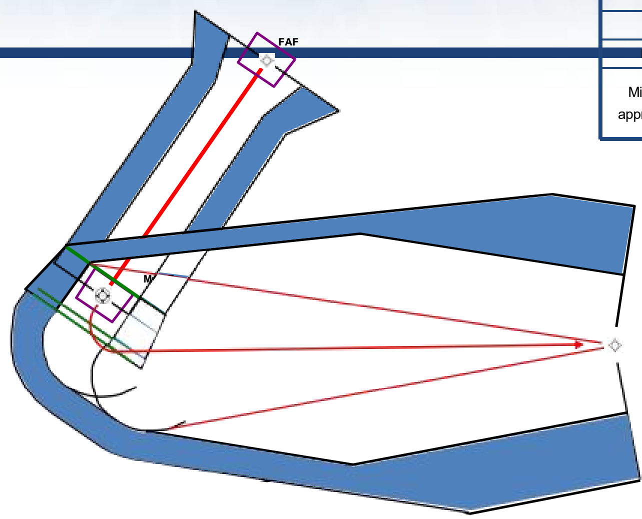
Note : If the airspeeds above are not adequate, different airspeeds may be chosen for the design of procedures (airspeeds used in the design are annotated on the chart)

Missed approach area

RNP APCH

½ AW	
INA	2.20 NM
FAF	1.15 NM
FNA	0.80 NM
Missed approach	1.85 NM

Turn at MAPT
more than 90。
DF to MAHF



Parameters	
IAS	90 kt
Alt.	2000 ft
Wind	30 kt

e: If RNP 0.3 is chosen on all segments, the area does not ay at the early MAPt and the final approach semi-width is ntained until 15 NM from the PinS

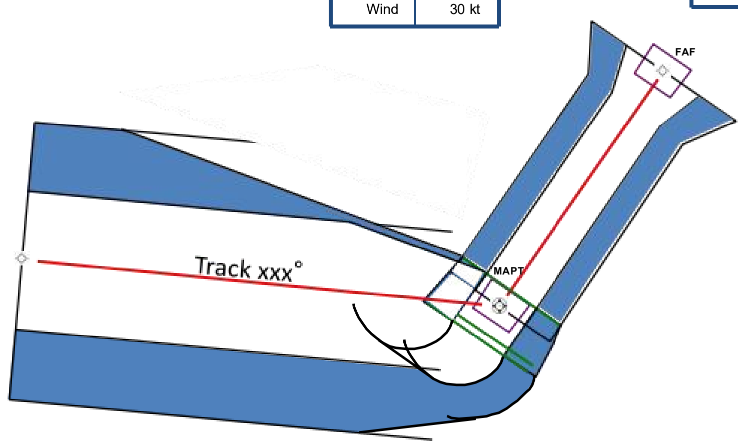
Missed approach area

RNP APCH

½ AW	
INA	2.20 NM
FAF	1.15 NM
FNA	0.80 NM
Missed	1.85 NM

Turn at MAPT
less than 90。
TF to MAHF

Parameters	
IAS	90 kt
Alt.	2000 ft
Wind	30 kt



Note: If RNP 0.3 is chosen on all segments, the area does not splay at the early MAPt and the final approach semi-width is maintained until 15 NM from the PinS

Visual segment

PinS approach: proceed visually

- The landing location shall meet the dimensions of the non-instrument heliport final approach and take-off area (FATO) and safety area (SA) as defined in Annex 14, Volume II (Visual FATO)
- Prior to the MAPt (PinS), the pilot shall decide to proceed visually to the landing location or to perform a missed approach (if the landing location or visual references associated are not visually acquired)

PinS approach: proceed visually

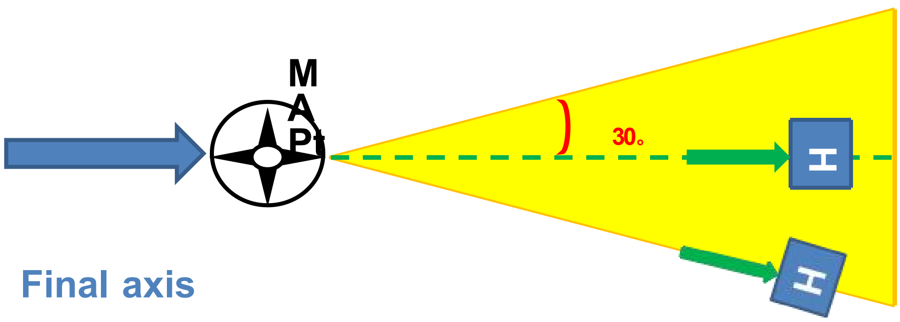
- From the MAPt and visually, the pilot manoeuvres around the heliport (or landing location) to land directly or from another direction (than MAPt/FATO).
- 3 types :
  - Direct visual segment ⇨ **Direct - VS**
  - Manœuvring visual segment ⇨ **Manoeuvring – VS**
  - Route Visual segment (prescribed track, no criteria for the moment)
- Visibility minima are based on the distance from the MAPt/PinS to the heliport or landing location for a Direct Visual segment and on other factors for manoeuvring visual segments

Proceed visually: « Direct - VS »

- From MAPt (PINS), pilot proceeds visually to the landing location
- This can be either direct to the landing location or via a descent point. This descent point (**DP**) is defined by track and distance from the MAPt. This DP is used to identify the end of that portion of the direct visual segment that should be flown at the MDA. Then, from this DP the final descent for landing should begin
- A Visual Segment Descent Angle (**VSDA**) is defined. It's the angle from the MDA at either the MAPt or DP to the landing location HRP at HCH. The nominal **VSDA** is *equal* to 8.3。 (14.6%)
- Track change is permitted at either the MAPt or the DP (if established) but not at both. The maximum track change is 30。
- Visual segment is protected by **OCS** (**O**bstacle **C**learance **S**urface) and **OIS** (**O**bstacle **I**dentification **S**urface**s**). OCS cannot be penetrated, and OIS are used to identify obstacles to publish
- Visual segment length : It depends on the Max IAS in the final approach segment of the instrument approach procedure
  - Maximum: 1.62 NM
  - Optimum : IAS 70 Kt ⇨ 0.65 NM ; IAS 90 Kt ⇨ 1.08 NM
  - Minimum : IAS 70 Kt ⇨ 0.54 NM ; IAS 90 Kt ⇨ 0.85 NM

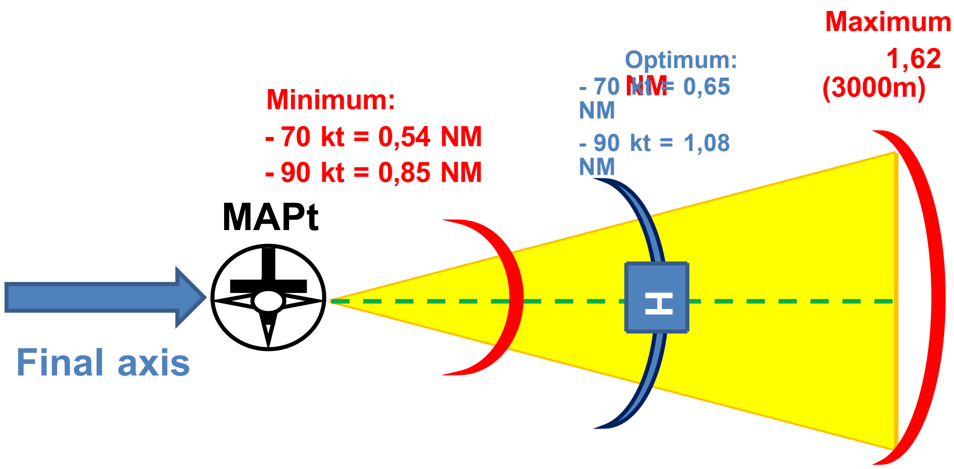
Direct - VS

FATO must be seen from MAPt (or DP) with angle ≤ 30。



Direct - VS

Length of segment



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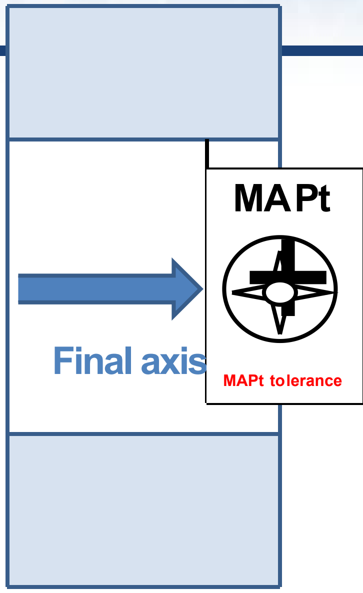
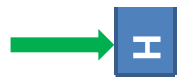
Direct - VS

Connect MAPt and FATO:

OCS: exclusion

OIS: information

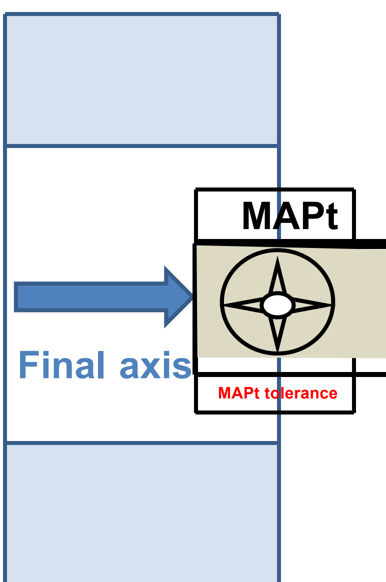


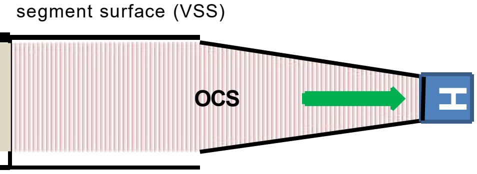


Direct - VS

1. **OCS** (sloping and level)

The OCS is continued from MAPt to the landing location and is similar to an OLS provided in Annex 14, VOL II, and a visual segment surface (VSS)





The OCS is aligned symmetrically on the course between HRP / MAPt The OCS originates at the outer edge of the landing location SA

The width of the OCS at its origin is equal to the width of the SA

The elevation of the origin of the OCS is equal to the landing location elevation

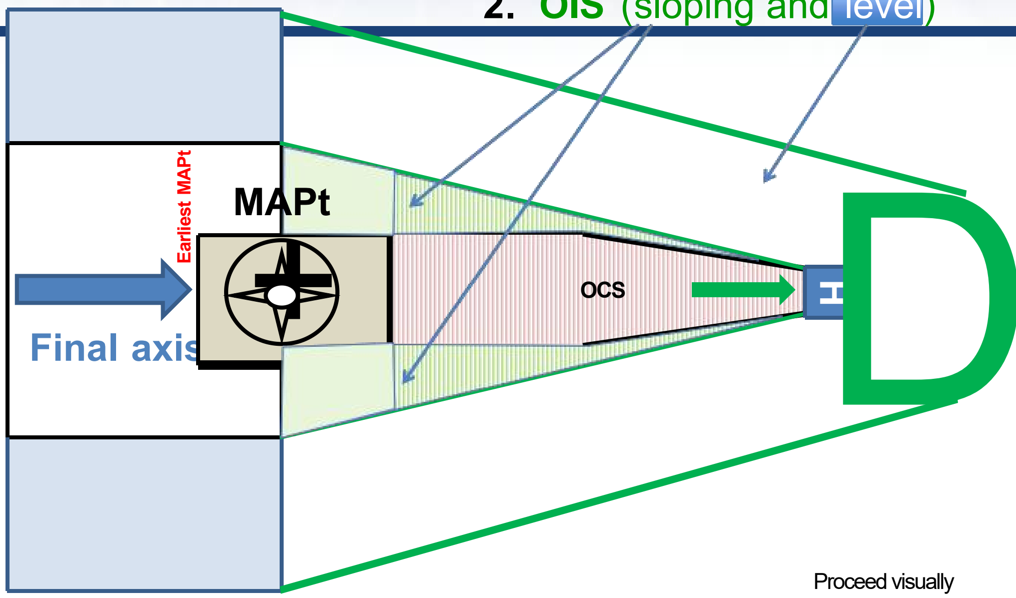
The OCS slopes upward at nominally 12.5% from the heliport elevation to the point where the surface reaches the altitude of the OCA minus the MOC established for the final approach segment

Proceed visually

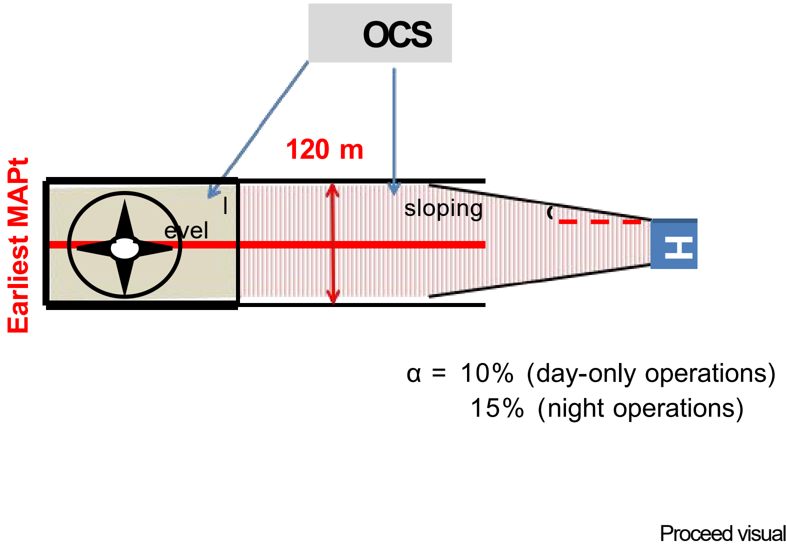
0

Direct - VS

2. OIS (sloping and level)



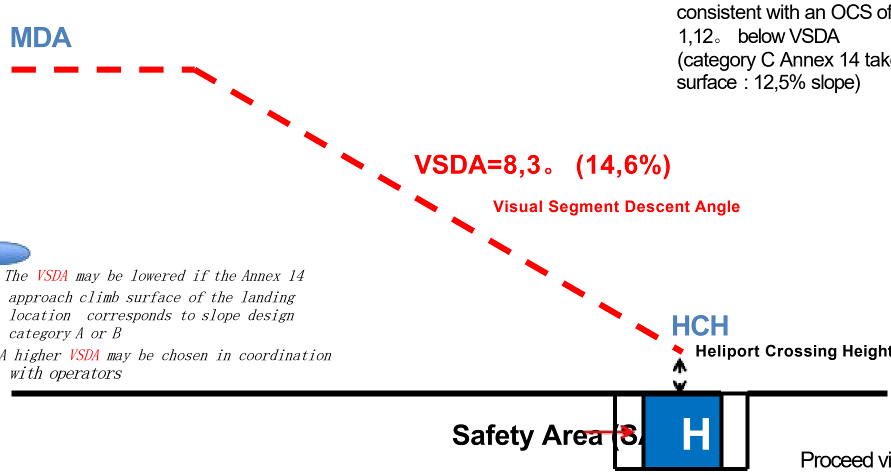
Direct - VS



Direct - VS : VSDA

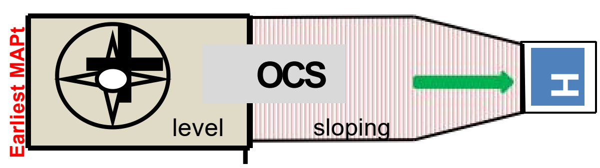
The VSDA is the Visual Segment Descent Angle. The visual segment descent angle is the angle from the MDA at the MAPt (or DP) to the landing location HRP at HCH.

The nominal VSDA is 8,3。 . This is consistent with an OCS of 1,12。 below VSDA (category C Annex 14 take-off climb surface : 12,5% slope)

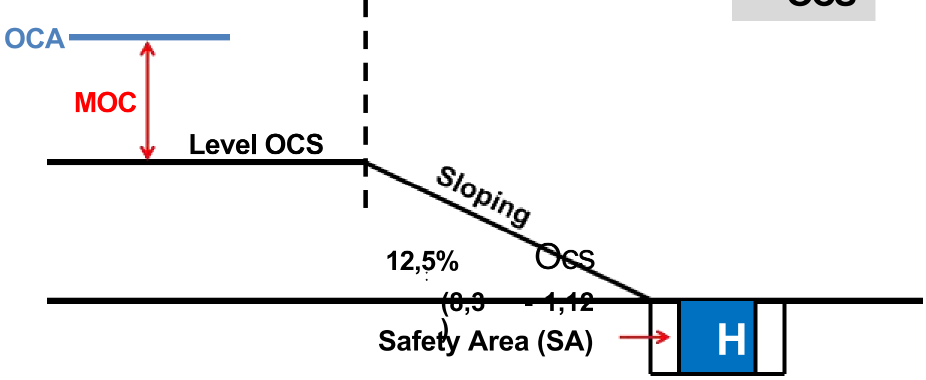


- *The VSDA may be lowered if the Annex 14 approach climb surface of the landing location corresponds to slope design category A or B*
- *A higher VSDA may be chosen in coordination with operators*

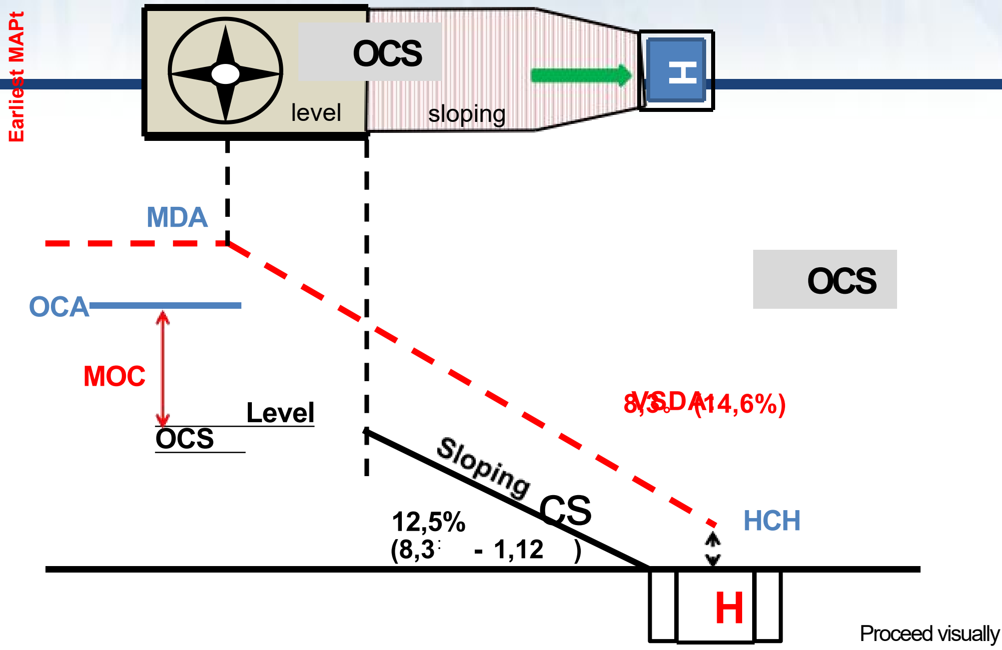
Direct - VS



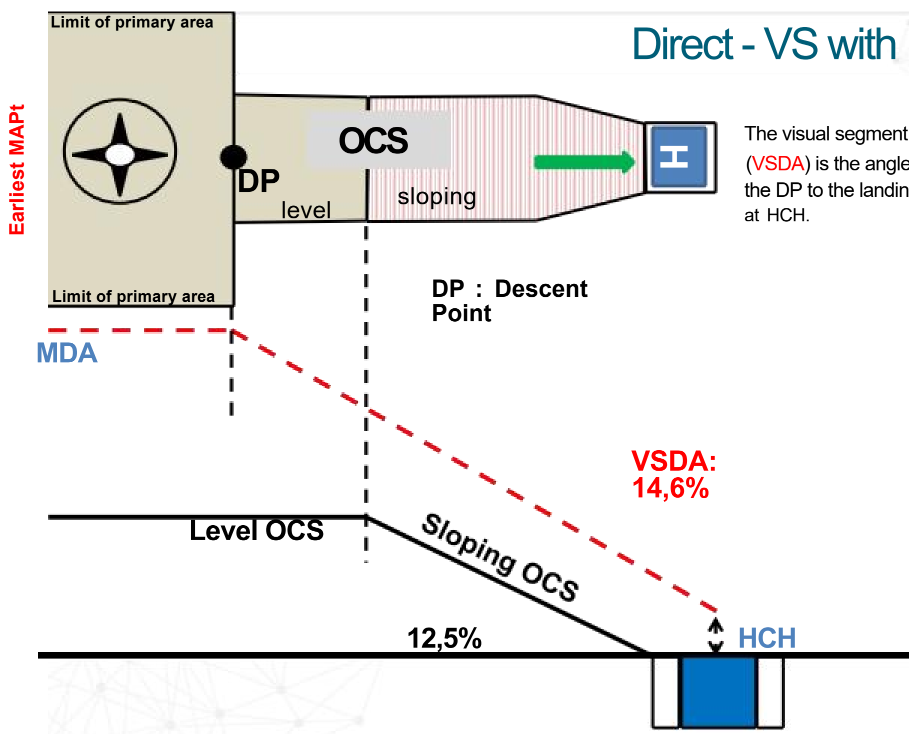
OCS



Direct - VS without DP

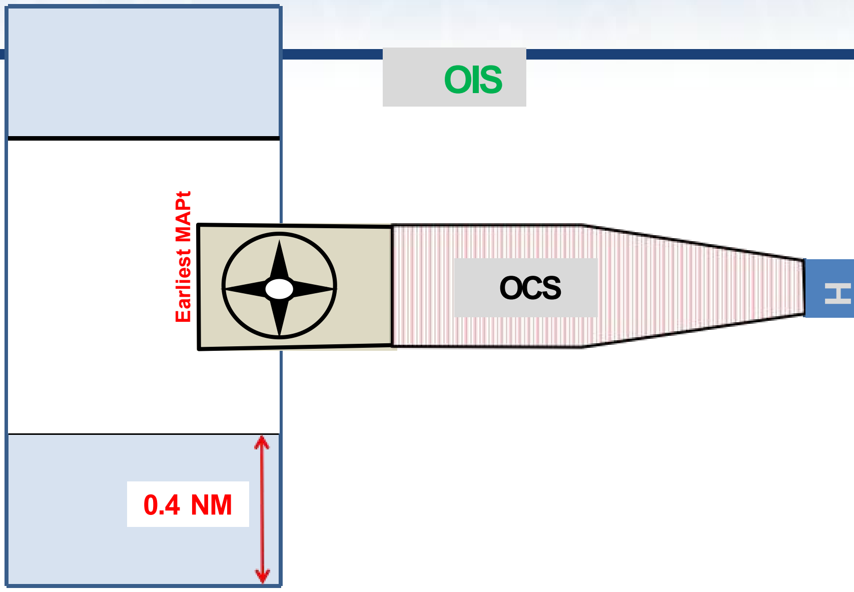


Direct - VS with DP



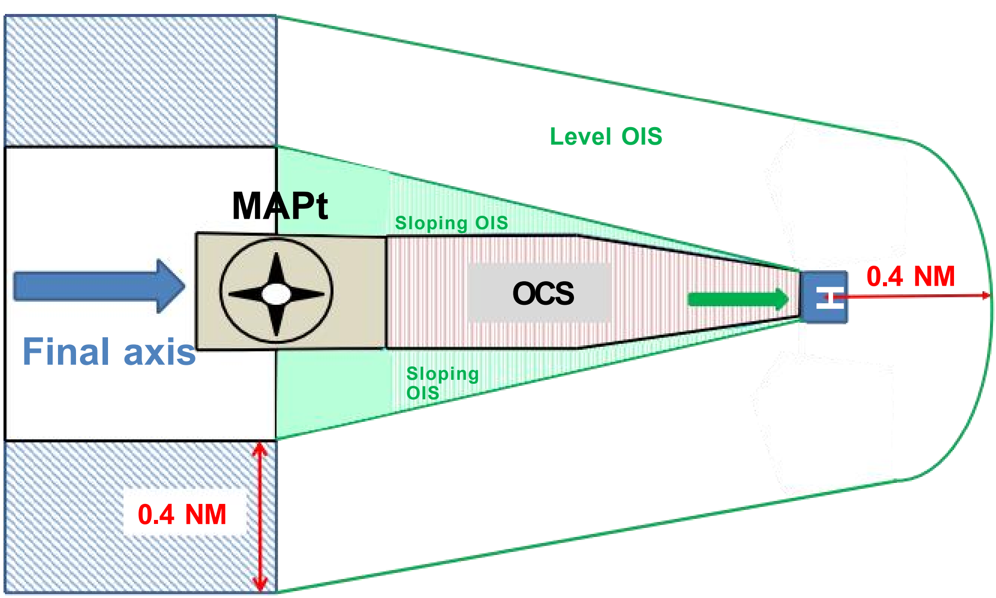
The visual segment descent angle (VSDA) is the angle from the MDA at the DP to the landing location HRP at HCH.

Direct - VS



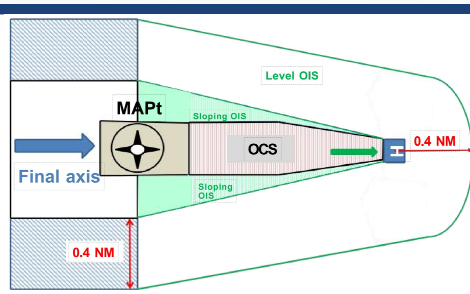
The inner and outer edges of each sloping OIS rises in the vertical plane at the same gradient as the OCS

Direct - VS



Proceed visually

0



Altitude level OIS: OCA for the instrument approach procedure minus 30 m

sloping OIS is climbing as the **sloping OCS**. (climbing up to OCH minus MOC then flat)

Direct-VS without DP and without course change

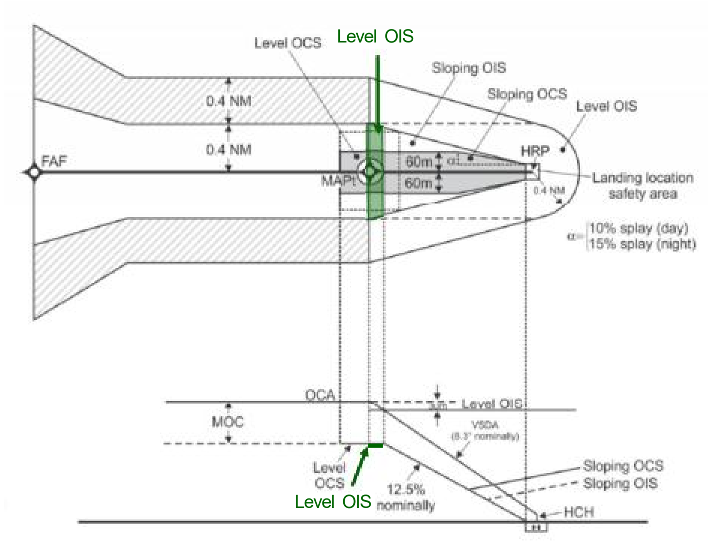
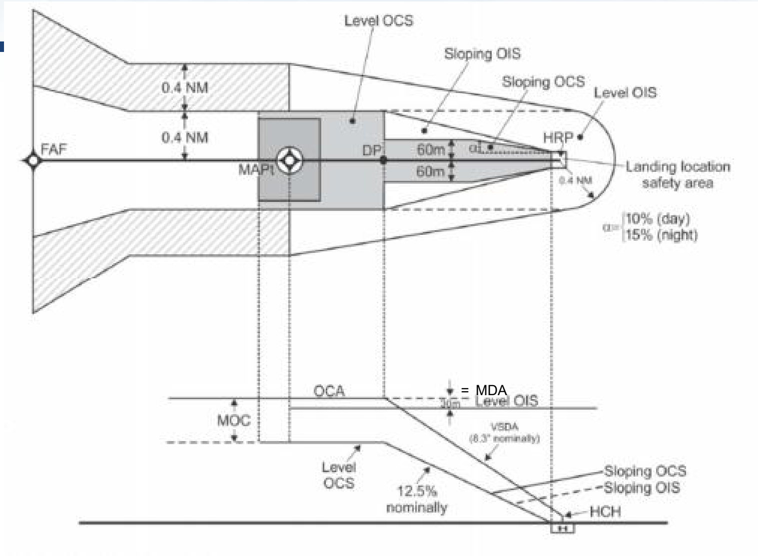


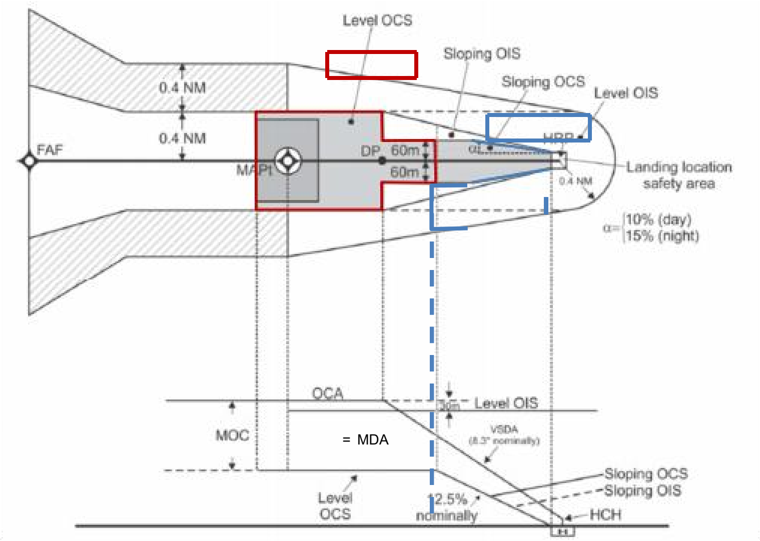
Figure IV-2-5. Direct-VS without DP and without course change

Proceed visually

Direct-VS with DP and without course change

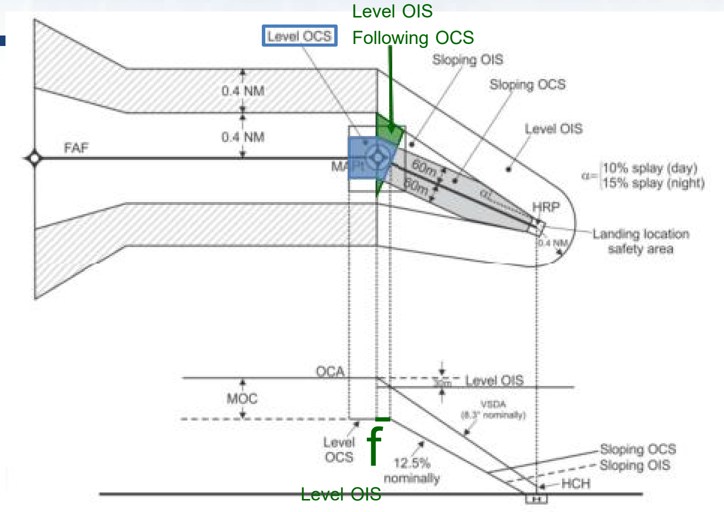


Direct-VS with DP and without course change

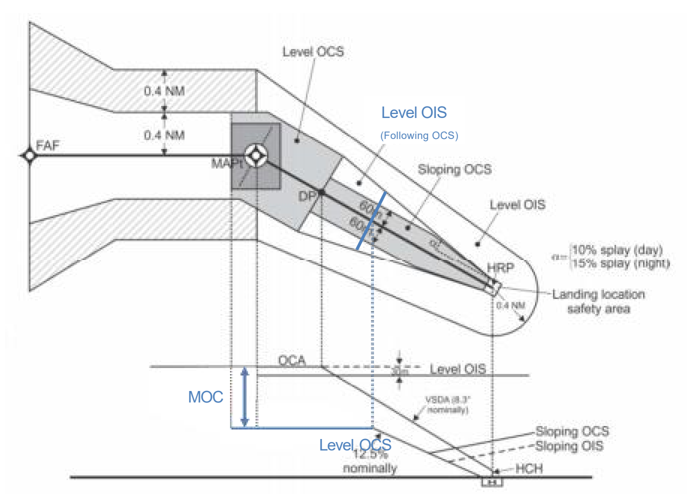


Proceed visually

Direct-VS without DP and with 30。 course change at MAPt

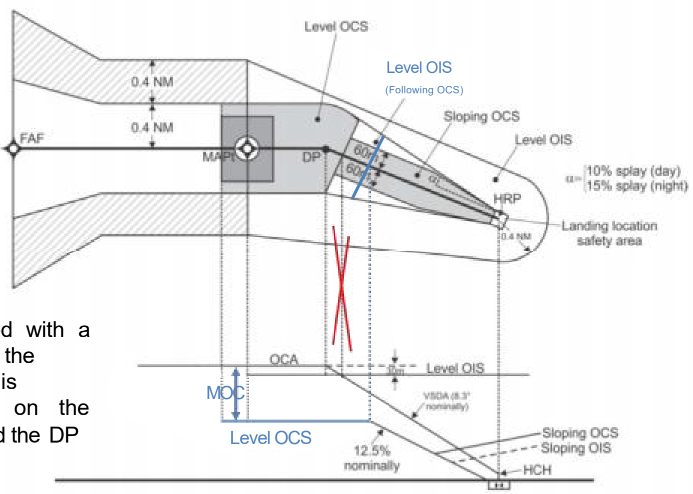


Direct-VS with DP and with 30。 course change at MAPt



Proceed visually

Direct-VS with DP and with 30。 course change at DP



If a DP is established with a change of track at the DP, the OCS is aligned symmetrically on the course between the HRP and the DP

Direct - VS

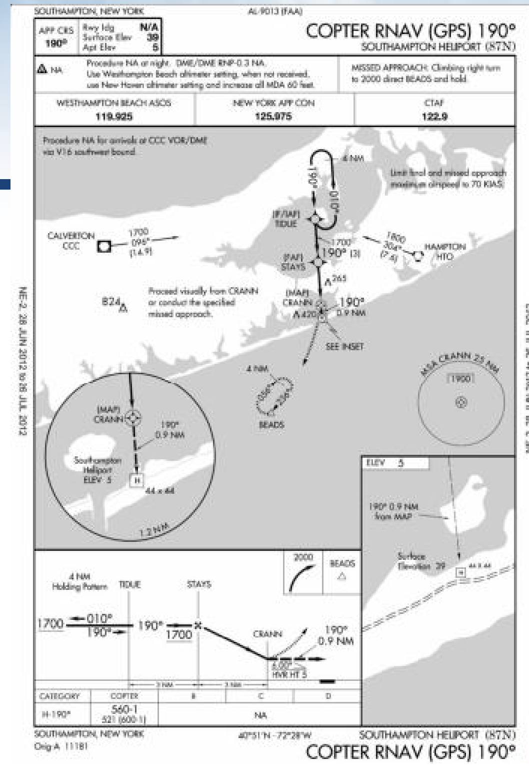
No obstacles shall penetrate the Direct-VS OCS.

Obstacles that penetrate the OIS (sloping or level) shall be documented and should be charted.

Proceed visually

Direct - VS

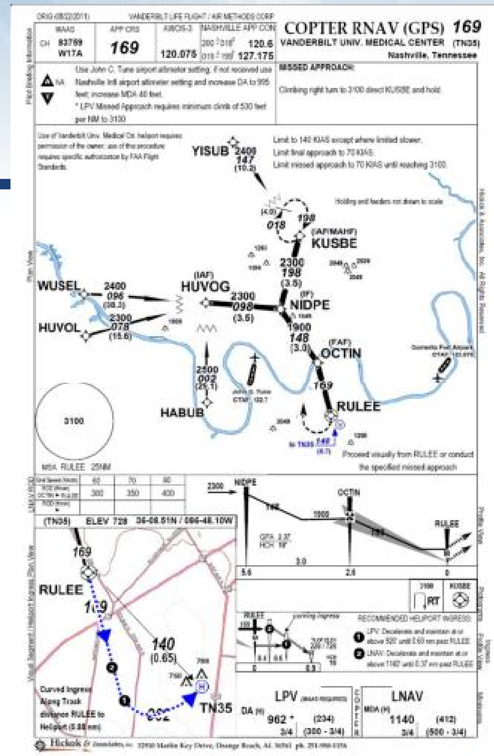
« SOUTHAMPTON »
Direct VS without DP and without course change



Visual Segment

« Route Visual

Segment »



Example
future development of criteria

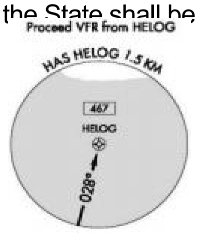
PinS approach: proceed VFR

- A PinS "proceed VFR" is an instrument approach procedure developed for heliports and landing locations that may not meet the standards for a visual FATO or where PinS "proceed visually" criteria cannot be met

- Beyond the MAPt, the visibility required is the visibility published on the chart, or VFR minima required by the class of airspace, or State regulations, whichever is higher. If this visibility is not acquired at or prior to the MAPt the pilot has to perform a missed approach
  - The pilot shall remain in VFR conditions after departing the MAPt. The pilot is responsible to see and avoid obstacles, and shall cancel IFR at the MAPt

PinS approach: proceed VFR

- There is no protection beyond the PinS. The pilot is responsible to see and avoid obstacles when proceeding from the MAPt to the heliport or landing location. a HAS (Height Above Surface) diagram shall be charted. The HAS diagram is centred on the MAPt and depicts the course into the MAPt. The radius of the HAS diagram, centred on the MAPt of the PinS approach procedure with a "proceed
VFR" instruction, is at least 1.5 km (0.8 NM). The difference in height between the OCA and the elevation of the highest terrain or water within 1.5 km (0.8 NM), or other higher value required by the State shall be charted. The inbound course to the MAPt shall also be charted

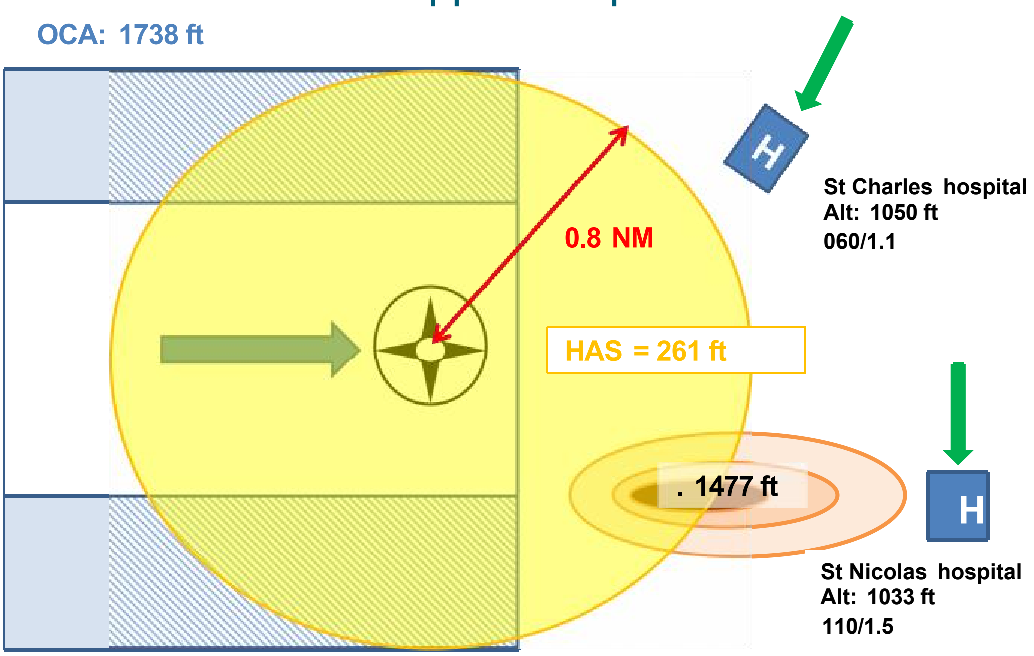


Note: *This minimum radius may be increased depending on State-specific requirements for helicopter VFR operations*

Note : diagram is charted to assist the pilot in the transition from IFR to VFR at the MAPt

Proceed VFR

PinS approach: proceed VFR



Proceed VFR

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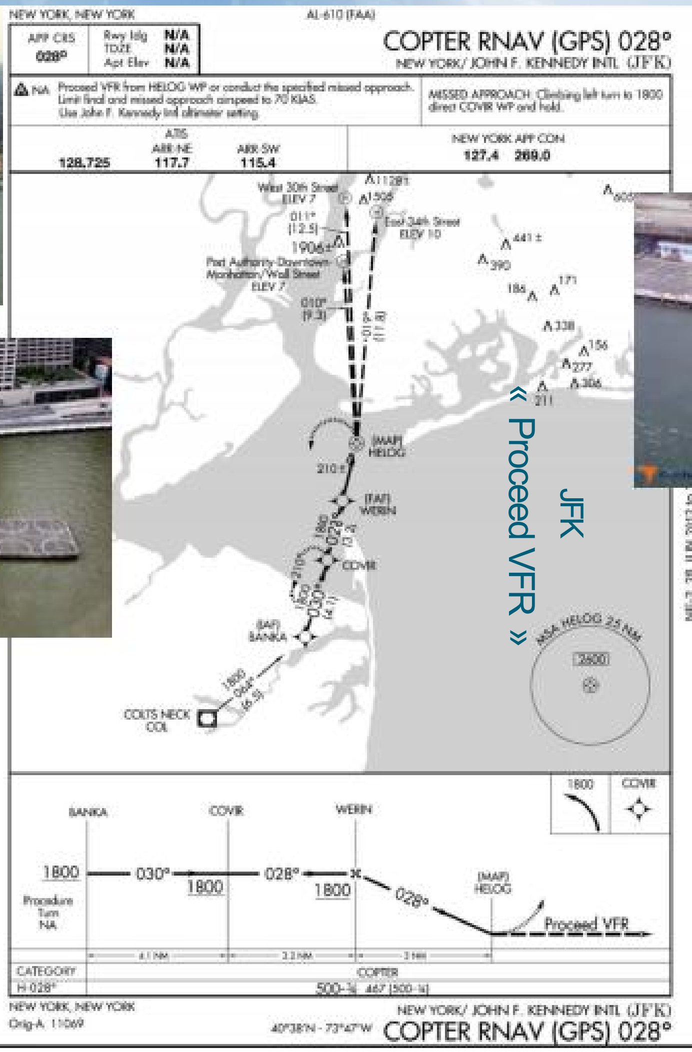
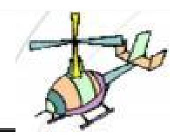
West 30th Heliport (JFK)


NEW YORK, NEW YORK
AL-610 (FAA)
APP CRS 028°
Rwy Idg N/A
TDZE N/A
Apt Elev N/A
COPTER RNAV (GPS) 028°
NEW YORK/ JOHN F. KENNEDY INTL (JFK)
NA Proceed VFR from HELOG WP or conduct the specified missed approach. Limit final and missed approach airspeed to 70 KIAS. Use John F. Kennedy Intl altimeter setting.
MISSED APPROACH: Climbing left turn to 1800 direct COVIR WP and hold.
ATIS 128.725
ARR NE 117.7
ARR SW 115.4
NEW YORK APP CON 127.4 269.0
West 30th Street ELEV 7
East 34th Street ELEV 10
Port Authority-Downtown Manhattan/Wall Street ELEV 7
(MAP) HELOG
(FAF) WERIN
COVIR
(IAF) BANKA
COLTS NECK COL
MSA HELOG 25 NM
2600
« Proceed VFR »
JFK
BANKA
COVIR
WERIN
1800
030°
028°
Procedure Turn NA
(MAP) HELOG
Proceed VFR
CATEGORY
H-028°
COPTER
500-¾ 467 (500-¾)
NEW YORK, NEW YORK
Orig-A 11069
40°38'N - 73°47'W
NEW YORK/ JOHN F. KENNEDY INTL (JFK)
COPTER RNAV (GPS) 028°



Proceed VFR