Instrument Procedure Design Helicopters criteria

LU LI
2026.05

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

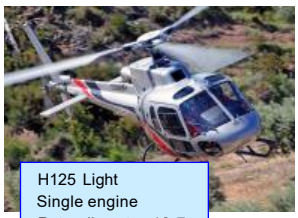
- Drawbacks of flying VFR
  - No operation in adverse weather conditions
  - Very restrictive for night (high visibility needed)
  - Difficult to integrate in dense airspace, in busy airports

- 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

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

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

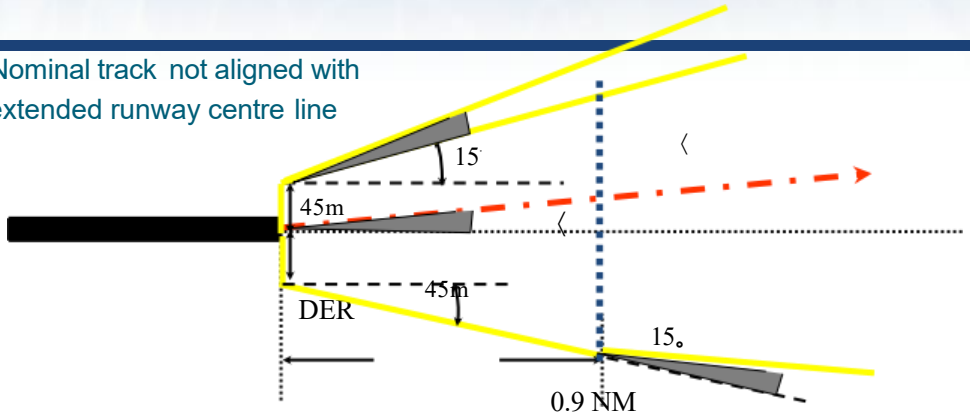
Helicopter instrument flight is relatively new when compared to airplane instrument flight. Helicopter instrument approach procedures have to be developed to take advantage of advances in both avionics and helicopter technology

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

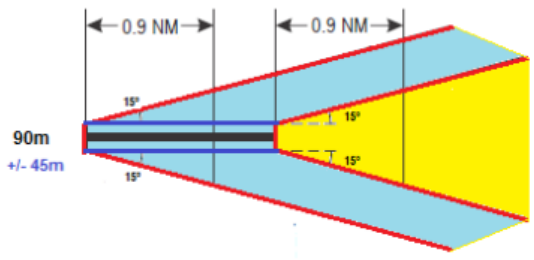
Nominal track not aligned with extended runway centre line



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

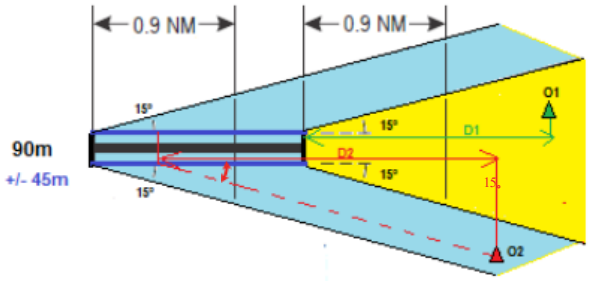
Departure

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)

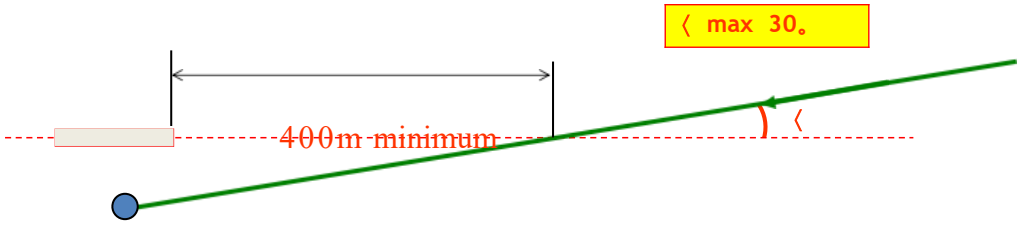
Intermediate approach (I-4-4)

- 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

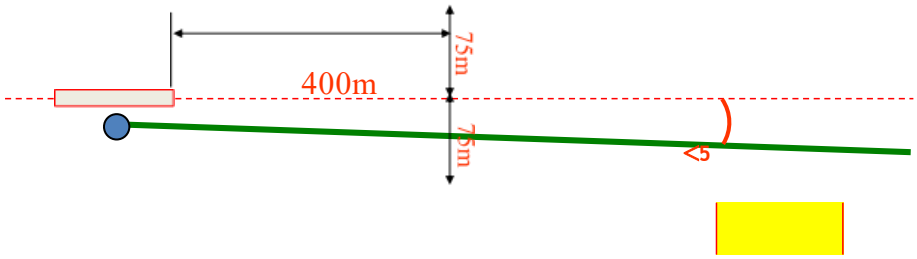
Final approach track **intersects** axis **before** FATO



Final approach: Alignment

- Straight-in approach

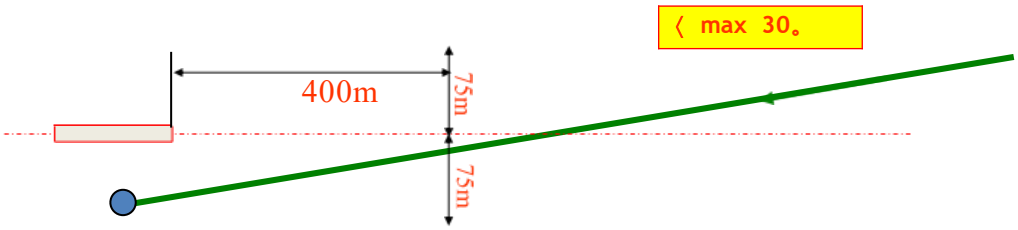
Final approach track **does not intersect** runway axis **before** FATO



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

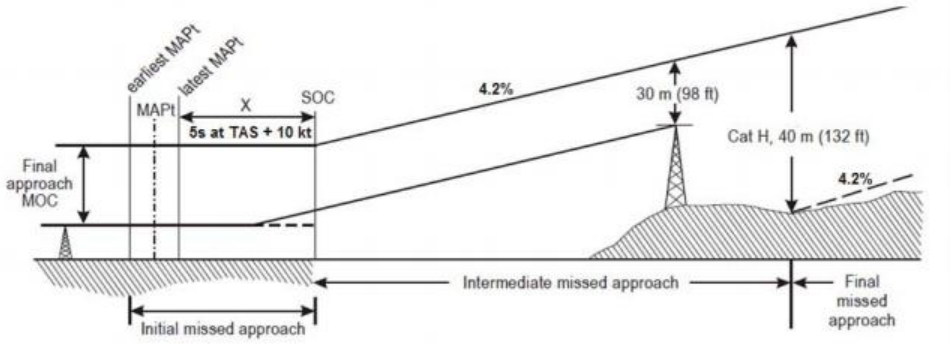
- Minimum descent gradient: 5.2%
- Maximum descent gradient: 10%
  - However, where an operational need exists and the magnitude of turn

    at the FAF is less than or equal to 30° , a gradient of as much as13.2 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

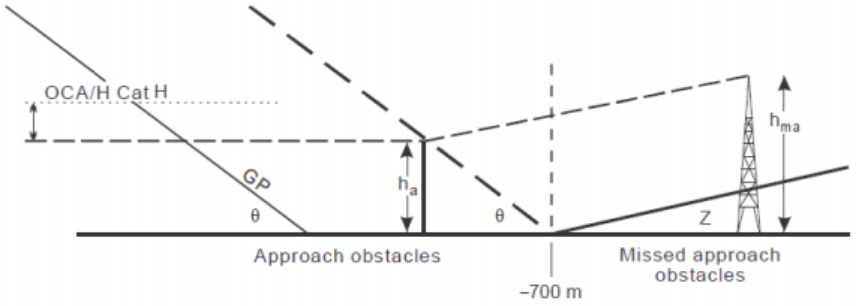
$$H_{eq} = \frac{h_{ma} \cot Z + (x - x_z)}{\cot Z + \cot \theta}$$

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

RNAV, concept (III-1-1)

- Buffer values , **BV**

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

GNSS RNAV
(III-1-2)

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)

L1= r1.sin √

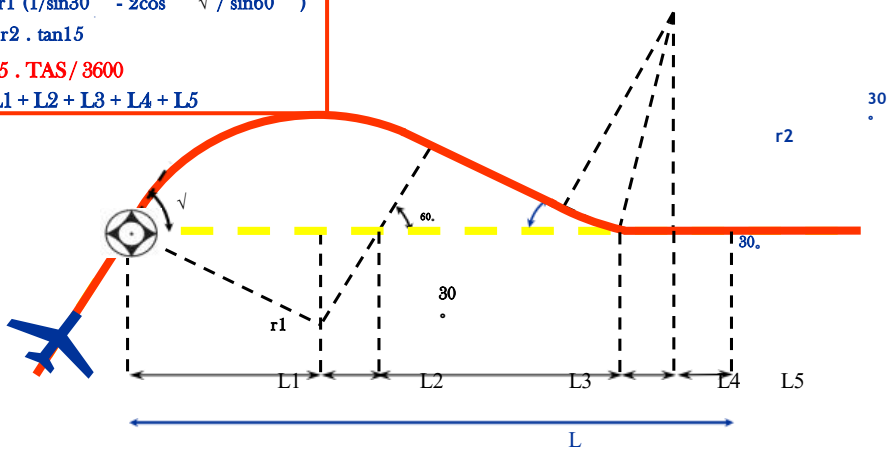
L2= r1.cos √ .tan30°

L3 = r1 (1/sin30° - 2cos √ / sin60°)

L4 = r2 . tan15

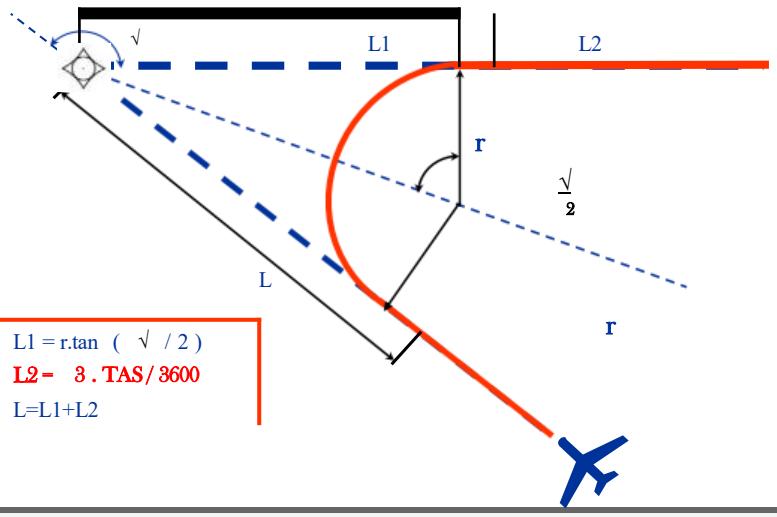
L5 = 5 . TAS / 3600

L = L1 + L2 + L3 + L4 + L5



RNAV, minimum stabilization distance

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



L1 = r.tan (√ / 2)

L2 = 3 . TAS / 3600

L=L1+L2

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)

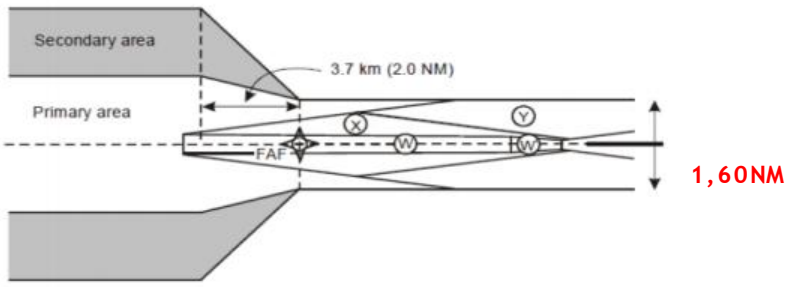
- Initial segment
  - for GNSS the optimum length is 3 NM
- Intermediate segment
  - Should be aligned with the final.
    - For NPA, if a turn at FAF is required it shall not exceed **60**
    - For BaroVNAV, if a fly-by turn at FAF is required it shall not exceed **30**

- 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



- Equivalent obstacle formula

  - APV I xz = - 1000 m

  - SBAS CAT I xz = - 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~~ •z

~~- APV 1: X_z = -(700 + (38/tg θ) + 50(θ - 3.5。) / 0.1。)~~

~~- SBAS CATI : X_z = -(700 + 50(-3.5。) / 0.1。)~~

APPROCHE AUX INSTRUMENTS
Instrument approach

ANGOULEME BRIE CHAMPNIERS

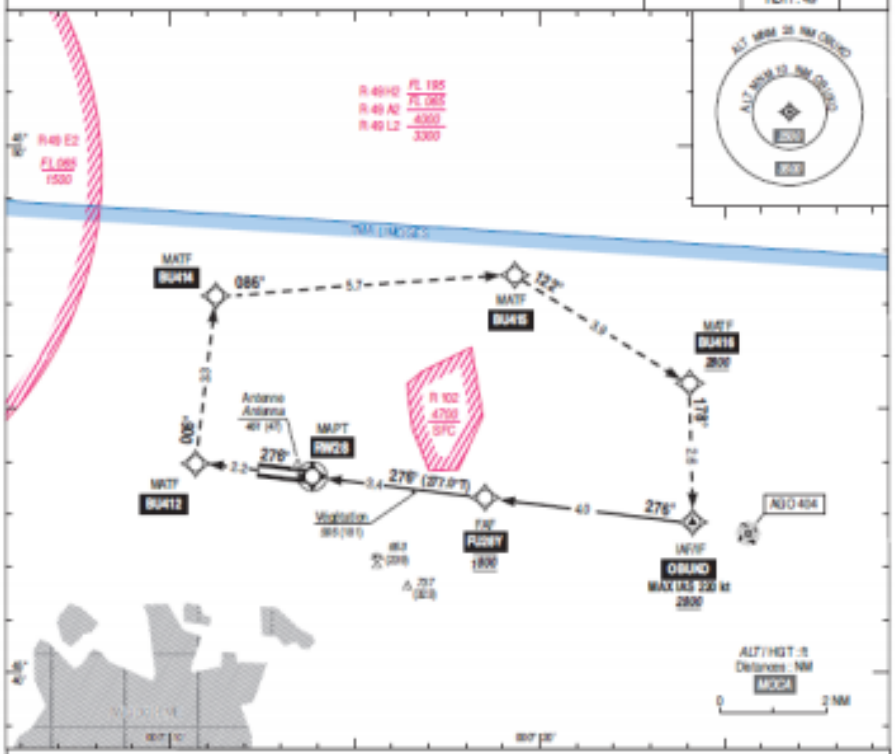
CAT H

ALT AD : 436, THR : 414 (15 hPa)

RNP Y RWY 28

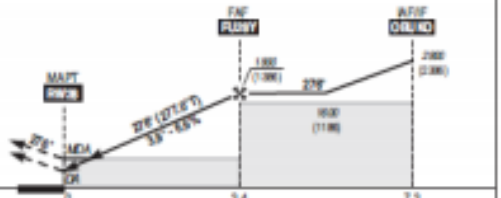
APP : LIMOGES Approche/Approach 118.080
TWR : NIL
AFIS : ANGOULEME Information 123.150

RNP APCH	EGNOS Ch 96274 E28'8 RDH : 49	VAR 1°E (20)



API : Monter vers **BU412**, puis tourner à **droite** vers **BU414**, puis à **droite** vers **BU415**, puis vers **BU416** et vers **OBUKO** en montée vers **2800** (2386) ou suivre les instructions du contrôle.

*Missed APCH: Climb to **BU412**, then turn **right** to **BU414**, then turn **right** to **BU415**, then to **BU416** and to **OBUKO** climbing up to **2800** (2386) or proceed according to ATC.*



WNM AD : distances verticales en pieds, RVR et VIS en mètres / vertical distances in feet, RVR and VIS in metres. REF HGT : ALT THR

H/C	LPV			LNAV			DIST RW28		
	DA (H)	RVR	OCH	MDA (H)	RVR	OCH	NM	2	3
H	529 (200)	550	160	880 (460)	1000	450	ALT (HGT)	1250 (836)	1650 (1236)

Observations / Remarks : Panne de guidage GNSS lors de l'approche / Loss of GNSS guidance during approach : voir / see AIP ENR 1.5

		60 kt	65 kt	70 kt	75 kt	80 kt	85 kt	90 kt
FAF - RW28	3.4 NM	3 min 23	3 min 07	2 min 54	2 min 42	2 min 32	2 min 23	2 min 15
VSP (ft/min)		400	435	485	500	520	565	600

IFR procedures for helicopters

APPROACH
« PinS Approach »

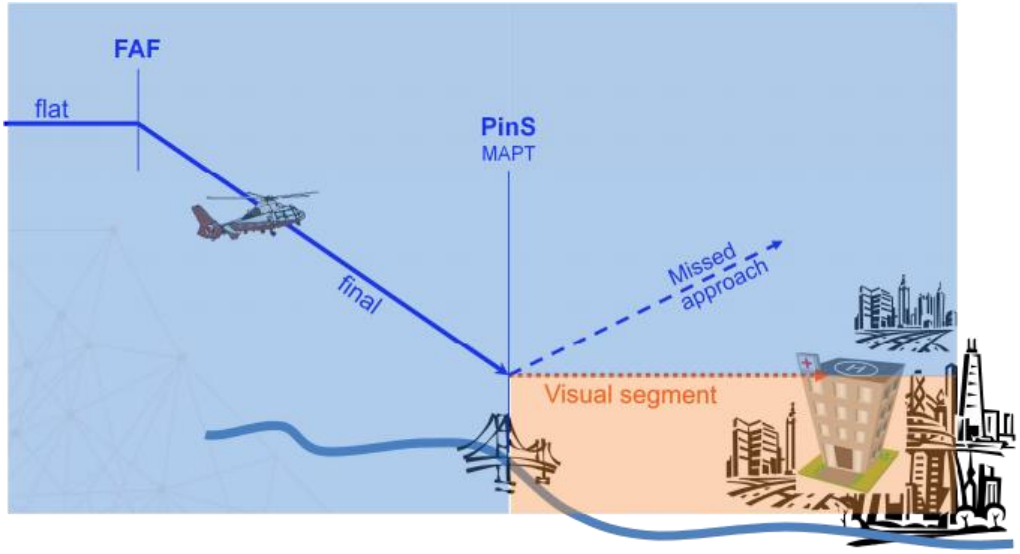
Contents

- 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**

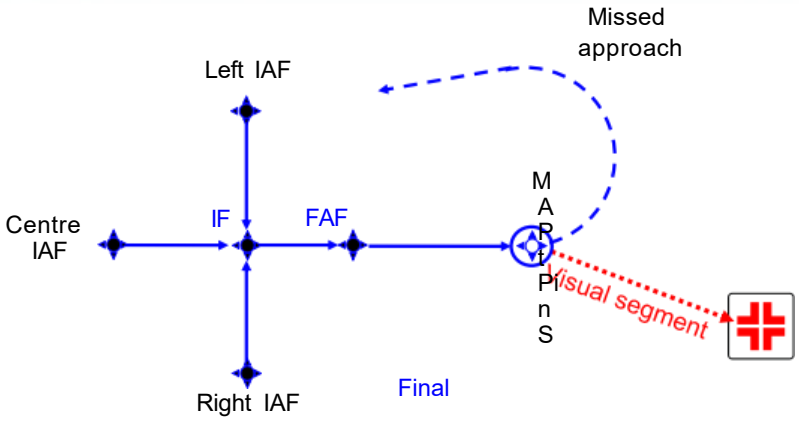
- The PinS approach procedure consists of an instrument segment followed by a visual segment.
- The point-in-space approach is based on a basic GNSS non-precision approach procedure. The final approach segment ends at a reference point located to allow landing using visual manoeuvres.
  - Procedures 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



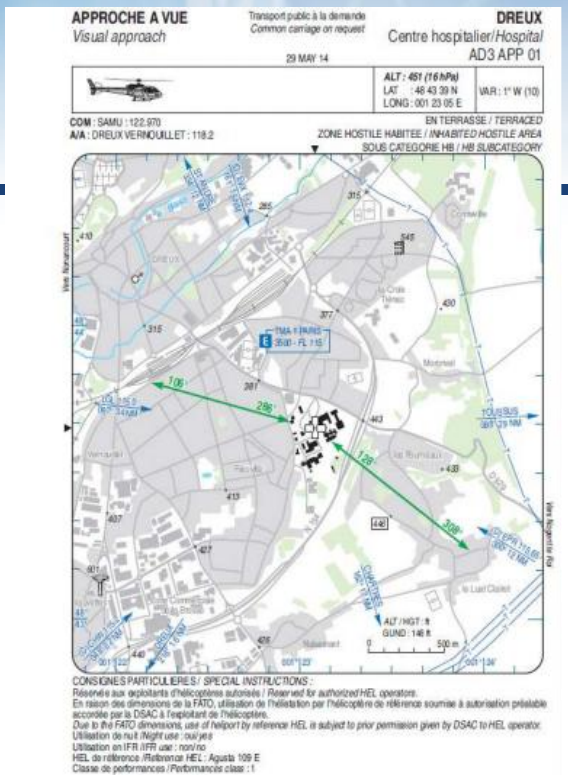
General geometry of PinS approach

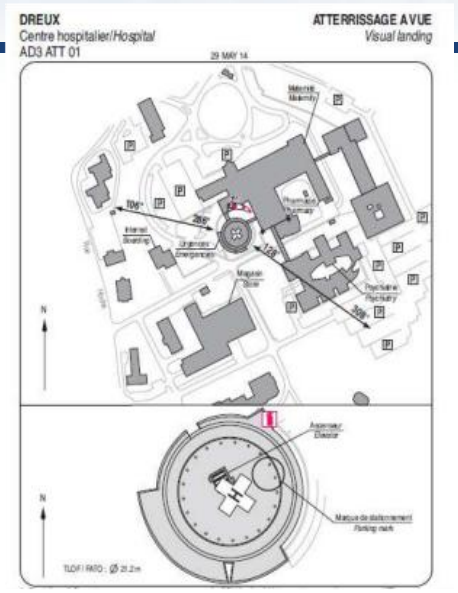
T or Y bar



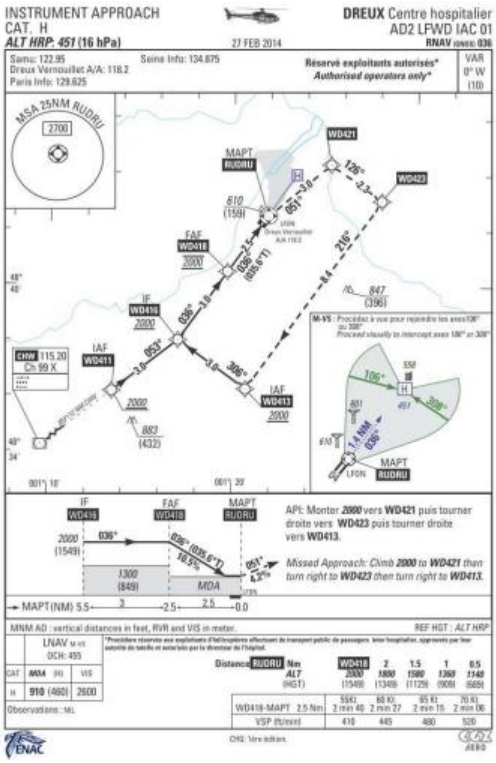
Example :

DREUX procedures

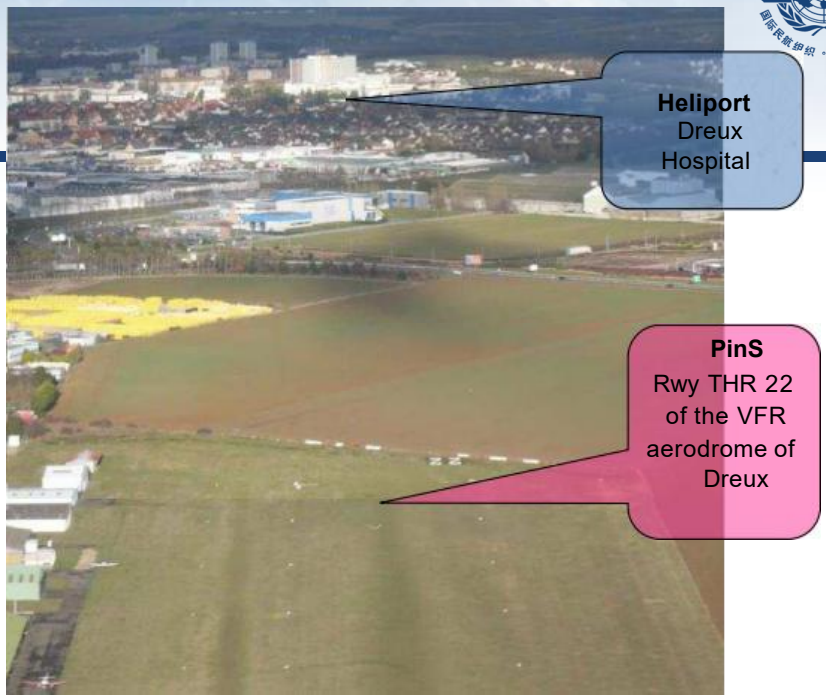




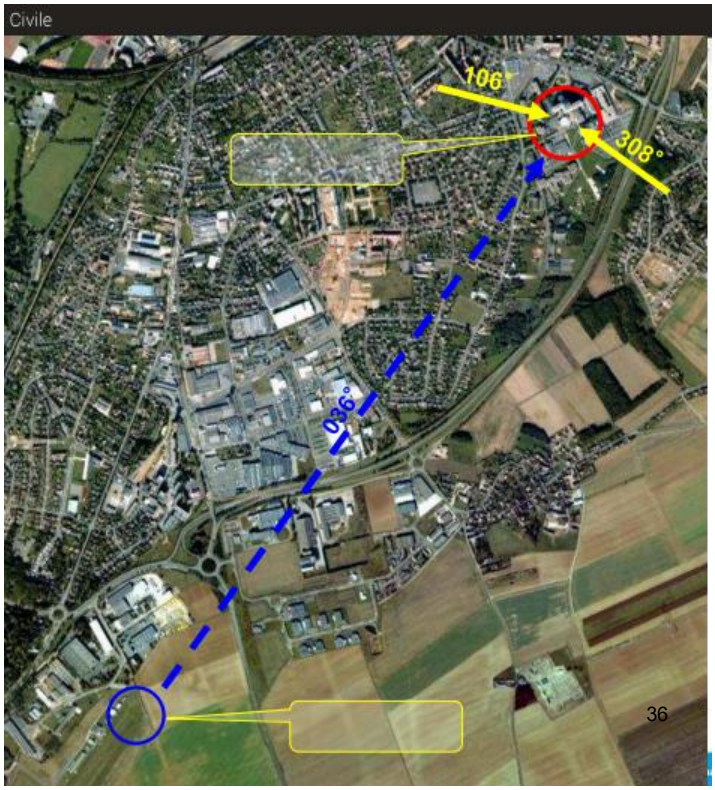
Approach chart Dreux



PinS Dreux

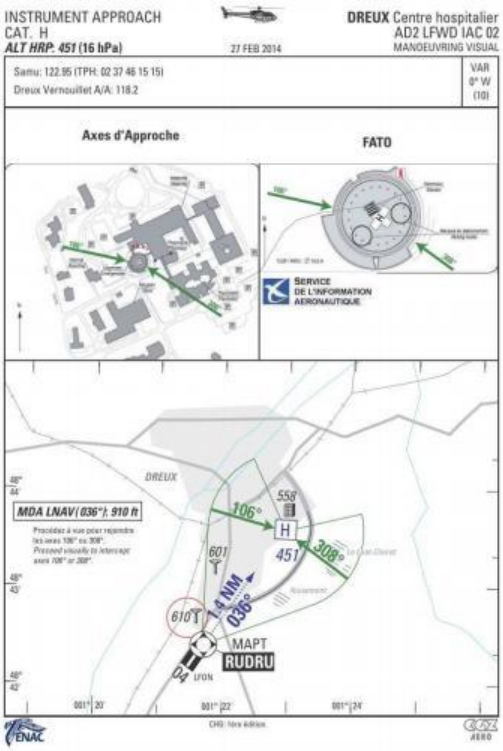


Visual Segment Dreux



Approach chart
Dreux

Visual phase

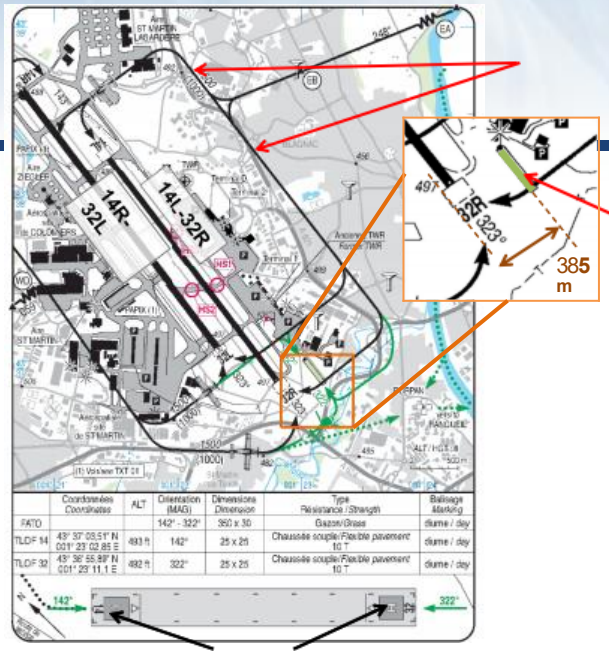


Example :

Procedures in TOULOUSE

Simultaneous Non Interfering procedures

V.A.C.
TOULOUSE



Toulouse Blagnac

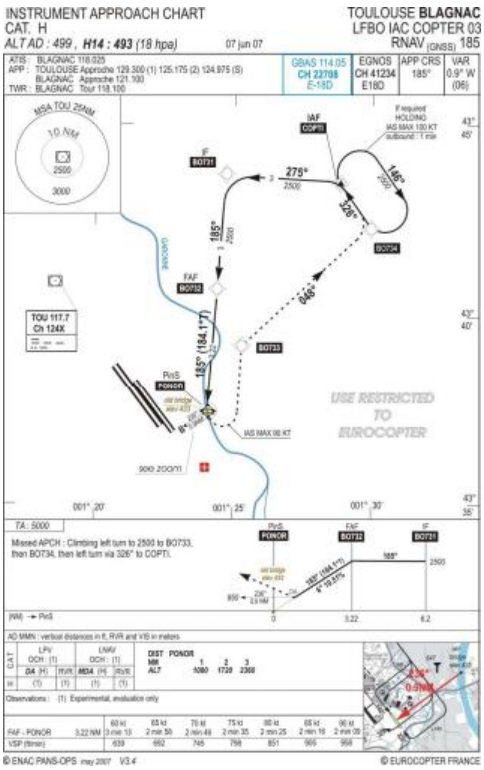
RNAV GNSS 185

(PinS = bridge = MAPt)

2007 : 1st project

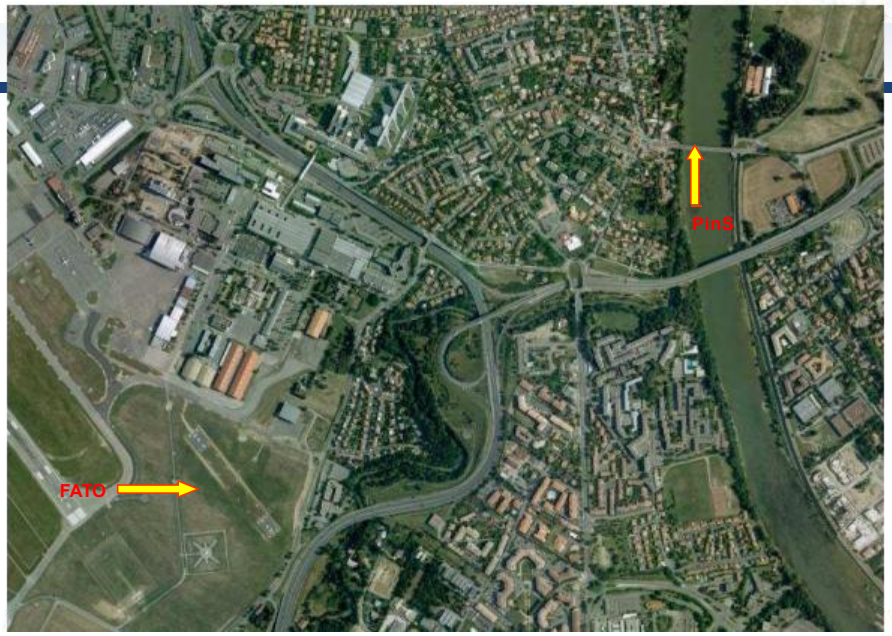
LNAV

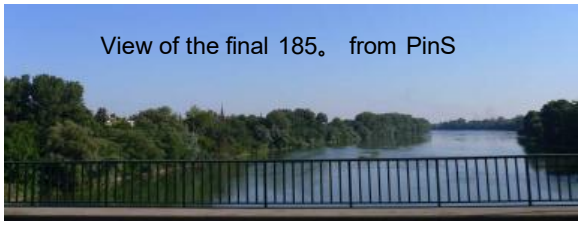
LPV



38

Toulouse Blagnac PinS 185

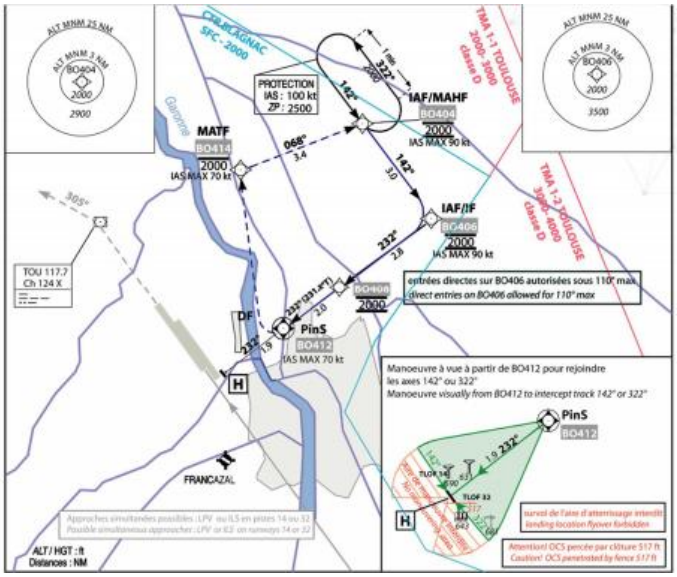




Toulouse Blagnac
PinS 185

Toulouse Blagnac
RNAV GNSS 232

2015 : 2nd project
LPV only



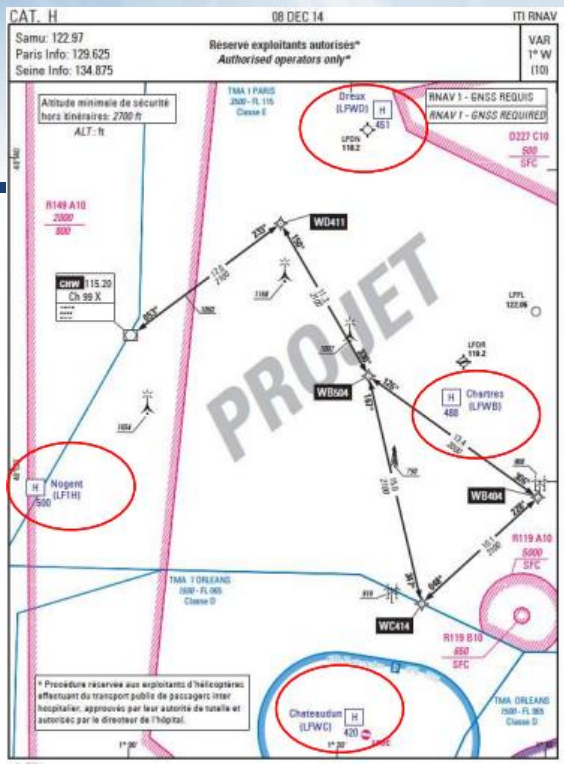
- Low level IFR routes optimized helicopter operations.
- These routes integrated into the airspace system utilizes flight levels where icing conditions are not normally experienced and where a pressurized cabin or oxygen would not be required.

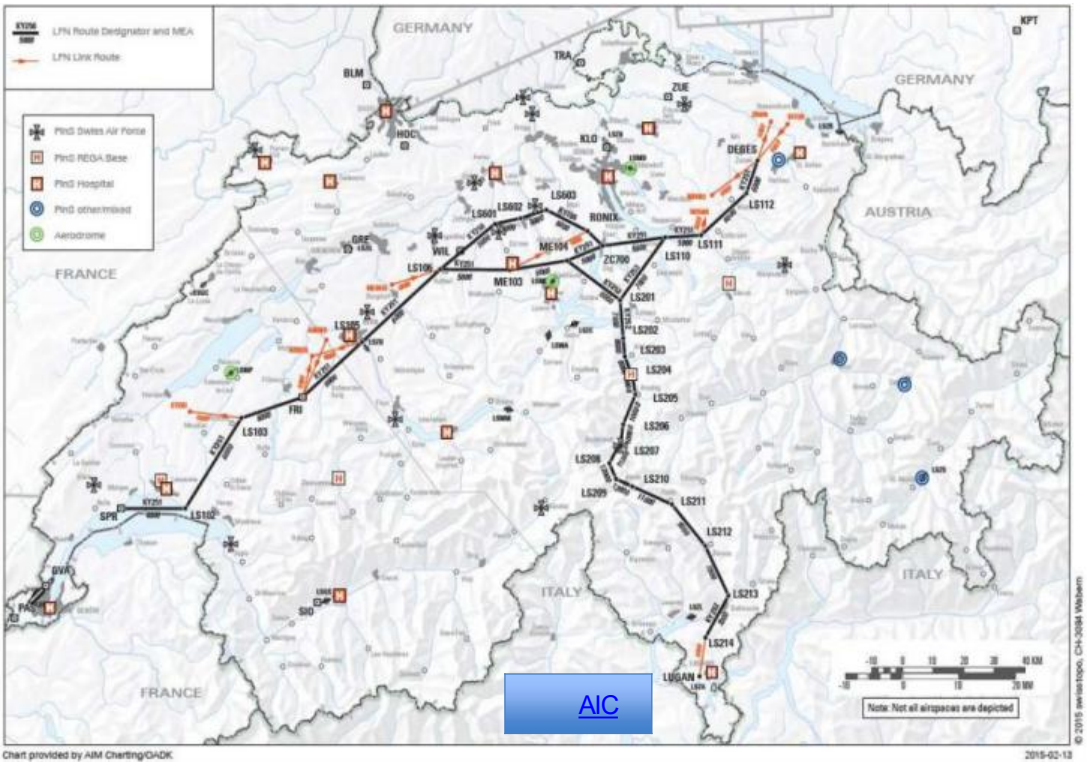
En-Route Phase, HEMS connection:

- Dreux
- Chartres
- Châteaudun
- Nogent

TMA class E

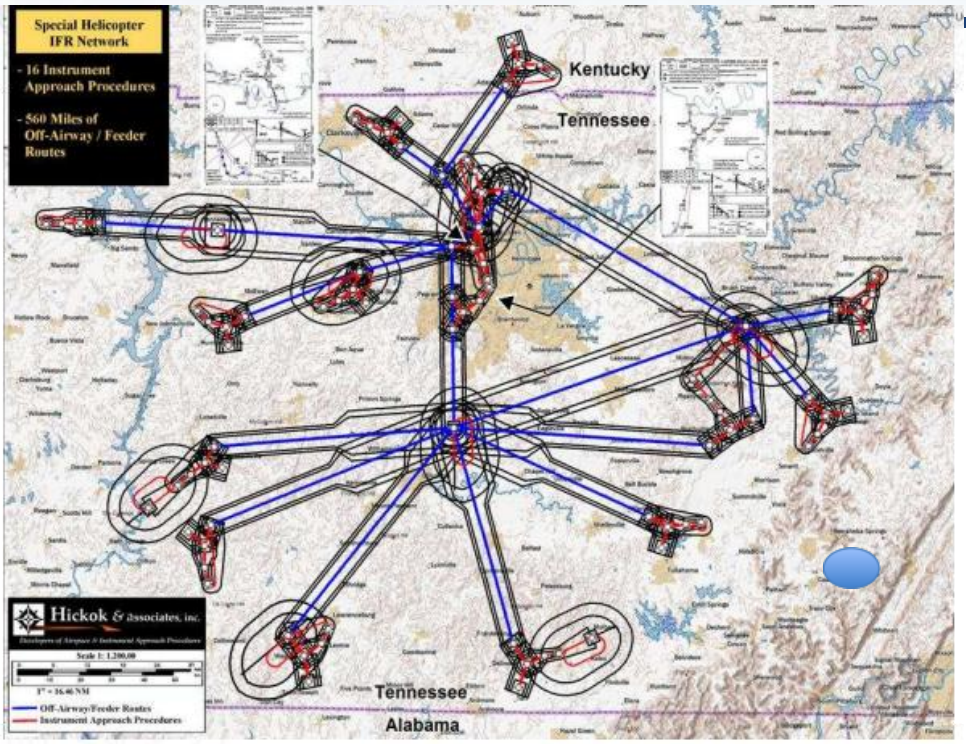
Temporary creation





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)

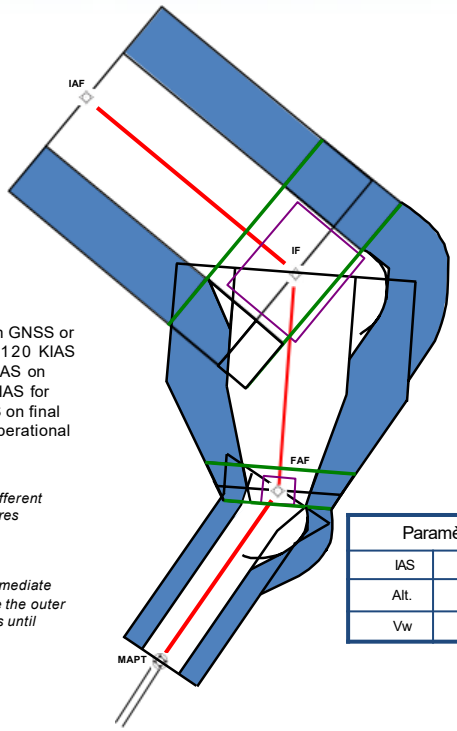
Interface INA/INT/FNA

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 of procedures

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

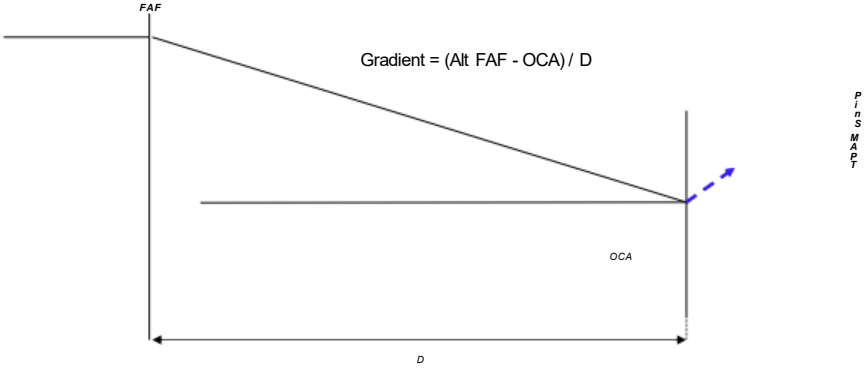
Final

- 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)

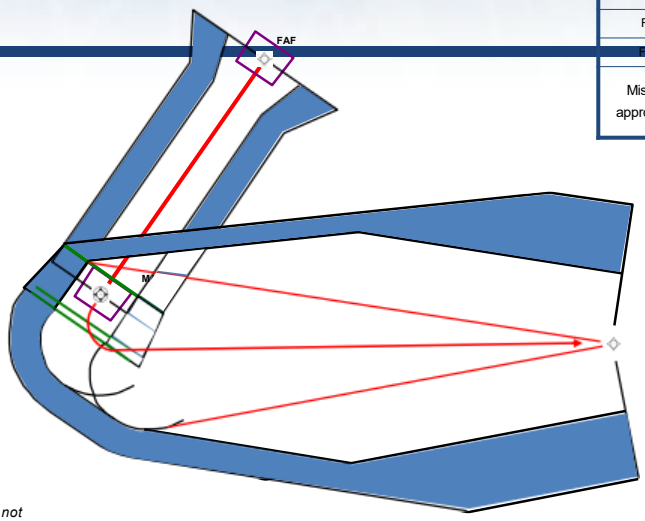
Missed approach area

Turn at MAPT more than 90°
DF to MAHF

RNP APCH

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

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

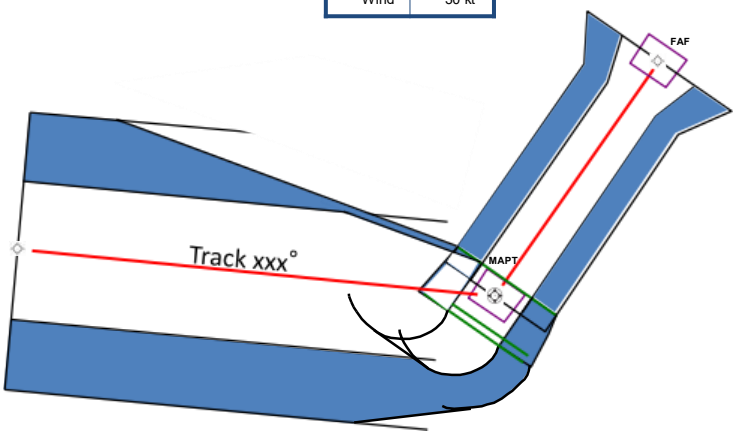
Missed approach area

Turn at MAPT less than 90°
TF to MAHF

Parameters	
IAS	90 kt
Alt.	2000 ft
Wind	30 kt

RNP APCH

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



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

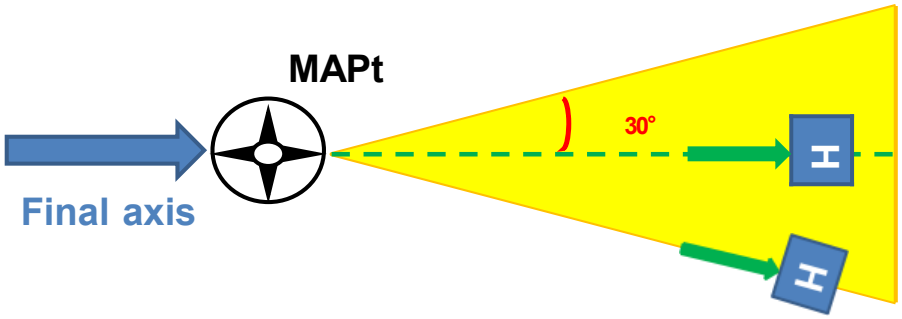
- From the MAPt and visually, the pilot manoeuvres around the heliport (or landing location) to land directly or from another direction (than MAPt/FATO).
- 3 types :
  - Direct visual segment **Direct - VS**
  - Manœuvring visual segment **Manoeuvring – VS**
  - Route Visual segment (prescribed track, 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

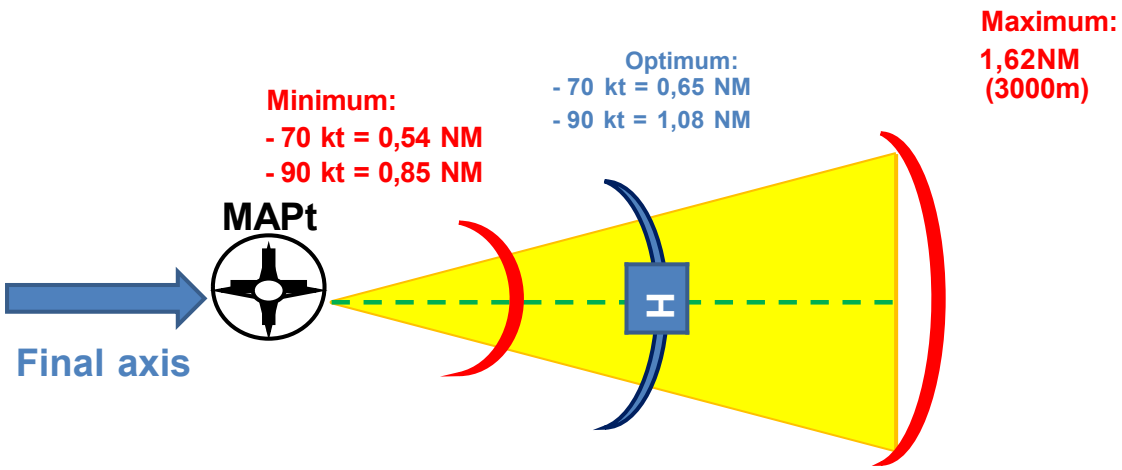
Direct - VS

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

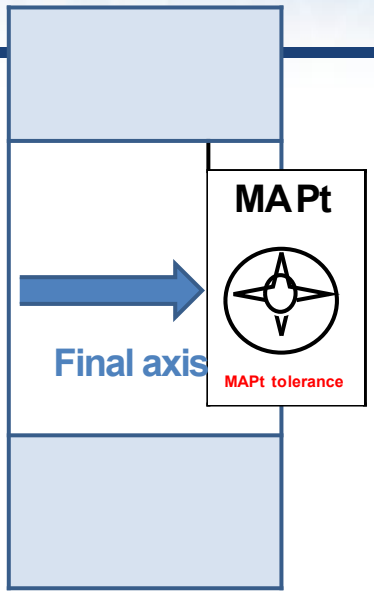


Direct - VS

Length of segment



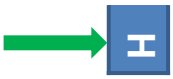
Direct - VS



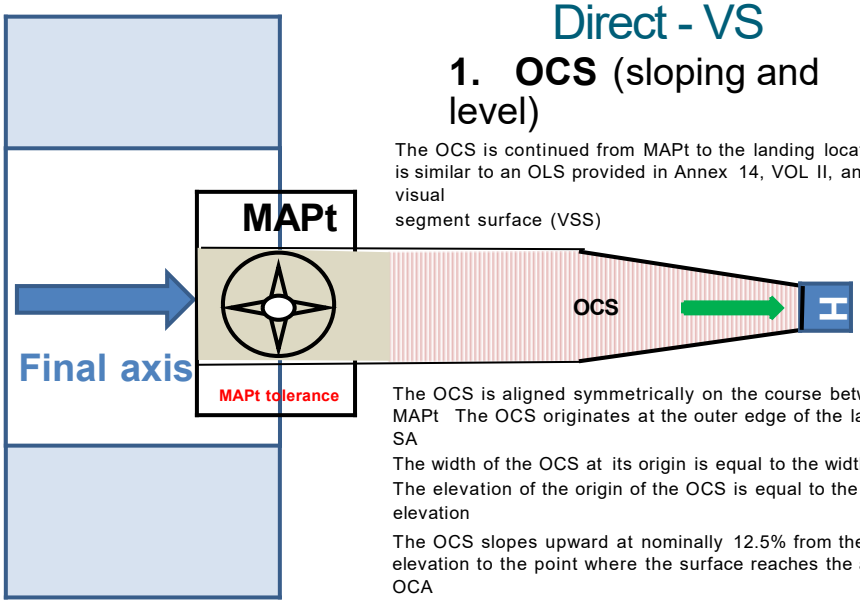
Connect MAPt and FATO:

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

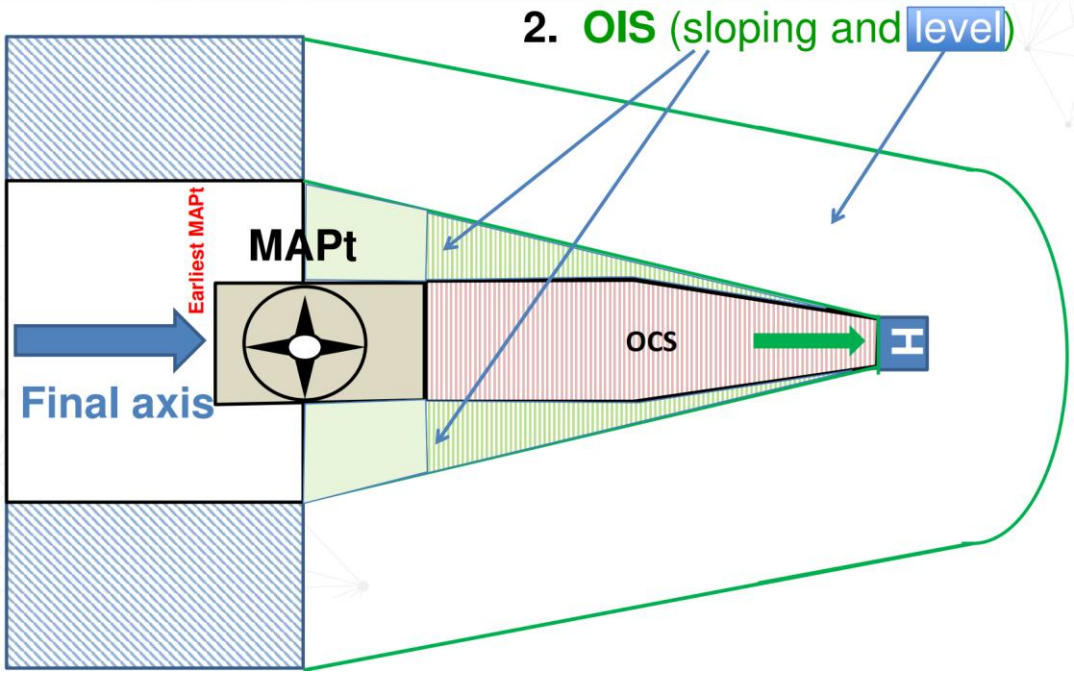
The OCS slopes upward at nominally 12.5% from the heliport elevation to the point where the surface reaches the altitude of the OCA

minus the MOC established for the final approach segment

Proceed visually

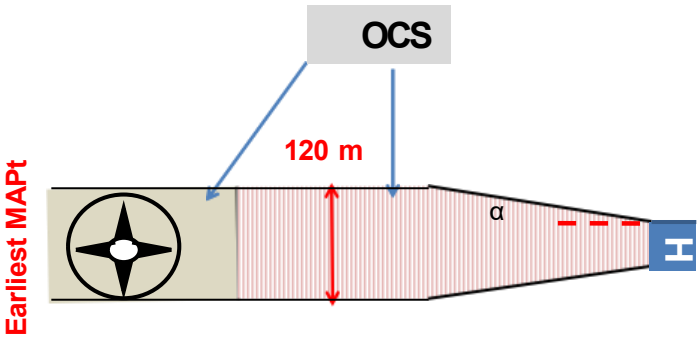
0

Direct - VS



Proceed visually

Direct - VS



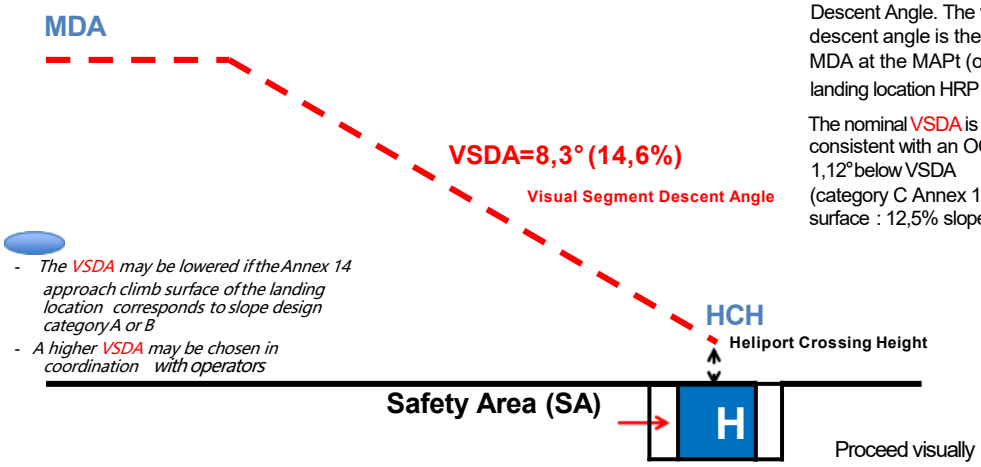
α = 10% (day-only operations)
15% (night operations)

Proceed visually

Direct - VS : VSDA

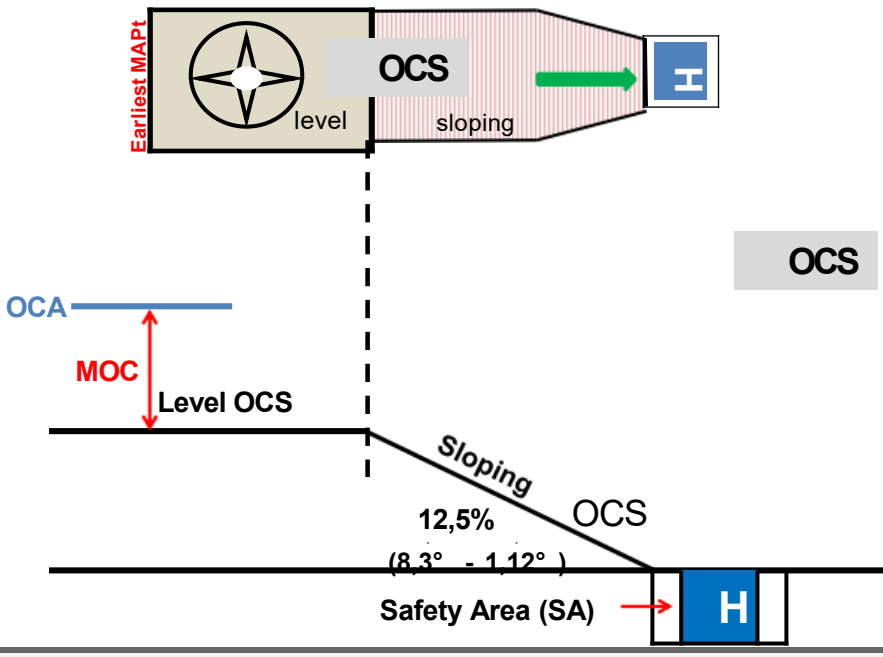
The VSDA is the Visual Segment Descent Angle. The visual segment descent angle is the angle from the MDA at the MAPt (or DP) to the landing location HRP at HCH.

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)

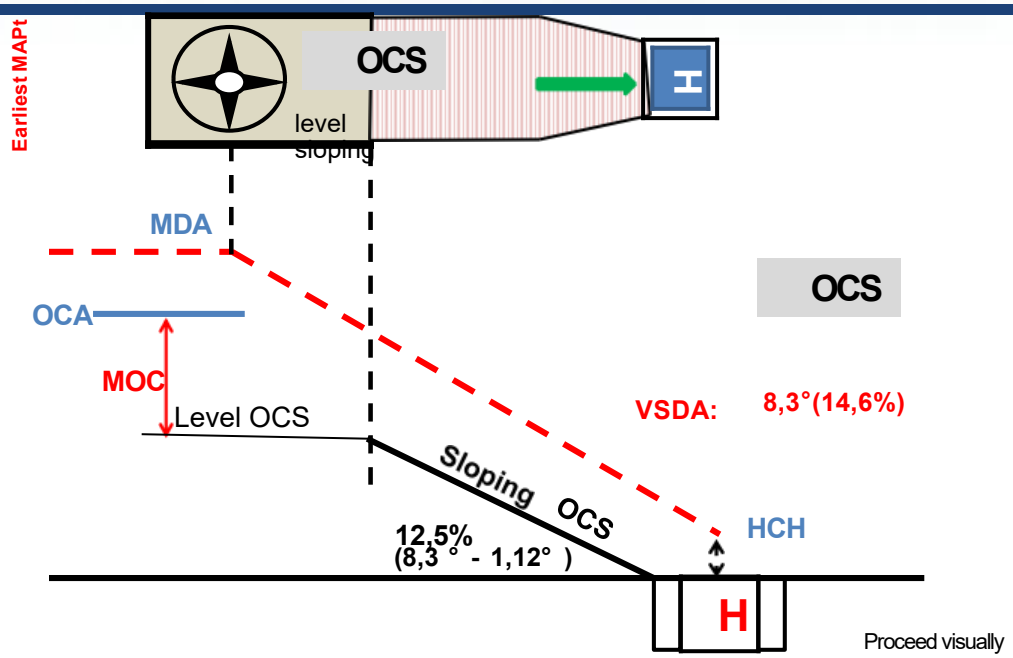


- *The VSDA may be lowered if the Annex 14 approach climb surface of the landing location corresponds to slope design category A or B*
- *A higher VSDA may be chosen in coordination with operators*

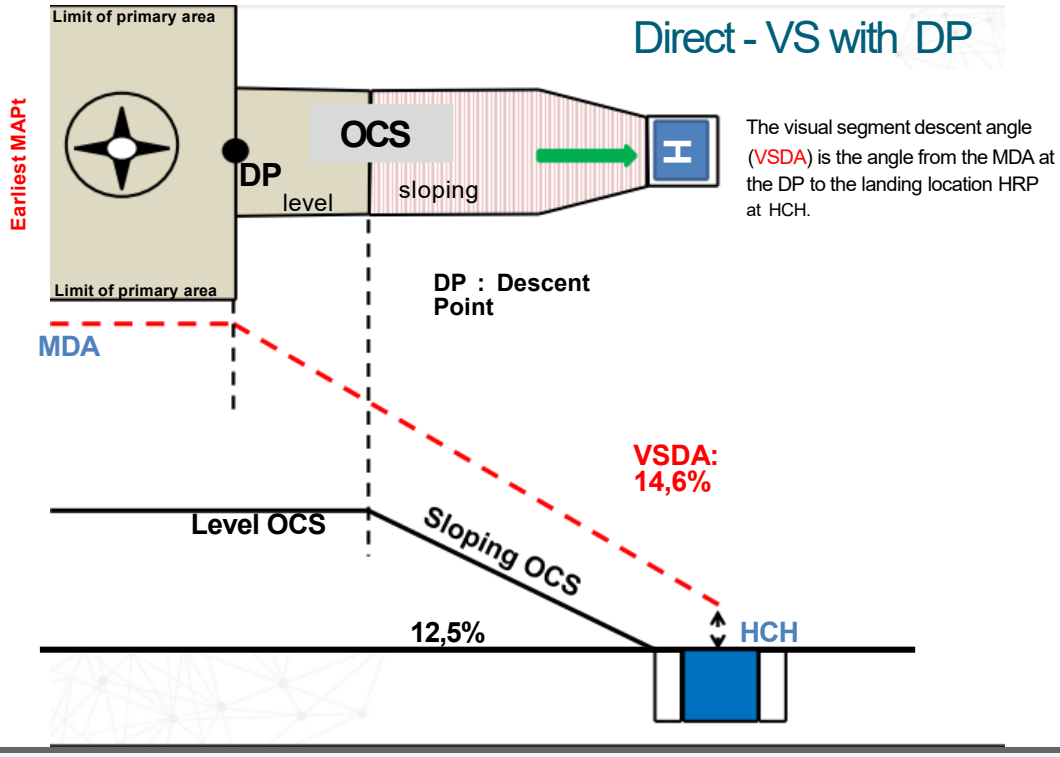
Direct - VS



Direct - VS without DP

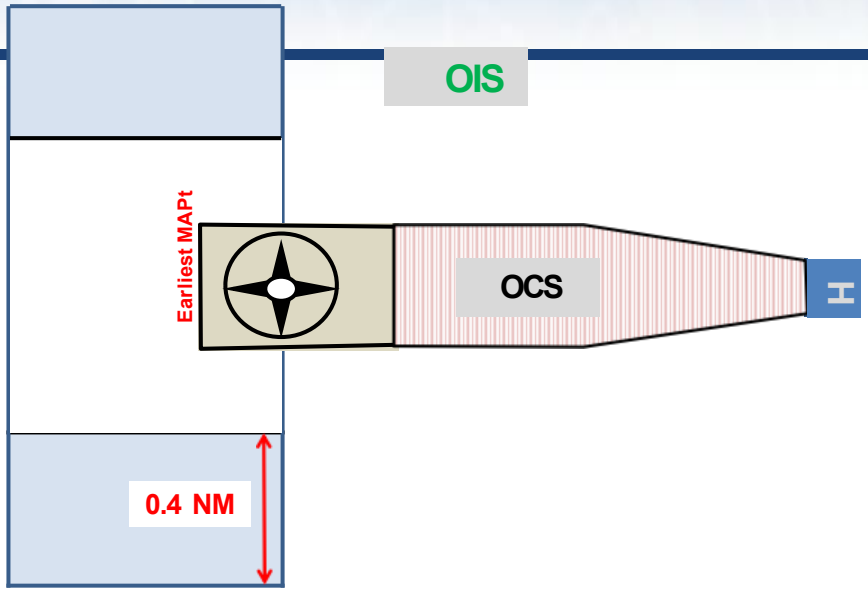


Direct - VS with DP



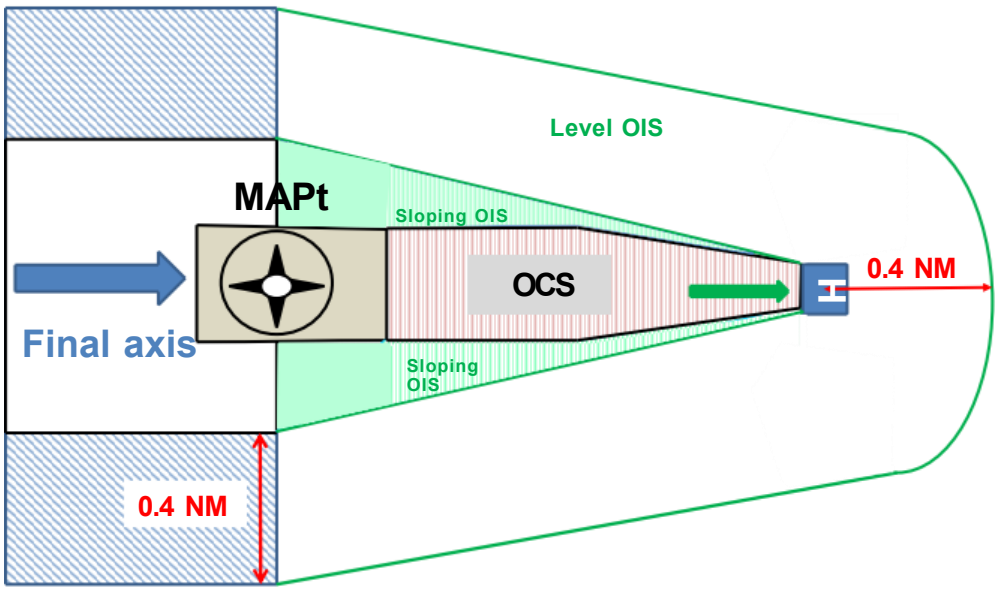
The visual segment descent angle (VSDA) is the angle from the MDA at the DP to the landing location HRP at HCH.

Direct - VS



Direct - VS OIS

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

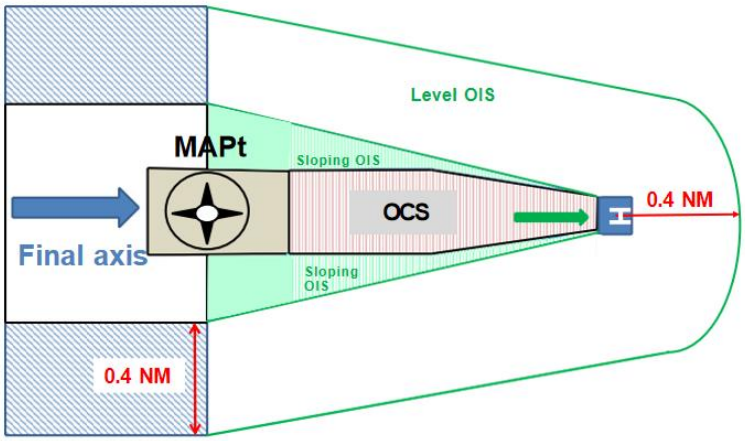


Proceed visually

0

Direct - VS

OIS



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

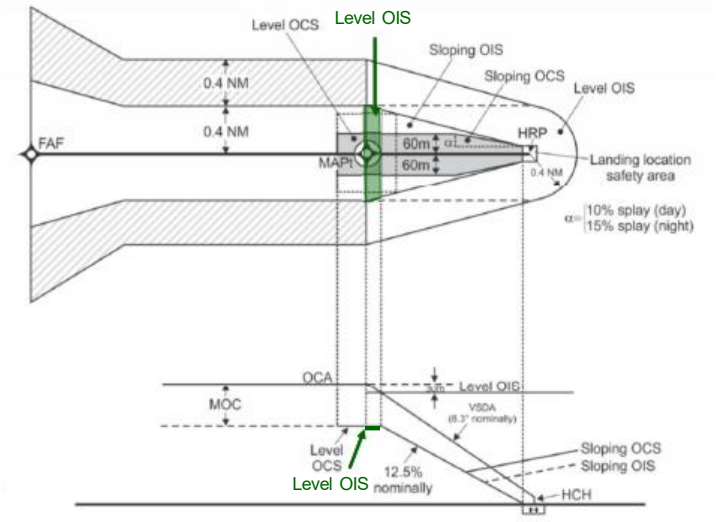
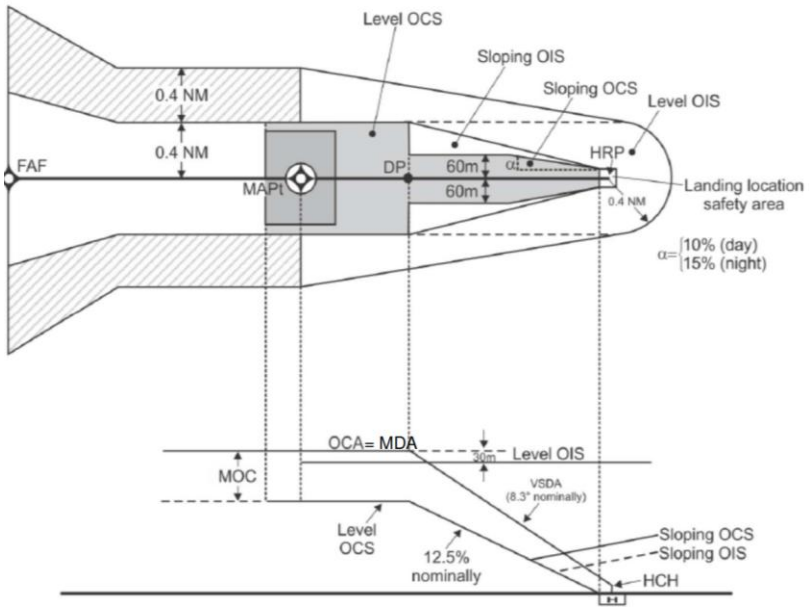
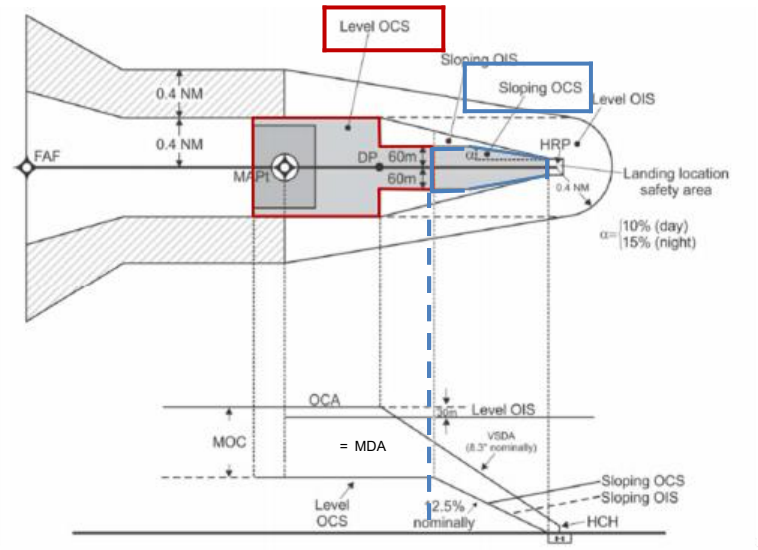


Figure IV-2-5. Direct-VS without DP and without course change

Proceed visually

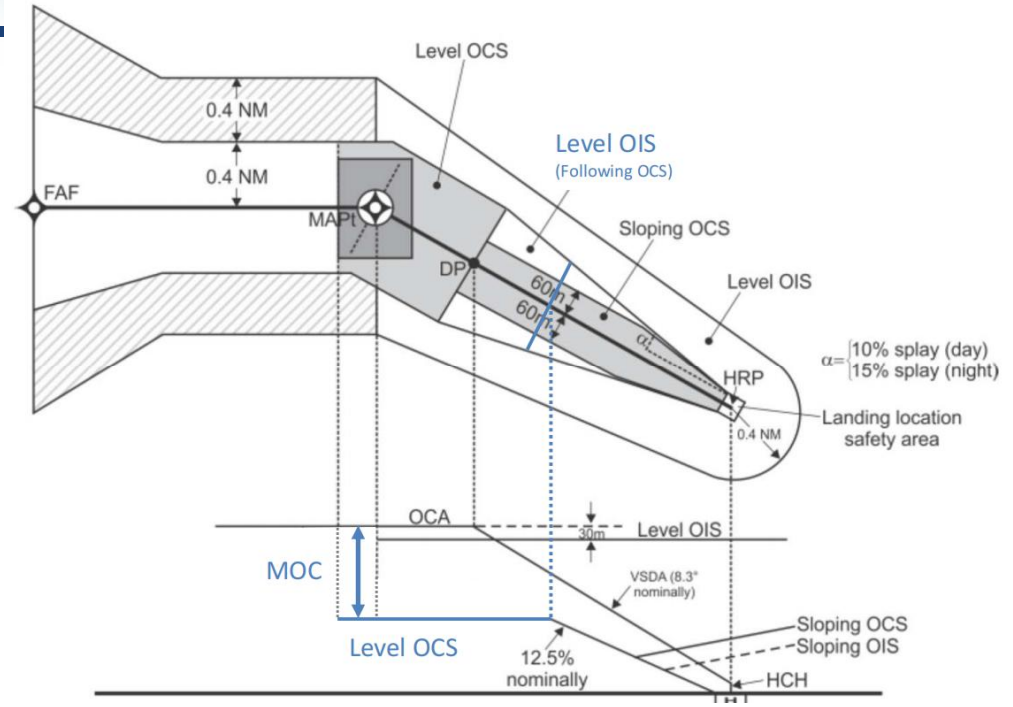


Direct-VS with DP and without course change



Proceed visually

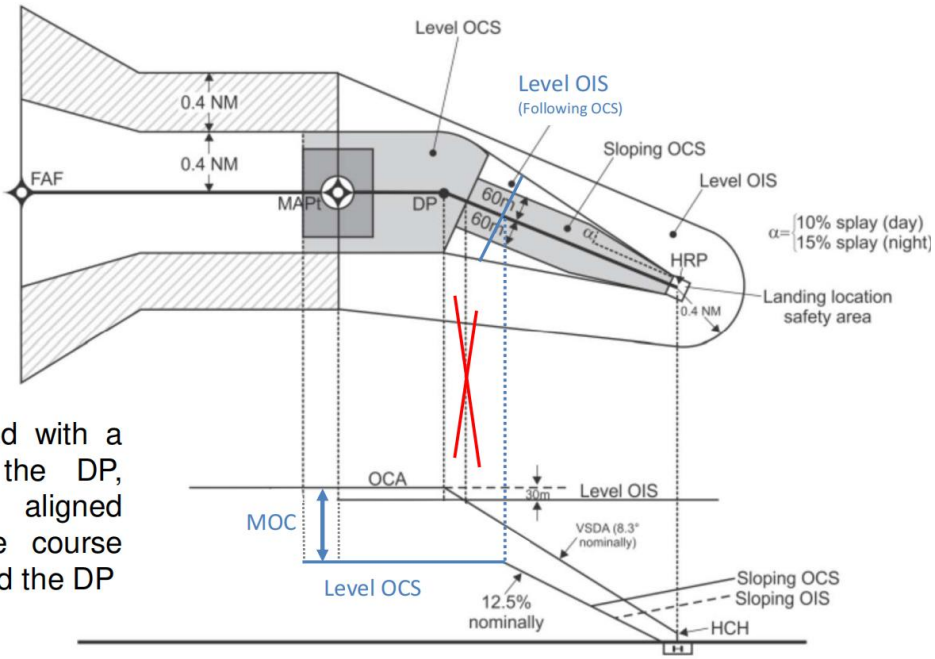
Direct-VS without DP and with 30°course change at MAPt



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

APP CBS	Rwy Idg	N/A
190°	Surface Elev	39
	Apt Elev	5

COPTER RNAV (GPS) 190°

SOUTHAMPTON HELIPORT (87N)

NA Procedure NA at night. DME/DME RNP-0.3 NA. Use Westhampton Beach altimeter setting, when not received, use New Haven altimeter setting and increase all MDA 60 feet.

MISSED APPROACH: Climbing right turn to 2000 direct BEADS and hold.

WESTHAMPTON BEACH ASOS	NEW YORK APP CON	CTAF
119.925	125.975	122.9

Procedure NA for arrivals at CCC VOR/DME via V16 southwest bound.

4 NM 190° 010°

Limit final and missed approach maximum airspeed to 70 KIAS.

(IF/IAF) TIDUE

CALVERTON CCC 1700 095° (14.9)

1700 190° (3)

1800 304° (7.4) HAMPTON /HTO

(FAF) STAYS

A 265

B24

Proceed visually from CRANN or conduct the specified missed approach.

(MAP) CRANN A 420 190° 0.9 NM

SEE INSET

4 NM 056° 236° BEADS

MSA CRANN 25 NM 1900

(MAP) CRANN 190° 0.9 NM

Southampton Heliport ELEV 5 H 44 x 44

1.2 NM

ELEV 5

190° 0.9 NM from MAP

Surface Elevation 39 44 X 44

2000 BEADS

4 NM Holding Pattern TIDUE STAYS

1700 010° 190° 190° 1700 CRANN 190° 0.9 NM

6.00° HVR HT 5

3 NM 3 NM

CATEGORY	COPTER	B	C	D
H-190°	560-1 521 (600-1)	NA		

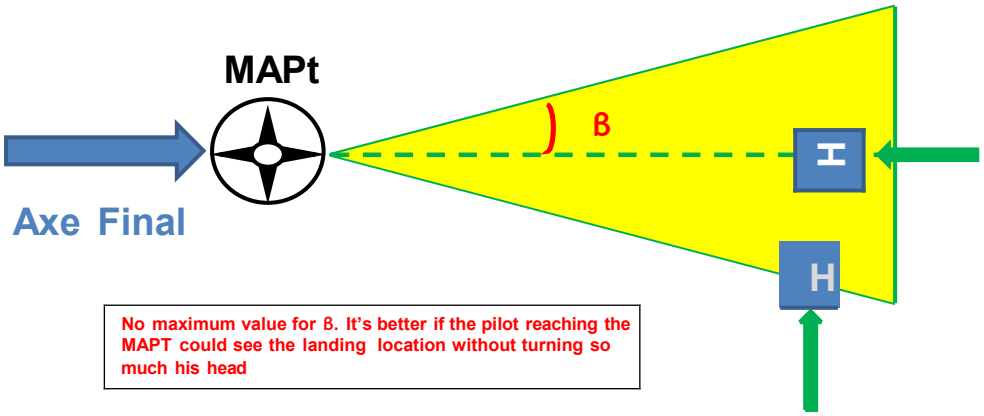
NE-2, 28 JUN 2012 to 26 JUL 2012

NE-2, 28 JUN 2012 to 26 JUL 2012

Manoeuvring - VS

Only a minimum distance is established. The minimum MAPt/HRP distance is dependent on the maximum speed in the final approach segment of the instrument procedure :

- IAS 70 Kt 0.54 NM
- IAS 90 Kt 0.85 NM



No maximum value for β. It's better if the pilot reaching the MAPT could see the landing location without turning so much his head

Manoeuvring – VS : Protection

- A "manoeuvre area" has to be defined. It corresponds to the area where the pilot is expected to manoeuvre from the MAPt to the point where it is aligned on the final landing. If more than one approach direction has to be considered, the final "manoeuvre area" is the combination of all the "manoeuvre areas"

- The "manoeuvre area" is the area enclosed by all the lines that originate at the MAPt and connect with a "base turn area" aligned symmetrically around the centre line of the approach surface

- Trajectories that have been considered to define the shape:
  - First case : the pilot flies at the OCA/H directly from the MAPt to the heliport/landing location and then performs a base turn to descend and align on the centre line of the approach surface
  - Second case : the pilot starts from the MAPt but diverges from the 'MAPt-HRP' axis in order to manoeuvre to align on the centre line of the approach surface

Proceed visually

Manoeuvring – VS : Protection

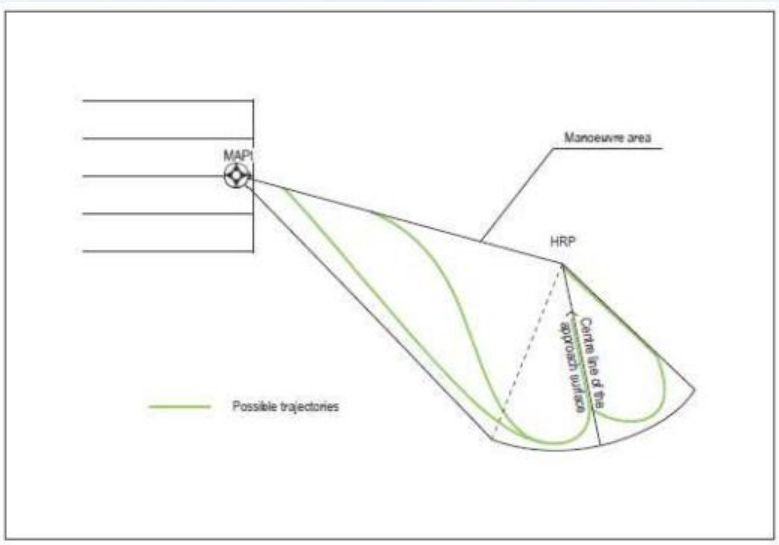


Figure IV-2-10. Representation of the possible trajectories defining the "Manoeuvring area"

Manoeuvring – VS : Protection

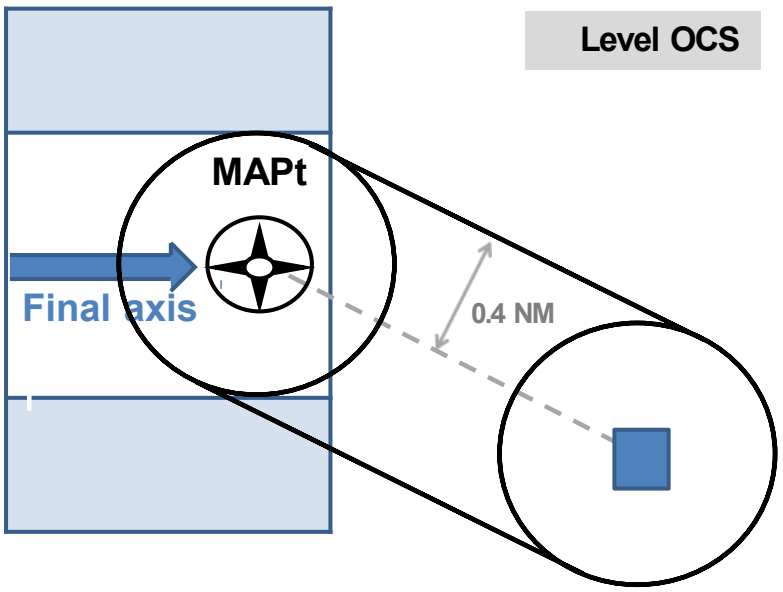
- Protection of visual segment is based on :
  - the required turn at the MAPt in order to stay in the "manoeuvre area" cannot be more than 30。
  - a speed of 50 KIAS or lower in the visual part of flight
  - The pilot may descend after the MAPt in the visual segment of the procedure to OCH/2 or 90 m (295 ft) above the heliport/landing location elevation, whichever is greater, taking account of the obstacles identified on the chart
  - the pilot shall not descend below OCH/2 or 90 m (295 ft) above the heliport/landing location elevation, whichever is greater, before being aligned on the centre line of the approach surface

Manoeuvring - VS : Protection

Manoeuvring-VS is protected by a level obstacle clearance surface (OCS), the obstacle limitation surfaces (sloping OCS and level OIS) and the safety area (SA) associated with the FATO

- **Level OCS**
  - the level OCS is a level surface at an altitude of OCA – 250 ft
  - the level OCS is aligned symmetrically on the course between HRP and MAPt
- **Sloping OCS**
  - The sloping OCS is aligned symmetrically on the centre line of the approach surface
  - The outer edges splay from their origins at the edge of the SA, symmetrically around the centre line of the approach surface
- **OIS**
  - The OIS is a level surface at a height of OCH (height above the heliport/landing location elevation)/2 – 150 ft or at a height of 150 ft above the heliport/landing location elevation, whichever is greater
  - The OIS surface is defined by the "Manoeuvre area" with an additional buffer

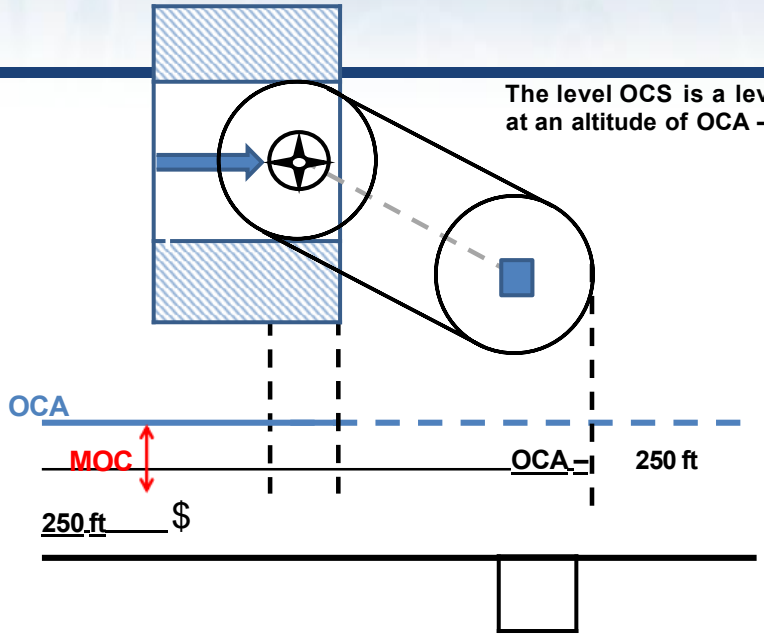
Manoeuvring - VS : OCS



0

Manoeuvring - VS : OCS

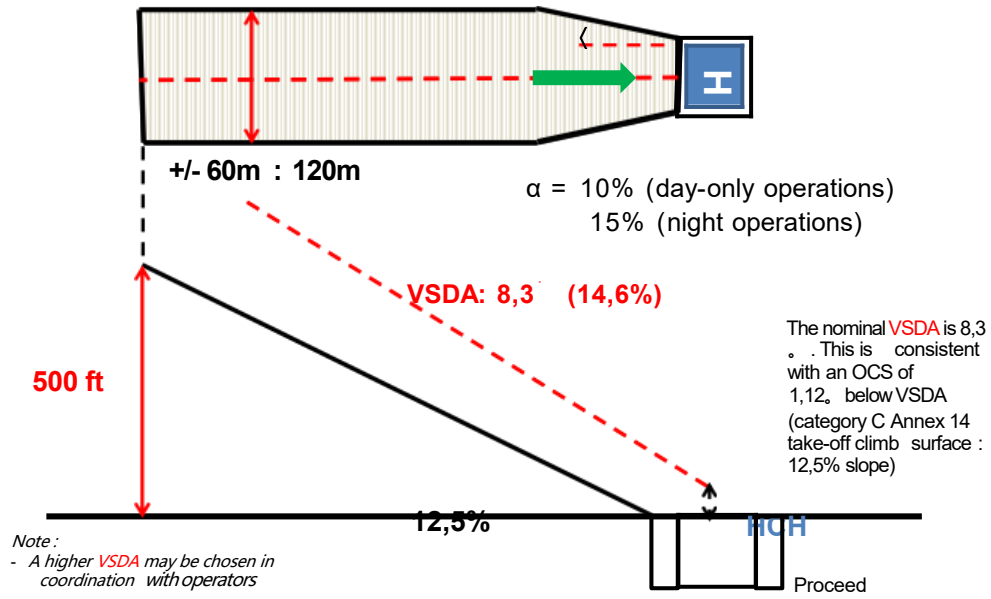
Level OCS



Proceed visually

Manoeuvring - VS : OCS

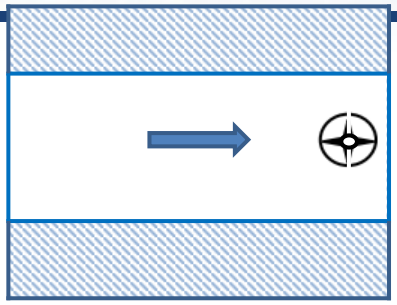
Sloping OCS



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)

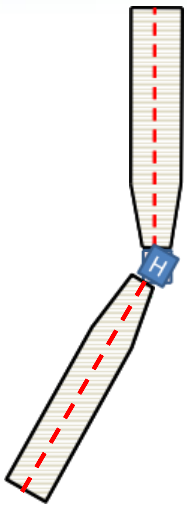
Note :
- *A higher VSDA may be chosen in coordination with operators*

Manoeuvring - VS : OCS

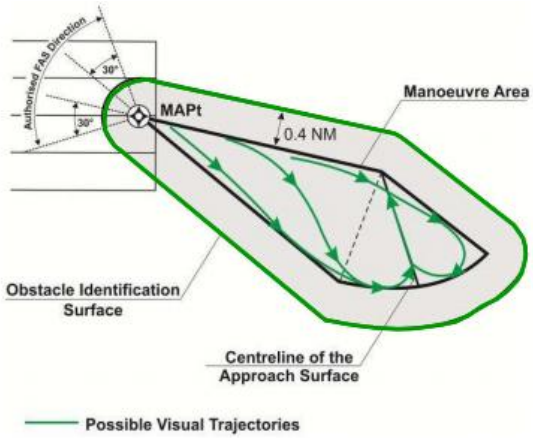


If more than one approach surface has to be considered, a sloping OCS is designed for
each

Sloping OCS



Manoeuvring - VS : OIS (manoeuvre area + buffer zone)



Shape of the area is based on :

- the pilot flies directly from the MAPt to the heliport/landing location and then performs a 'base turn' to descend and align on the centre line of the approach surface

- the pilot starts from the MAPt but diverges from the "MAPt-HRP" axis in order to manoeuvre to align on the centre line of the approach surface

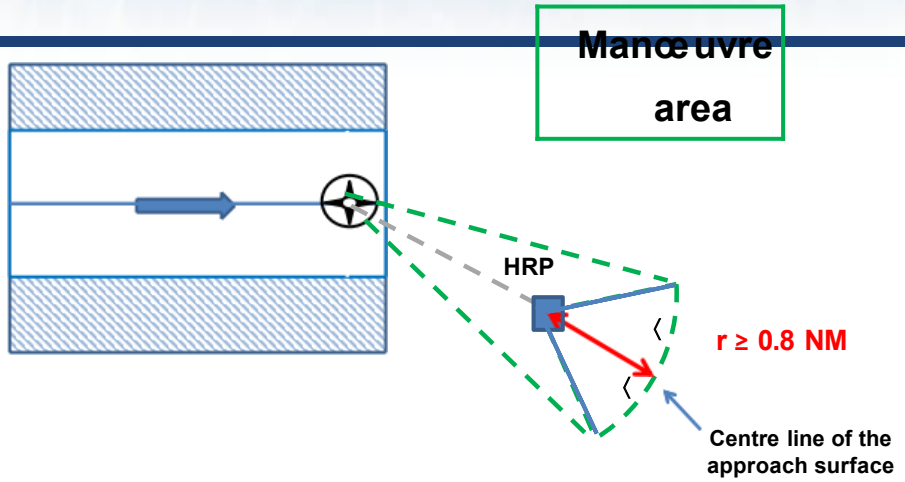
- a speed of 50 KIAS or lower in the visual part of flight

- the required turn at the MAPt in order to stay in the "manoeuvre area" cannot be more than 30 degrees

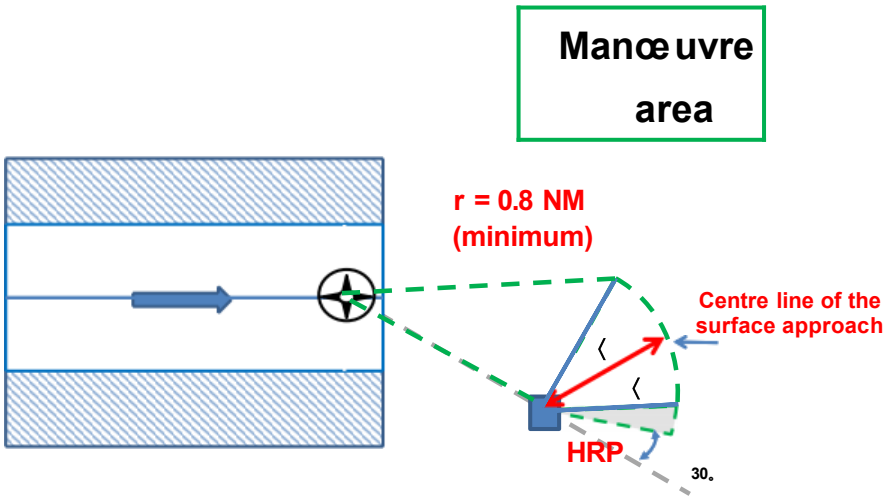
Note: *the pilot may descend after the MAPt in the visual segment of the procedure to OCH/2 or 90 m (295 ft) above the heliport/landing location elevation, whichever is greater, taking account of the obstacles identified on the chart. To descend below this height, the pilot has to be aligned on the centre line of the approach surface*

Proceed visually

Manoeuvring - VS



Manoeuvring - VS



the turn over the HRP is greater than 30。 : extension of the manoeuvre area

Proceed visually

0

Manoeuvring - VS

If more than one approach direction has to be considered, the final "manoeuvre area" is the combination of all the "manoeuvre areas

- r: radius from HRP of the 'base turn area'

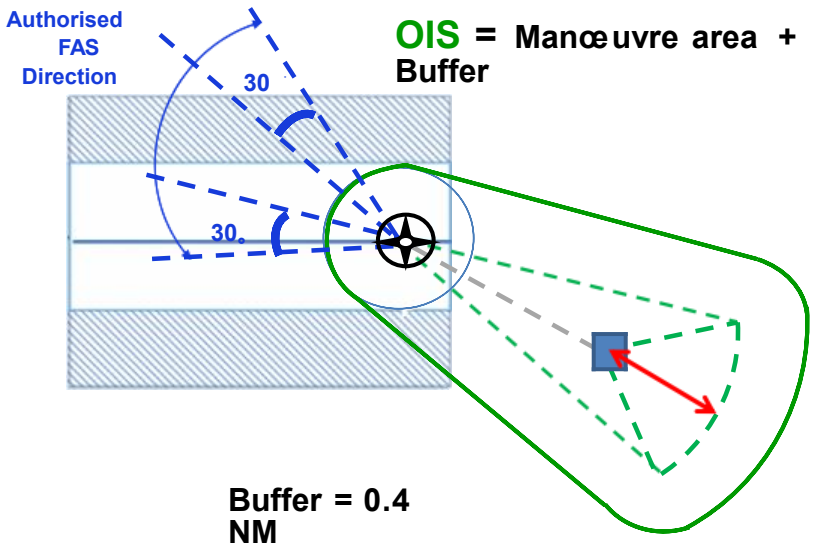
OCH	300ft	400ft	500ft	600ft	700ft	800ft	900ft	1000ft	>1000
r	0.8 NM	0.8 NM	0.8 NM	0.8 NM	0.9 NM	1.0 NM	1.1 NM	1.2 NM	+ 0.1 NM
⟨	50。	50。	50。	50。	45。	40。	35。	30。	Constant 30

Note.— Where operationally beneficial, in order to extend the resulting "manoeuvring area", the "turn area" can be extended by using wider angles on one side or on both sides of the centre line of the approach surface.

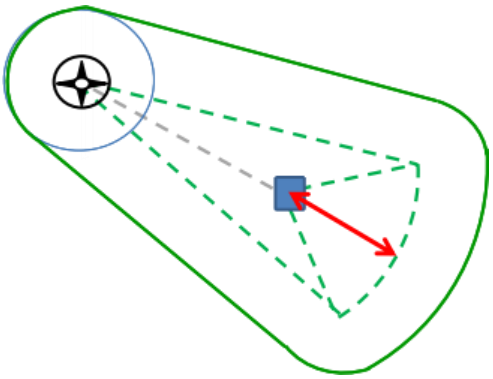
If the OCH of the procedure is more than 600 ft above the heliport/landing location elevation, r increases linearly (0.1NM) for each additional 30 m above 600 ft.

Proceed visually

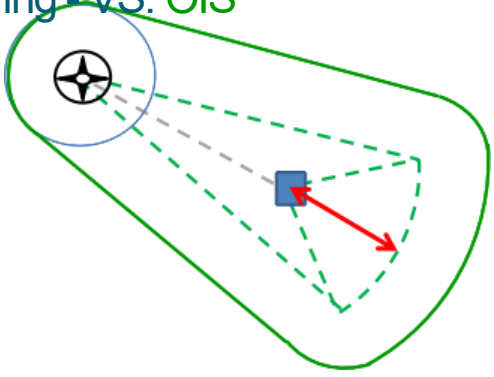
Manoeuvring - VS: OIS



Proceed visually



Manoeuvring – VS: OIS



The OIS is a level surface at a height of the maximum between :

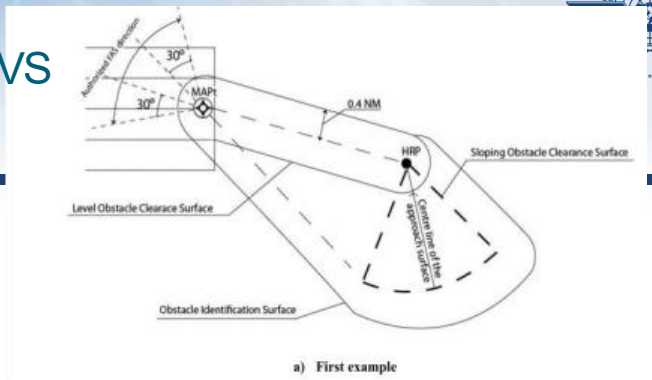
1- OCH (height above the heliport/landing location elevation)/2 – 150 ft 2- 150 ft above the heliport/landing location elevation

obstacles that penetrate the OIS shall be charted

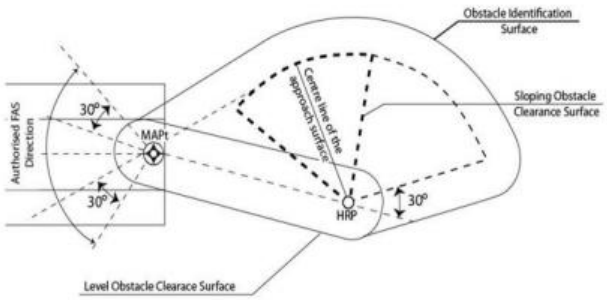
Proceed visually

Manoeuvring - VS

level OIS and level OCS based on two different approach surfaces



a) First example

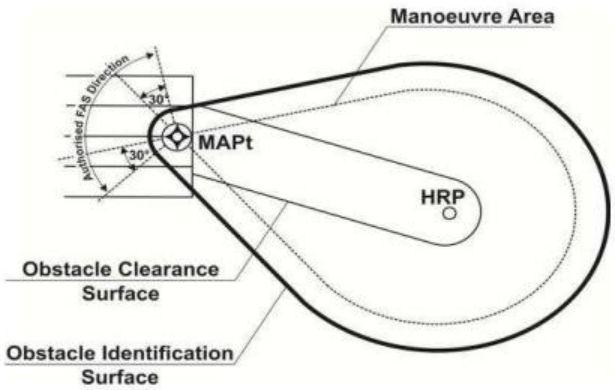


b) Second example

Proceed visually

Manoeuvring - VS

Level OCS and level OIS with omni-directionnal approach surface



Proceed visually

Manoeuvring - VS

No obstacles shall penetrate the level OCS or the sloping OCS. Obstacles that penetrate the OIS shall be documented and charted. Other obstacles may be documented and charted if deemed necessary even if they do not penetrate the different OIS.

Manoeuvring - VS

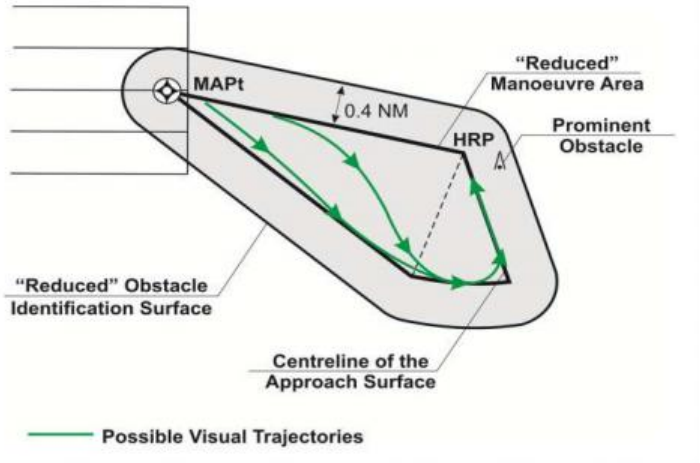
- A relevant obstacle infringing the level OCS less than 0.4 NM from the HRP, may be ignored for this OCS assessment if:
  - flyover of the heliport or landing location during the visual manoeuvre is prohibited
  - the obstacle is not inside the “manoeuvre area” that is reduced accordingly
  - the obstacle does not penetrate the sloping OCS and the IFR protection areas

In order to disregard an obstacle, the “manoeuvring area” needs to be reduced

Proceed visually

Manoeuvring - VS

flyover of the landing location during the visual manoeuvre is prohibited



Proceed visually

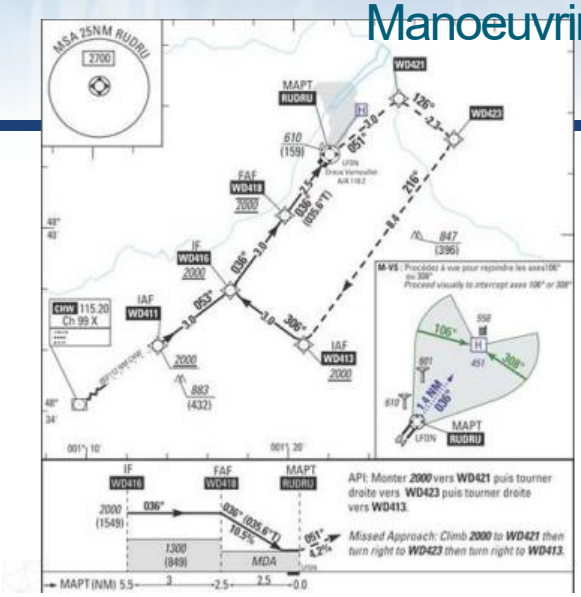
Manoeuvring - VS

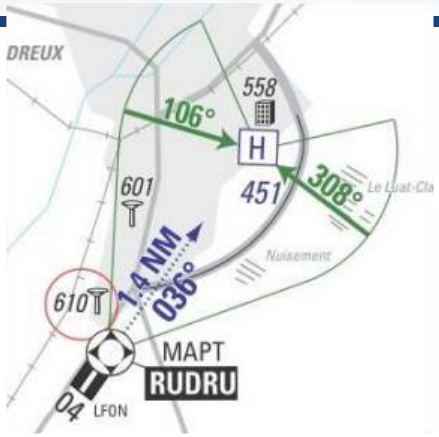
- **Visibility :**

  The visibility requirements to fly a manoeuvring visual segment shall not be less than the MAPt/HRP distance or than the value of r (radius of the 'base turn) whichever is greater

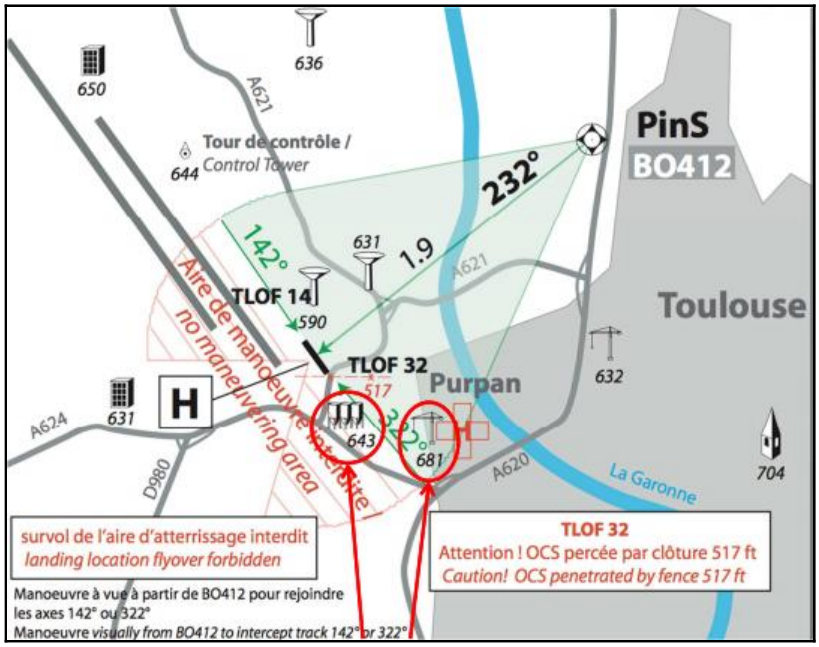
Proceed visually

Manoeuvring - VS

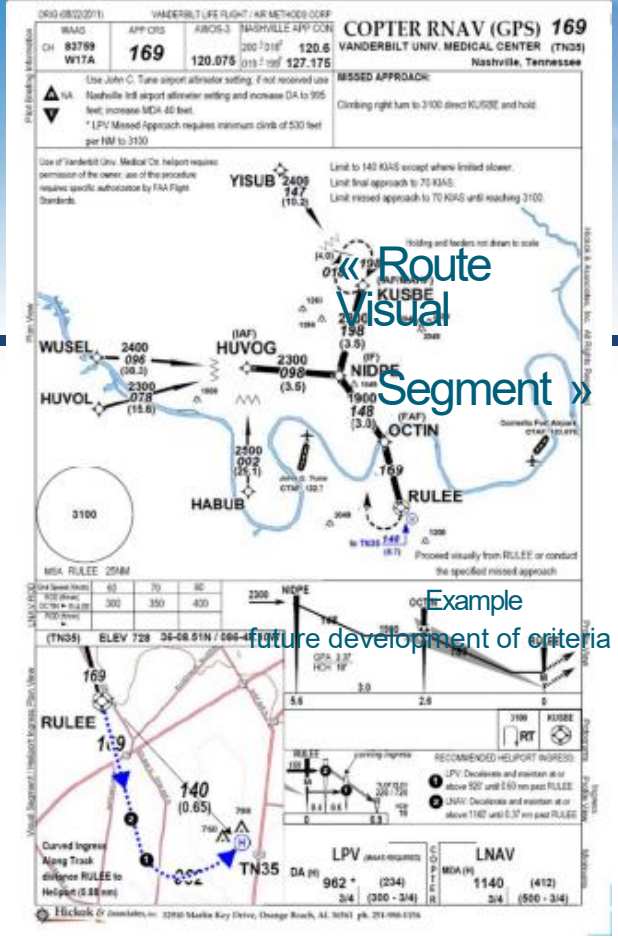




Toulouse Blagnac
RNAV GNSS 232



Obstacles
from OIS



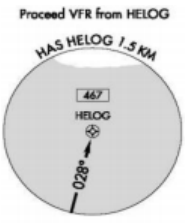
PinS approach: proceed VFR

- 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



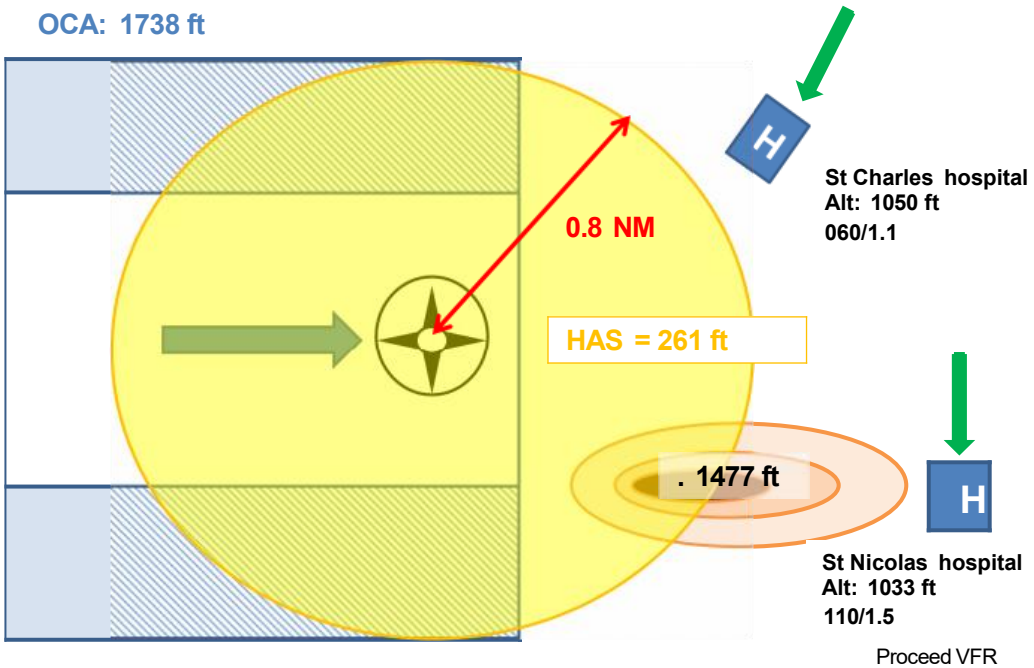
Note: *This minimum radius may be increased depending on State-specific requirements for helicopter VFR operations*

Proceed VFR

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

PinS approach: proceed VFR

OCA: 1738 ft



Proceed VFR

NEW YORK, NEW YORK

AL-610 (FAA)

APP CRS	Rwy Idg	N/A
028°	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	ARR NE	ARR SW	NEW YORK APP CON	
128.725	117.7	115.4	127.4	269.0

West 30th Street ELEV 7

Port Authority-Downtown-Manhattan/Wall Street ELEV 7

East 34th Street ELEV 10

011° (12.5)

1906±

010° (9.3)

« Proceed VFR »

JFK

441 ±

390

186

171

338

156

277

306

211

(MAP) HELOG

210±

(FAF) WEBIN

1800 028° (3.4)

COVIR

210°

1800 030° (4.1)

(IAF) BANKA

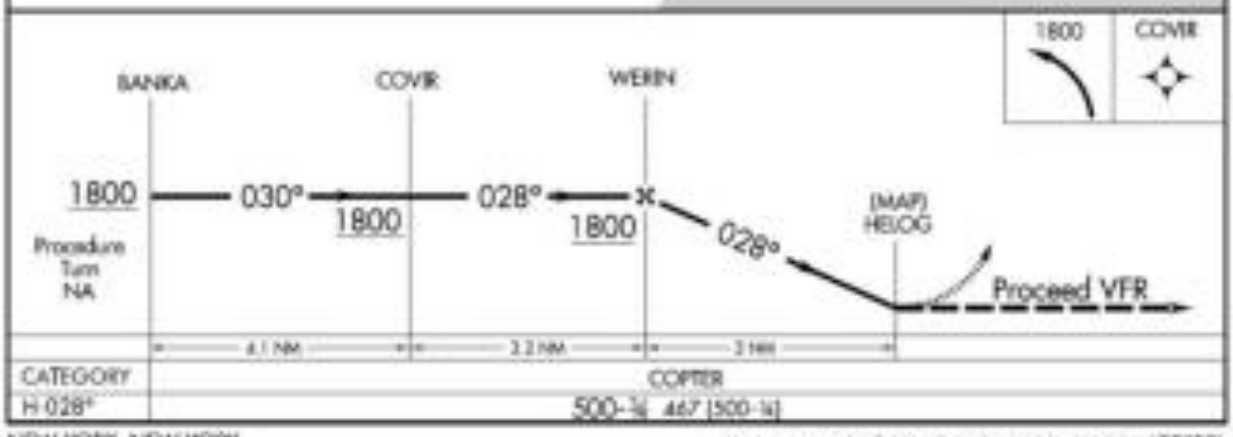
1800 064° (6.5)

COLTS NECK COL

MSA HELOG 25 NM

2600

Proceed VFR



CATEGORY	COPTER
H 028°	500-¼ 467 (500-¼)

NEW YORK, NEW YORK

Orig-A 11069

NEW YORK/ JOHN F. KENNEDY INTL (JFK)

40°38'N - 73°47'W

COPTER RNAV (GPS) 028°

IFR procedures for helicopters

DEPARTURE

《 PinS Departure 》

Contents

- PinS departure concept
- PinS departure
  - Instrument phase
  - Visual segment
    - Proceed Visually
      - Direct VS
      - Manoeuvring VS
    - Proceed VFR

PinS departure

- A departure procedure designed for helicopters only that includes both a visual and an instrument segment
- The visual segment starts from the heliport or landing location. It consists of a visual segment or VFR segment and ends at the Initial Departure Fix (IDF) at or above the IDF Minimum Crossing Altitude (MCA)
- From IDF, the appropriate helicopter navigation specifications is applied to define the protection of the instrument trajectory of the departure procedure. The trajectory is extracted from the RNAV data base system. Terminal mode is active.
- PinS departure is called “Reverse PinS” if the IDF is the same reference point than the MAPt (PinS) of the approach.

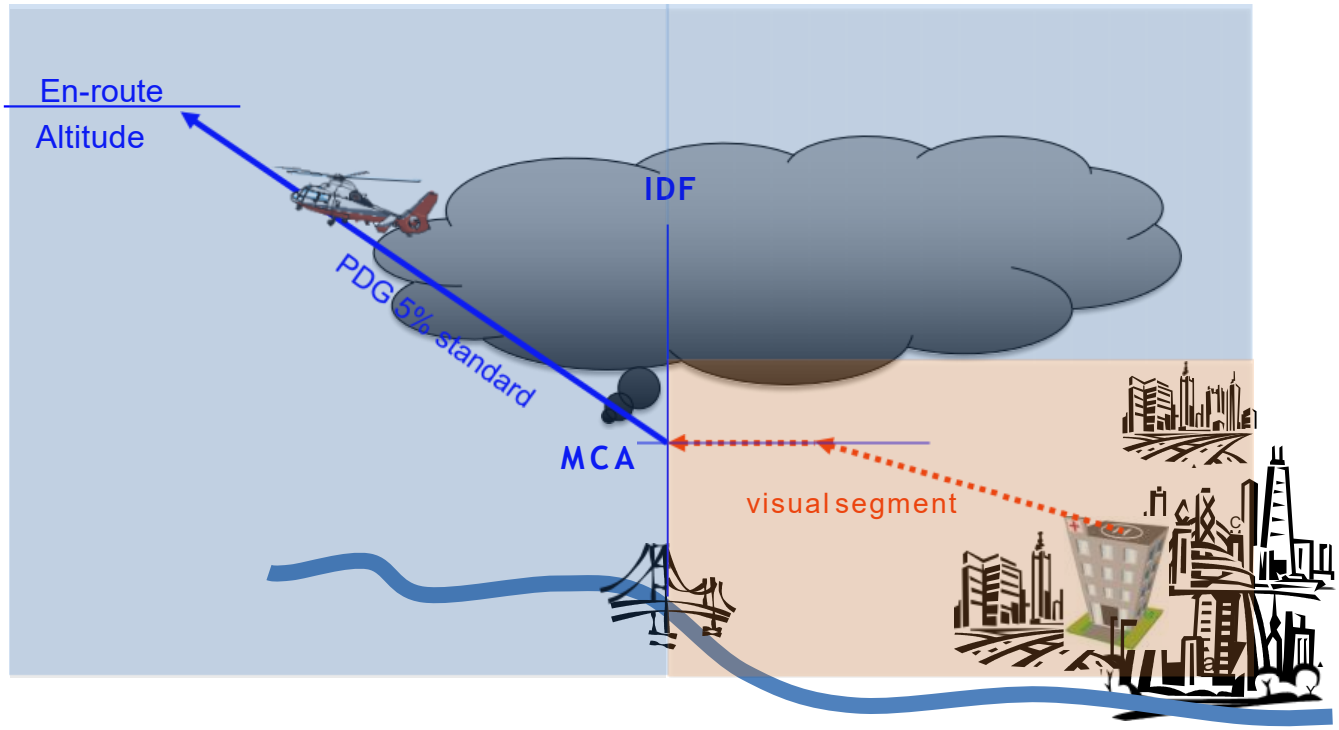
PinS departures : Types

- **« proceed VFR»**
  - *From the heliport or landing location to the IDF, pilot can comply with VFR in the visual segment to see and avoid obstacles until crossing the IDF at or above the IDF MCA. No obstacle protection area in the VFR segment. IFR clearance shall be obtained prior to reaching the IDF*

- **« proceed visually»**
  - *Departing on an IFR clearance, from a single heliport or landing location, a pilot can navigate by visual reference to see and avoid obstacles, with visibility sufficient to return to the heliport or landing location 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.*
  - 2 types :
    - *Direct visual segment*
    - *Manœuvring visual segment*

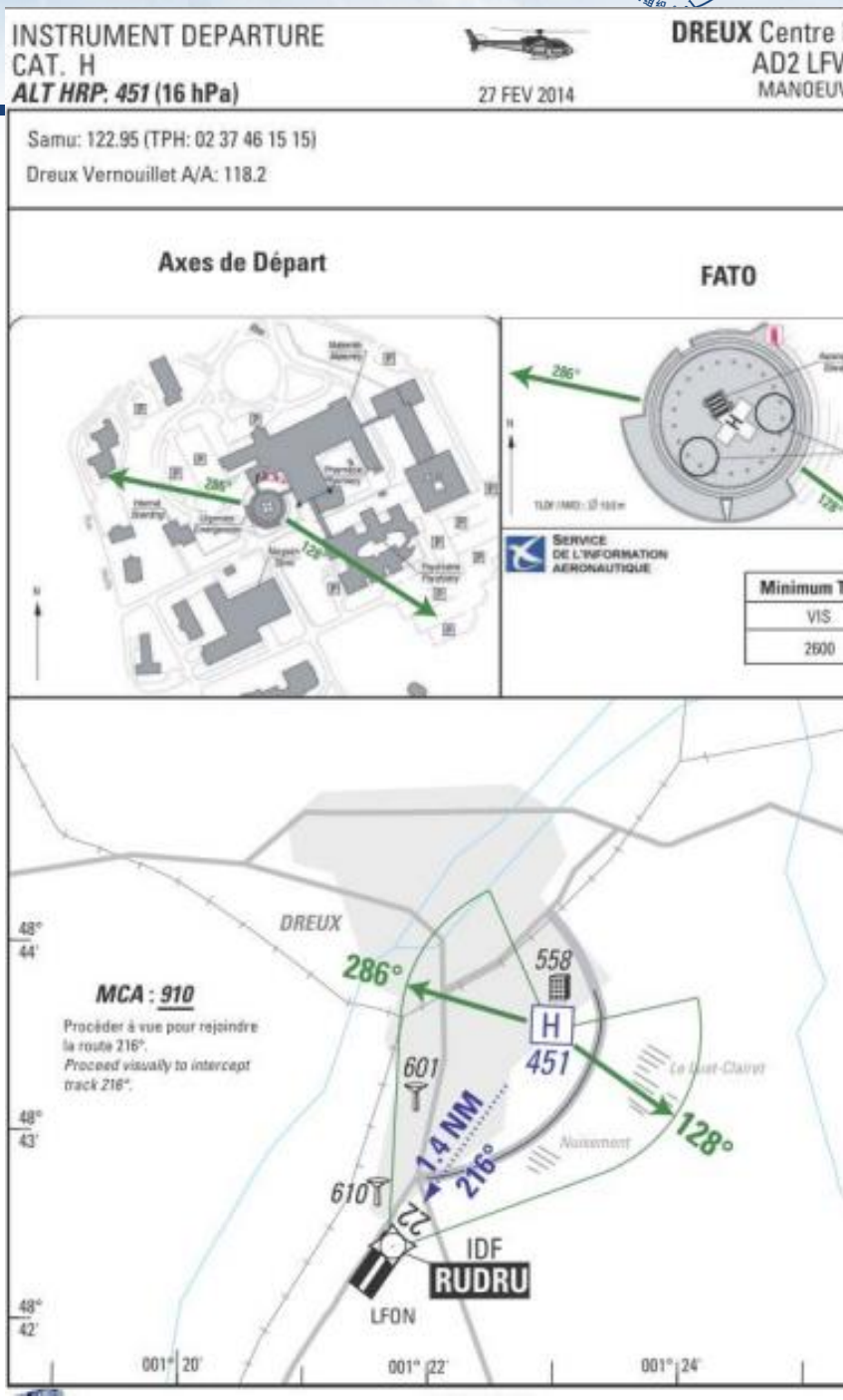
***Note**:*
*"**VFR**" refers to specified minimum meteorological conditions established by the State for the airspace the operation is conducted in or the applicable operating regulation.*
*"**Visual**" refers to meteorological conditions permitting visual reference to the surface but not necessarily meeting specified minimum meteorological conditions for VFR operations.*

PinS Departure



Departure Chart
Dreux

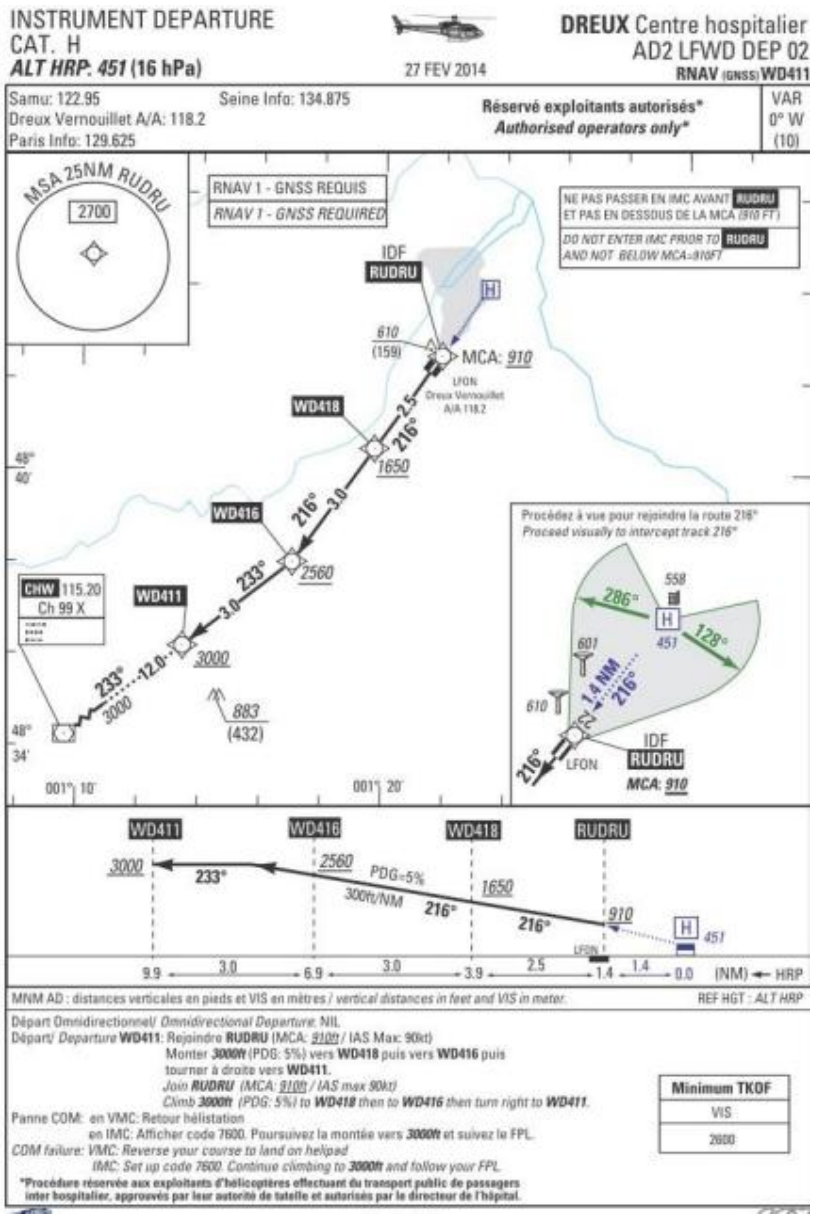
Visual segment



Departure Chart

Dreux

Instrument phase



IFR procedure: Main characteristics

- IDF can be compared to the DER
  - Note: generally charted as a 'fly-by' waypoint. Could be charted as a 'fly-over' for operational reasons only

- Instrument flight procedure begins at IDF at a Minimum Crossing Altitude (MCA). If the minimum PDG along the IFR trajectory is greater than 5%, the minimum PDG shall be annotated on the chart

- The Minimum Crossing Height (MCH) of the IDF for a PinS departure procedure with a manoeuvring visual segment shall not be less than 90 m (295ft) above the heliport/landing location elevation

Criteria for IFR trajectory

- Max IAS in departure
  - 90 kt or
  - 70 kt ; speed *limitation annotated on the chart*
- The navigation specifications applicable to PinS departure are :
  - RNAV 1 / RNAV 2 / RNP 1 / RNP 0.3 / A-RNP
- IDF tolerance depends on application

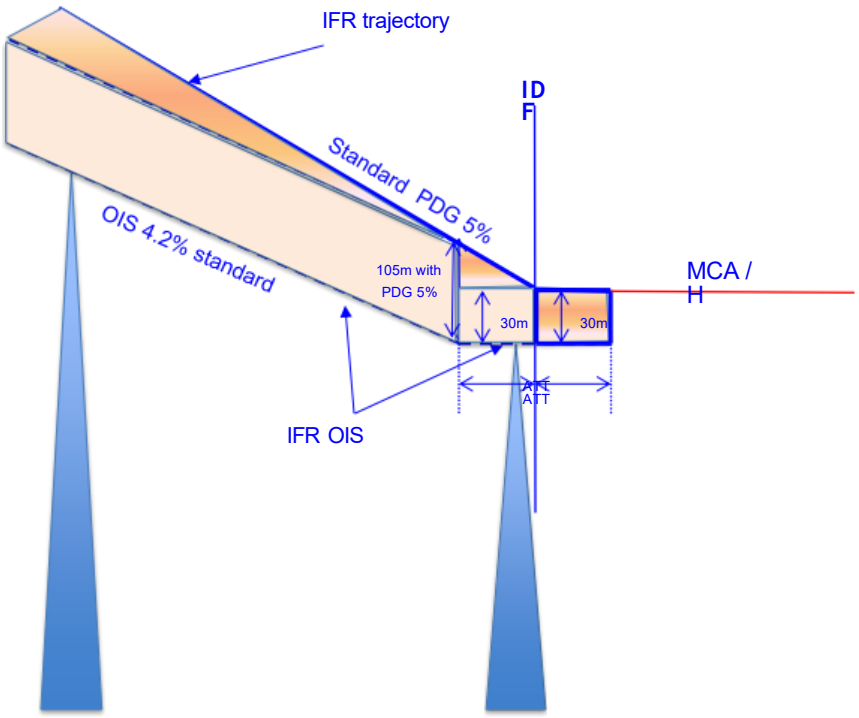
  - *Example : RNAV 1*
    - *ATT = 0.8 NM*
    - *XTT = 1.0 NM*
    - *BV = 0,35 NM*
    - *½ AW = 1.85 NM*
    - *Next WP:*
      - *½ AW = 1,85 NM if less than 15NM from IDF*
      - *½ AW = 2.2 NM if less than 30NM from IDF*
      - *½ AW = 4 NM if more than 30NM from IDF (XTT = 2 and BV = 1)*

PDG and MOC

- Procedure Design Gradient
  - Standard: 5,0%
- MOC
  - Between the earliest IDF and the IDF: **30m**
  - Between the IDF and the latest IDF, the MOC is increased by a value corresponding to the PDG :
    - **30m + [PDG x (distance from IDF)]**
  - from the latest IDF MOC is increased by 0.8 per cent of the distance from the latest IDF until the en-route MOC is reached
    - **30m + [PDG x distance(IDF/latest IDF)] + [0,8% x(distance from latest IDF)]**

  - Remark : An alternative to increasing the PDG above the 5 per cent standard value beyond the IDF, would be to increase the IDF MCA to provide the necessary clearance over an obstacle in the subsequent departure leg while maintaining a lower PDG

PDG and MOC


IFR trajectory
ID
F
Standard PDG 5%
OIS 4.2% standard
105m with
PDG 5%
30m
30m
MCA /
H
ATT
IFR OIS

H

« Proceed visually » Direct VS
Criteria for visual segment

- The pilot will fly directly from the heliport or landing location to the IDF
  - The term "proceed visually" implies that pilots can navigate by visual reference to 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
- The Direct-VS is protected by one direct visual OCS and one visual OIS (climbing)
- The maximum track change at the IDF is 30°
- The IDF shall be located to provide sufficient visual reference from the heliport or landing location to the IDF to enable the helicopter to cross the IDF at or above the MCA
- Entering **IMC** on the **Direct VS**.

IMC may be entered on the **Direct VS**, prior to the IDF, when the following conditions are all met:

- the procedure description shall start with a prescribed course from the heliport or landing location to the IDF; and
- the direct visual segment shall have additional obstacle protection with a second OCS (level)

« Proceed visually » Direct VS
Criteria for visual segment

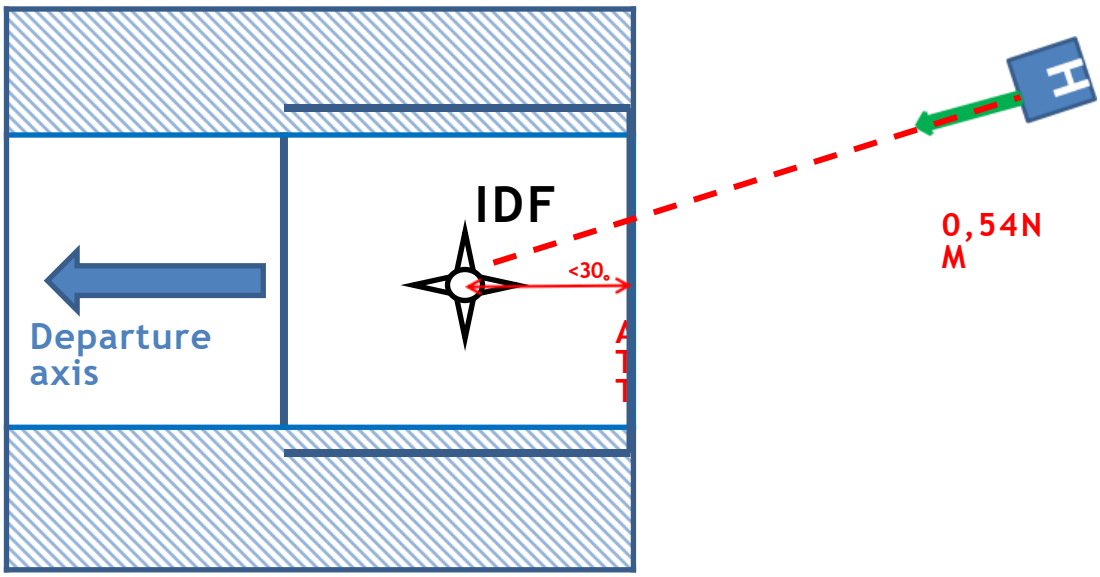
- The length of the visual segment shall be measured from the outer edge of the heliport or landing location safety area to the IDF. The length of the visual segment should permit the helicopter to climb to the IDF MCA and to accelerate to Vmini by the IDF. The minimum visual segment length shall be 1.00 km (0.54 NM).
- The maximum length shall be 13 km (7 NM) for departures based on RNP 1/RNAV 1 and 5.6 km (3 NM) for departures based on RNP 0.3.

Note.— For visual segment lengths greater than the length of the Annex 14 take-off climb surface, the extension of the Annex 14 take-off surface should be considered (see the Heliport Manual *(Doc 9261).*

- A climbing gradient is defined for the visual segment : VSDG (VSDG: Visual Segment Designed Gradient)

Proceed visually

Direct VS : Minimum visual segment length

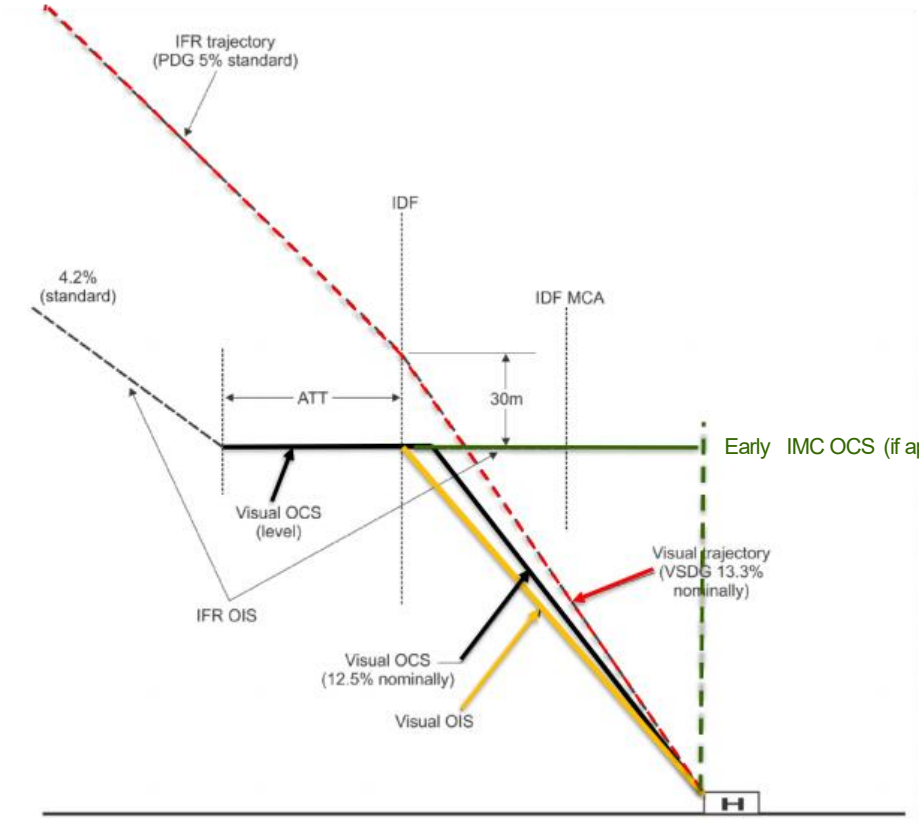


Proceed visually

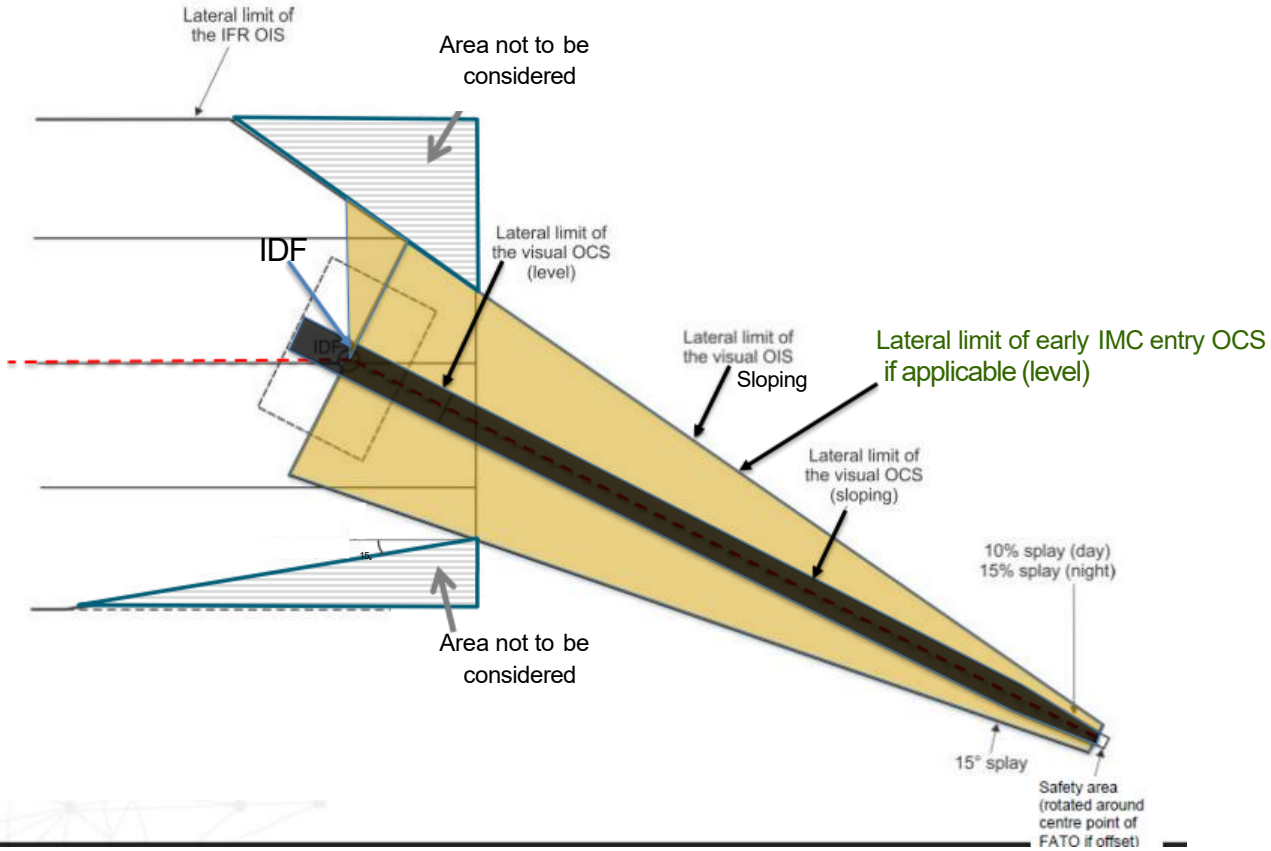
Direct VS： Maximum visual segment length

~~*No more maximum lenght*~~

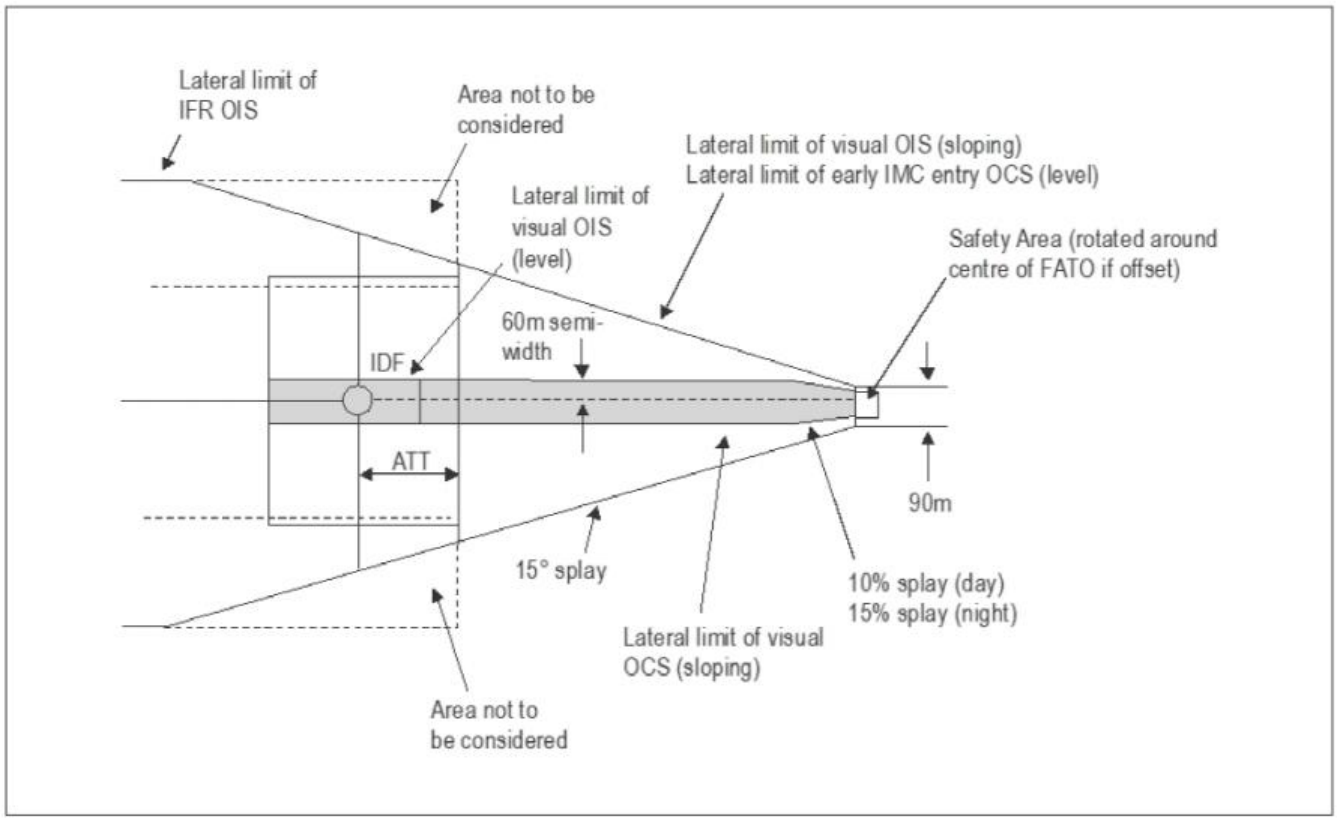
Direct VS: OCS + OIS



Direct VS: OCS + OIS

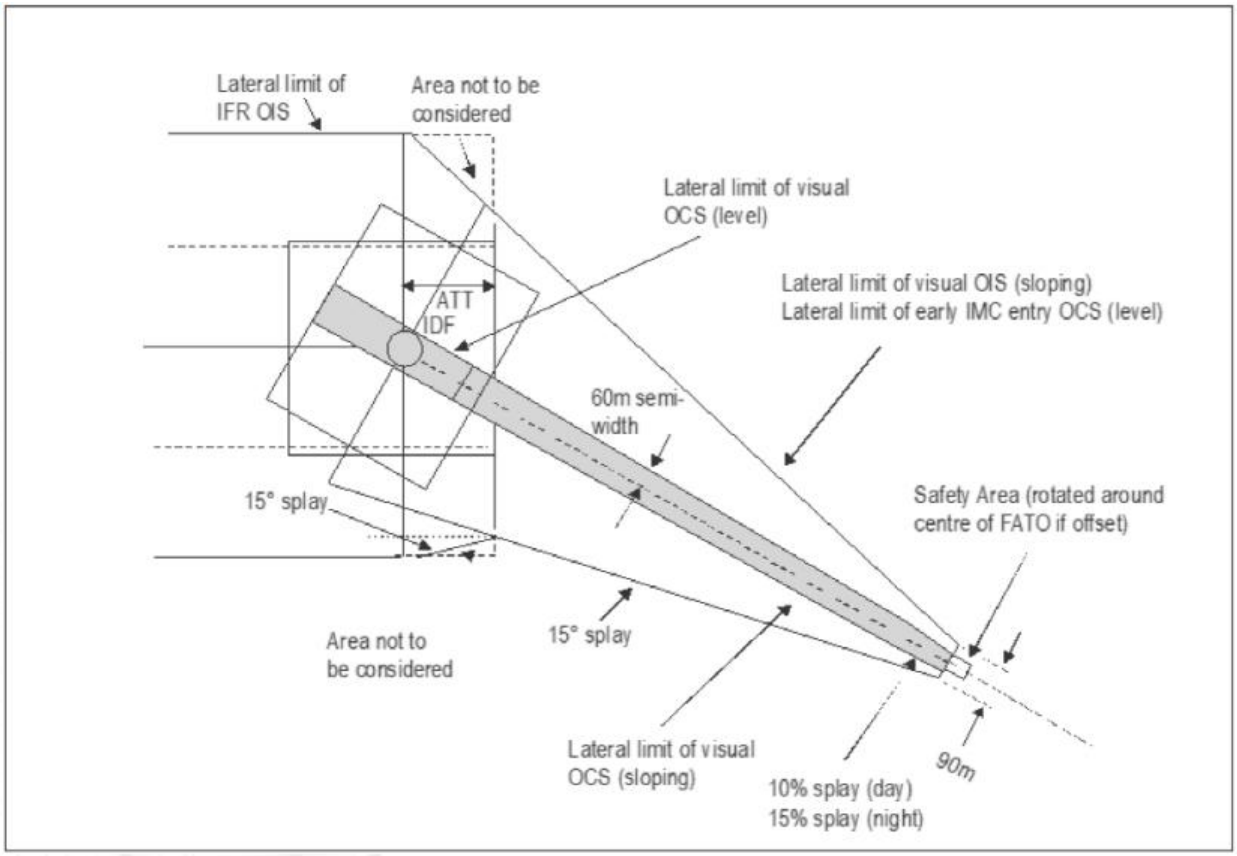


Direct VS: OCS + OIS



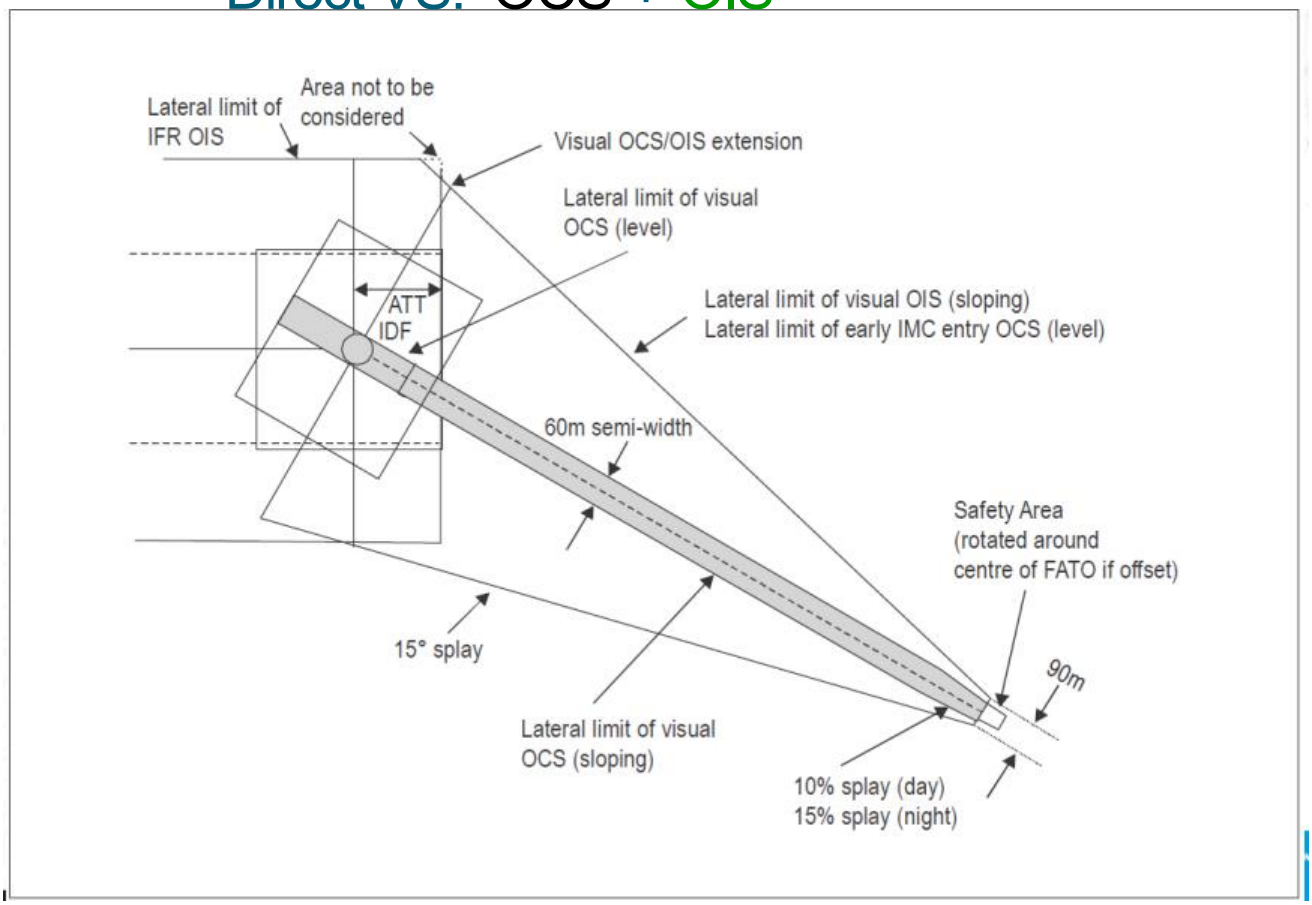
Lateral blending with no track change at the IDF

Direct VS: OCS + OIS



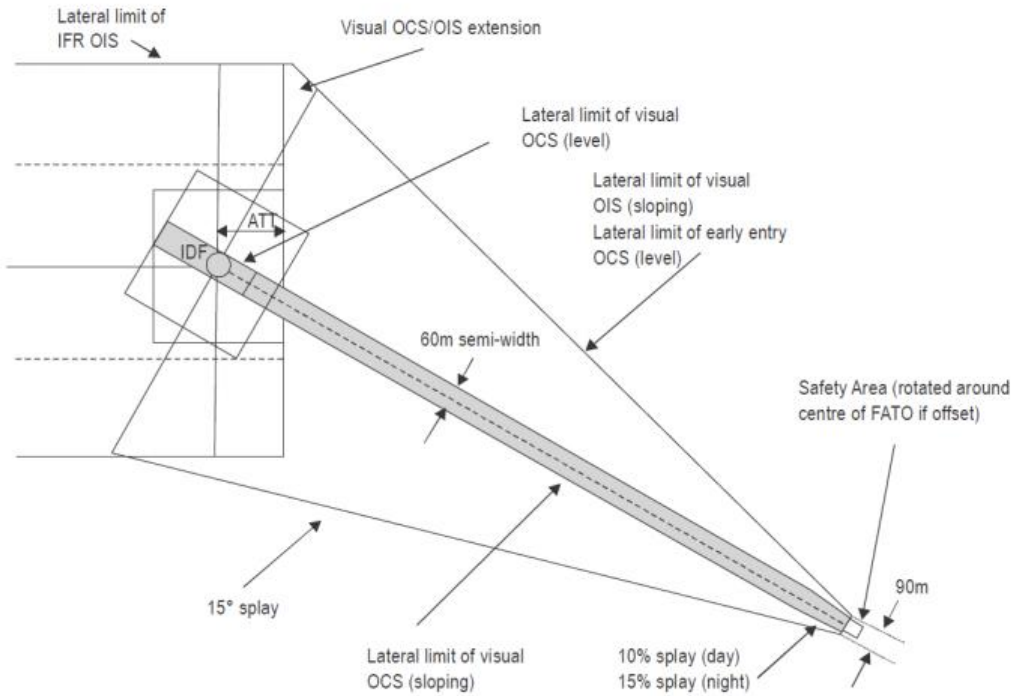
Lateral OIS with track change at the IDF and small length of the visual segment

Direct VS: OCS + OIS



with track change at the IDF and large length of the visual segment

Direct VS: OCS + OIS



Lateral blending with large track change at the IDF and large visual segment lengthfor RNP 0.3

Direct VS : Visual OCS (sloping surface)

- The width of the direct visual OCS at the origin is equal to the width of the SA. The outer edges splay from their origins at the edge of the SA, symmetrically around the centre line of the take-off climb surface, to an overall maximum width of 120 m, at which point the outer edges parallel the centre line. For day-only operations, the splay is 10 per cent; for night operations, the splay angle is increased to 15 per cent

- The elevation of the origin of the direct visual OCS is equal to the heliport or landing location elevation. It inclines at VSDG minus 0.8 per cent (nominally 12.5 per cent) from the heliport/landing location elevation to the point where the surface reaches the height of
  30 m (100 ft) below the IDF MCA, at which it becomes level

- The direct visual OCS ends at ATT after the nominal IDF

- No obstacles shall penetrate the direct visual OCS. Eventual penetrations can be eliminated by increasing the slope of the direct visual OCS and a resulting increase of the VSDG if operationally feasible. Such an increase shall be coordinated with the operators concerned

Direct VS : Visual OIS (sloping surface)

- The visual OIS segment is used to identify obstacles for charting (from origin at elevation of the heliport/landing location to the nominal IDF MCA minus 30m (100ft))
- The semi-width of the at the origin is 45 m (150 ft) and the area splays at 15 until the area connects with the instrument segment protection
- The visual segment OIS gradient shall be lower or equal to the visual direct OCS gradient. As a result, some combinations of IDF MCA, VSDG and VS length will not be feasible
- Remark: The Visual OIS shall be evaluated and any penetrating obstacles shall be documented and charted. The Visual OIS shall be evaluated and if recommended by an aeronautical study any penetrating obstacles should be lit and marked

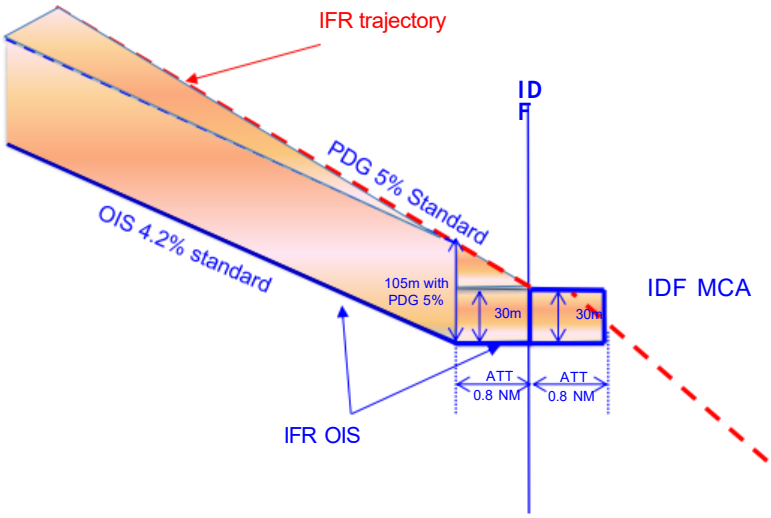
Proceed visually

Direct VS： Early entry OCS (level surface) required for IMC prior to the IDF

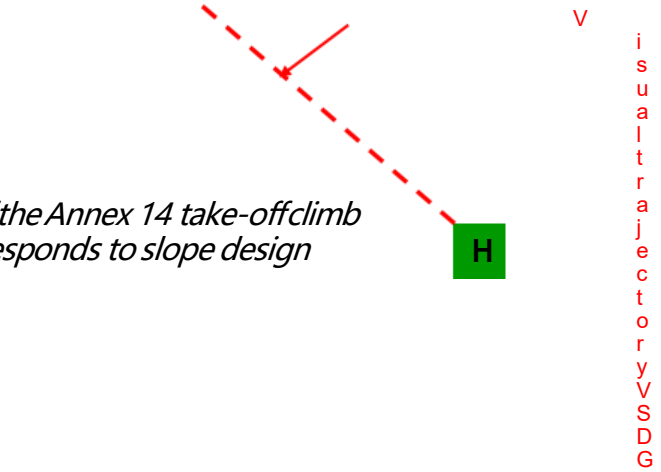
- The lateral dimensions of the early IMC entry OCS are the same than the direct visual segment OIS.
- The elevation of the early IMC entry OCS is the elevation of IDF MCA minus 30m.
- No obstacles shall penetrate the IMC entry OCS.

Proceed visually

Direct VS: VSDG

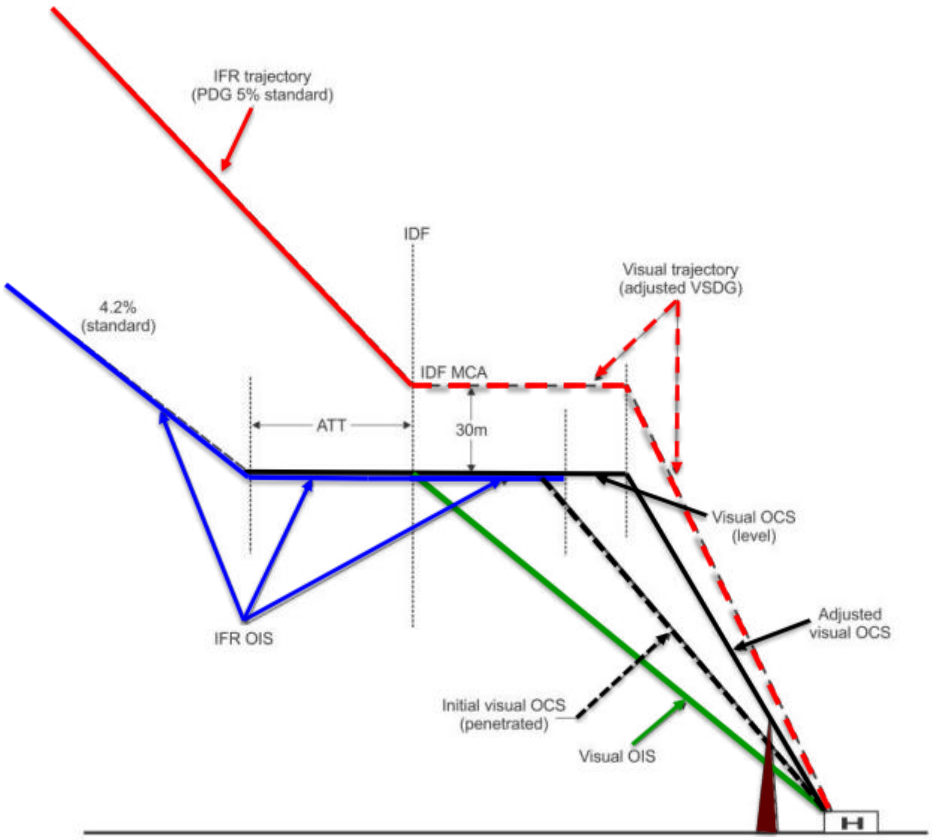


The VSDG is the Visual Segment Designed Gradient. In the direct visual segment it is established by connecting the edge of the heliport or landing location safety area to the nominal IDF (or before) at the IDF MCA.
The nominal VSDG shall be 13,3% until reaching the IDF MCA
Consistent with an obstacle clearance of 0.8% above the direct visual OCS (which is 12,5% for category C Annex 14 take-off climb surface)



Note : The VSDG may be lowered if the Annex 14 take-off climb surface of the landing location corresponds to slope design category A or B

Direct VS: adjusted VSDG (OCS penetrated)



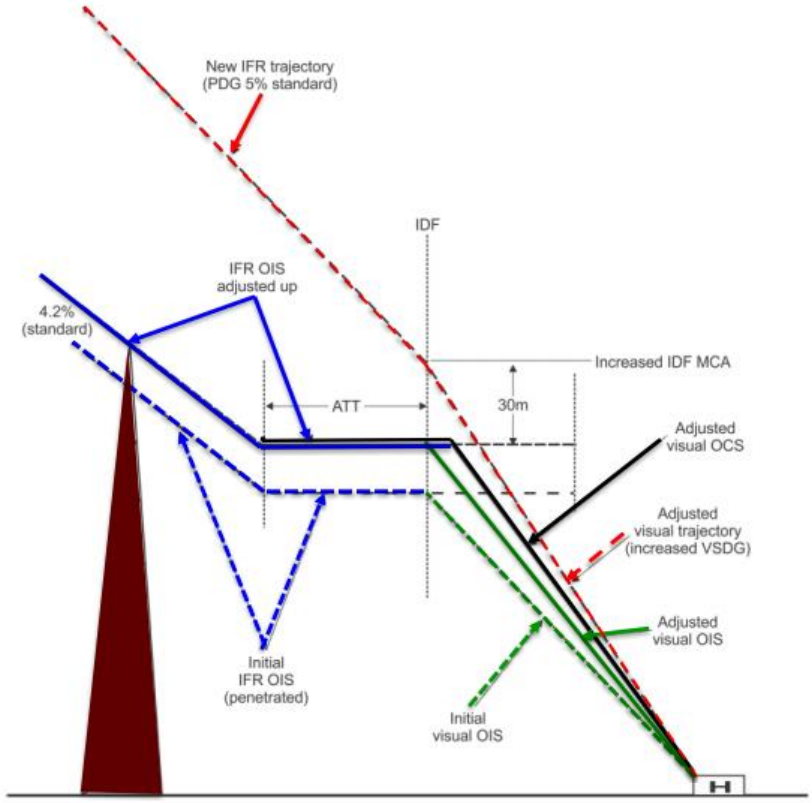
Direct VS: Obstacle penetration in the instrument segment: adjusted OIS, OCS and VSDG

- To avoid obstacle penetration of the IFR OIS, the IDF MCA should be increased such that the IFR OIS remains clear, or a turn initiated, in preference to increasing the PDG above the standard 5 per cent

- The resulting VSDG is increased and is determined by the elevation change between the boundary of the heliport or landing location safety area and the revised IDF MCA

Proceed visually

Direct VS: Obstacle penetration in the instrument segment: adjusted OIS, OCS and VSDG



Note : Visual OCS and VSDG will be ajusted if necessary only. Don't forget that OCS slope is more or equal than OIS slope

« Proceed visually » Manoeuvring VS

- The pilot takes-off in a direction other than directly to the IDF and then visually manoeuvres to join the initial instrument segment at the IDF
  - The pilot shall navigate by visual reference to the earth's surface and the visibility shall be sufficient to see and avoid obstacles, and return to the heliport or landing location if it is not possible to continue visually
- This manoeuvring VS is protected by **one sloping initial Visual OCS and one Visual OIS**
  - Note: The protection provided for this visual segment is comparable with the one provided for PinS approaches followed by a manoeuvring visual segment
- The length of the visual segment should permit the helicopter to climb to the IDF MCA and to accelerate to Vmini by the IDF. The minimum visual segment length shall be 1.00 km (0.54 NM)
- IMC shall not be entered prior to crossing the IDF at or above MCA

Proceed visually

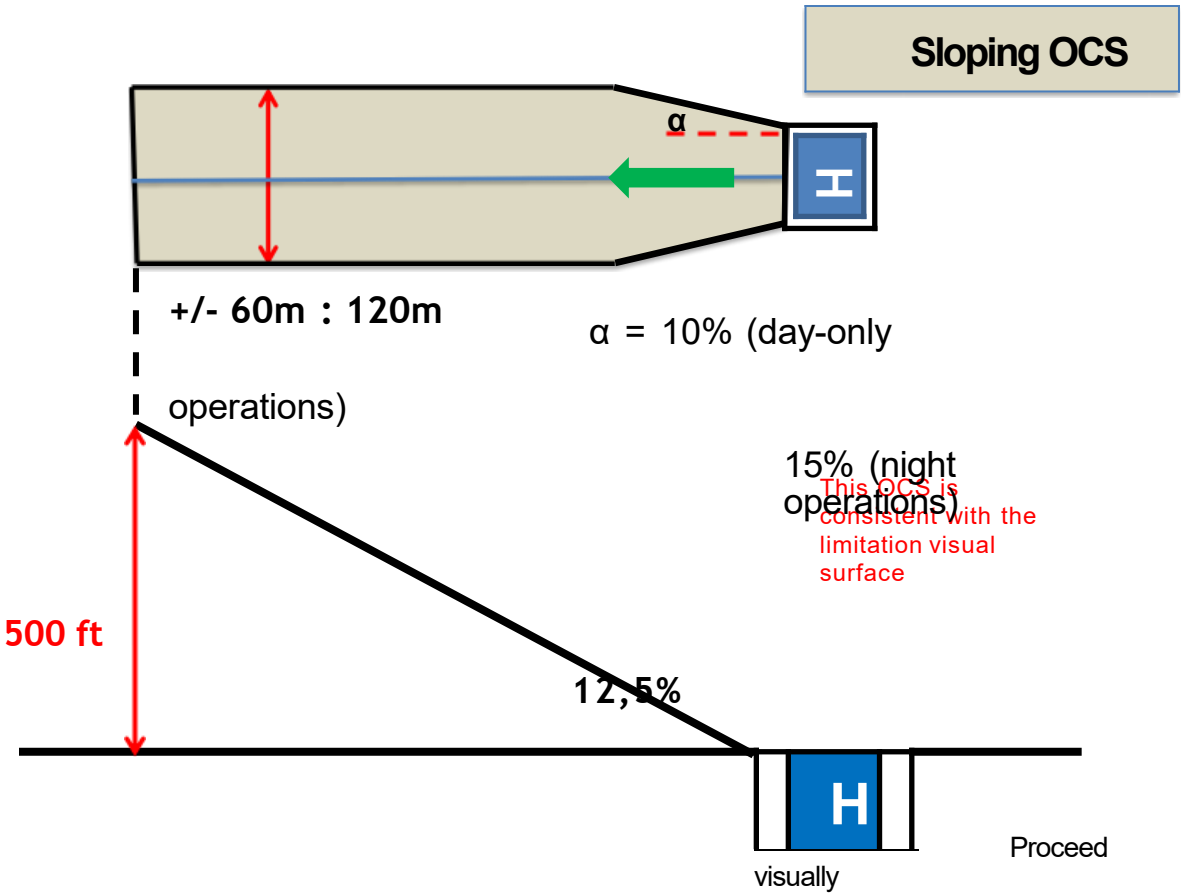
« Proceed visually » Manoeuvring VS

- The nominal VSDG shall be 13.3 per cent. This is consistent with an obstacle clearance of 0.8 per cent above the sloping initial visual OCS (see 1.3.4.5). The VSDG shall not be less than 0.8 per cent above the Annex 14 take-off climb surface

- The Minimum Crossing Height of the IDF for a PinS departure procedure with a manoeuvring visual segment shall not be less than 90 m (295 ft) above the heliport/landing location elevation.

Proceed visually

Manoeuvring VS



Manoeuvring VS : Manoeuvre area

The “manoeuvre area” is defined based on the following rules:

- Before manoeuvring towards the IDF, the pilot climbs initially on the centre line of the take-off climb surface to reach the greater of the two following heights :
  - **The IDF MCH /2**
  - **90 m (295 ft) above the heliport/landing location elevation**

then the pilot continues to climb and accelerates so as to cross the IDF at or above the IDF MCA

- the “manoeuvre area” is the area representing all the lines that originate at the IDF and connect with a “turn area” aligned symmetrically around the centre line of the take-off climb surface

Proceed visually

Manoeuvring VS : Manoeuvre area

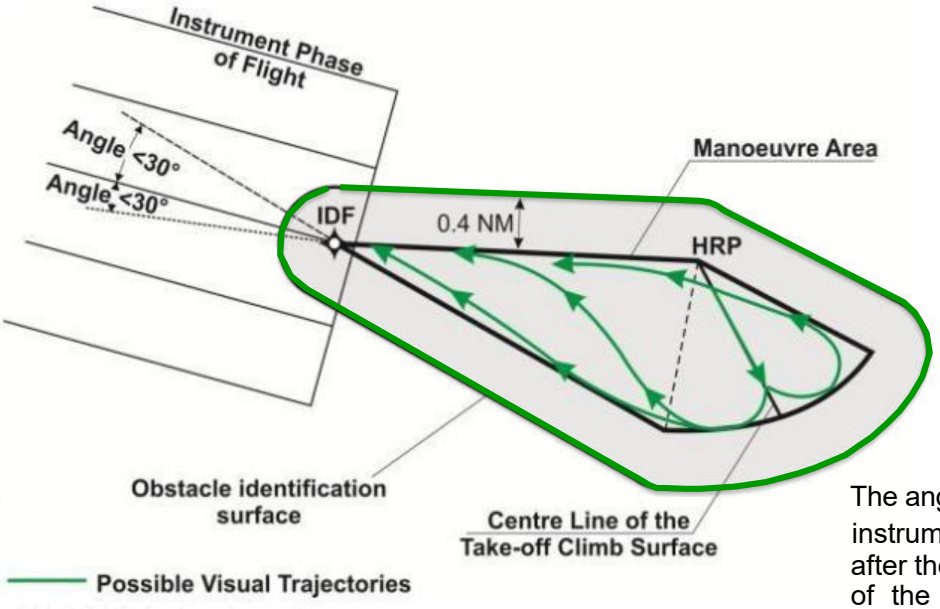
- r: radius from HRP of the 'turn area'
- α : angle from centre line of the take-off approach

IDF MCH	300ft	400ft	500ft	600ft	700ft	800ft	900ft	1000ft	>1000
r	0.8 NM	0.8 NM	0.8 NM	0.8 NM	0.9 NM	1.0 NM	1.1 NM	1.2 NM	+0,1 NM
α	50。	50。	50。	50。	45。	40。	35。	30。	Constant 30

Note.— Where operationally beneficial, in order to extend the resulting "manoeuvring area", the "turn area" can be extended by using wider angles on one side or on both sides of the centre line of the take-off climb surface.

If the IDF MCH of the procedure is more than 600 ft above the heliport/landing location elevation, r increases linearly (0.1NM) for each additional 30 m above 600 ft.

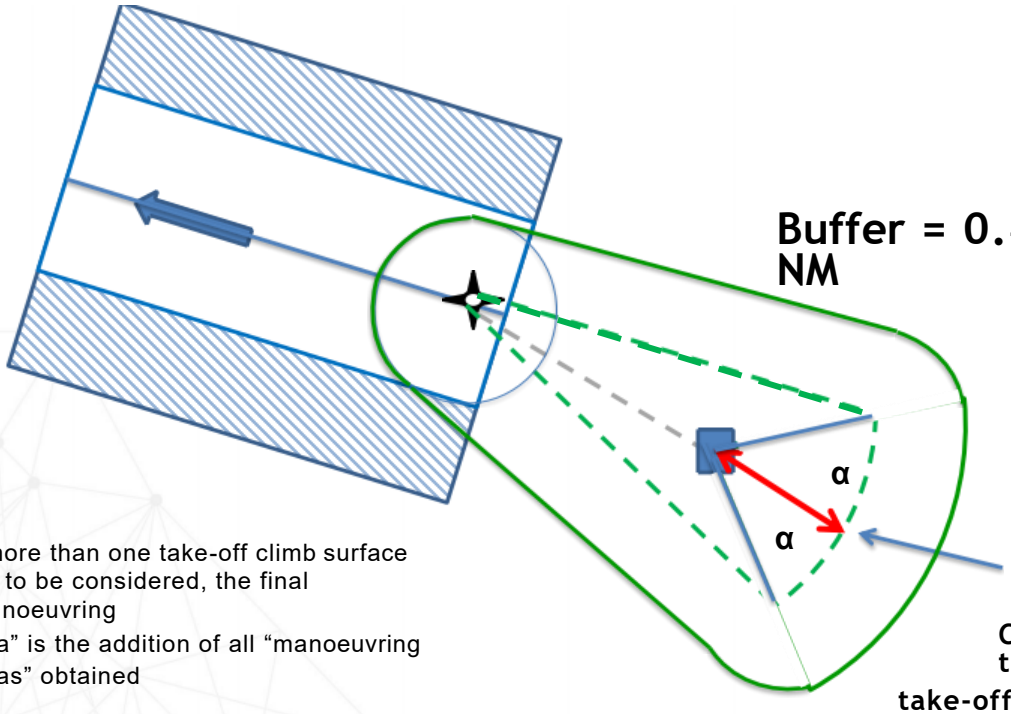
Manoeuvring VS : OIS (Manoeuvre area + buffer)



The angle between the initial instrument segment direction after the IDF and the direction of the "extreme" visual trajectories corresponding to the limits of the "manoeuvring area" shall be less than 30°

Proceed visually

Manoeuvring VS : OIS (Manoeuvre area + buffer)

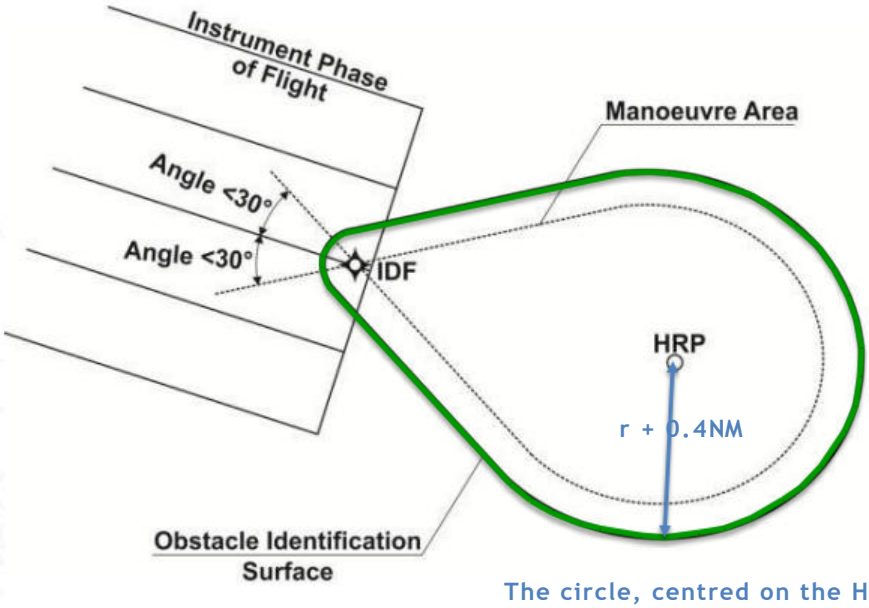


If more than one take-off climb surface has to be considered, the final "manoeuvring area" is the addition of all "manoeuvring areas" obtained

Proceed visually

Manoeuvring VS : OIS (Manoeuvre area + buffer)

The initial take-off can be performed in an omni-directional way

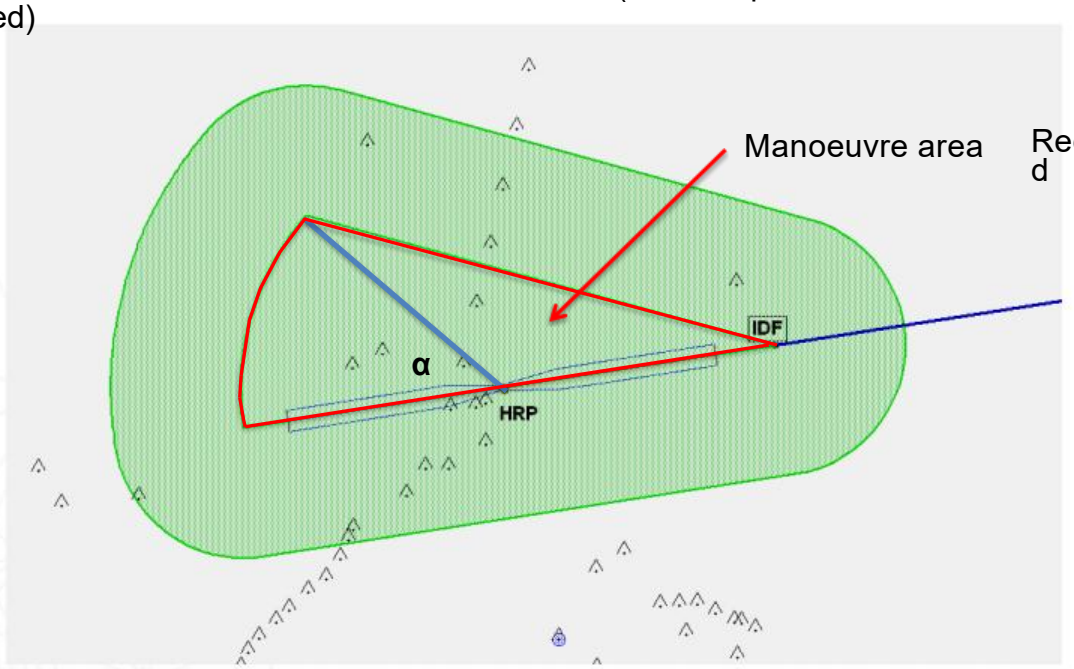


The circle, centred on the HRP, has a radius equal to (r + 0.4NM)

Proceed visually

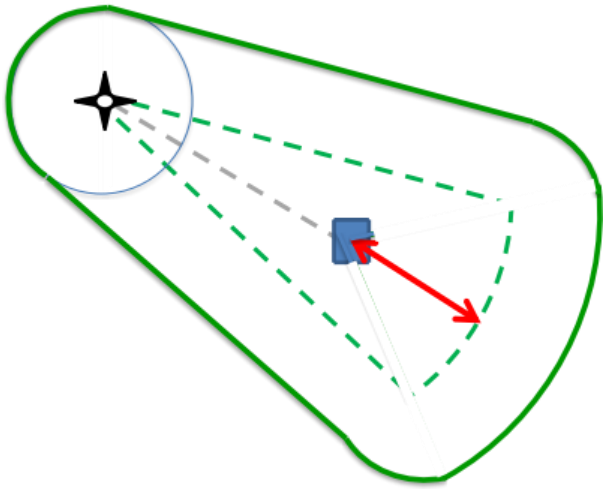
OIS : Manoeuvre area + buffer

2 take-off axis. Reduction of the manoeuvre area (West departure: left turn prohibited)



Proceed visually

OIS : Manoeuvre area + buffer



Obstacles penetrating OIS shall be charted and may be marked and/or lighted when feasible

The OIS is a level surface at a height of the maximum between :

1- IDF MCH (actual height of MCA above the heliport/landing location)/2 - 150 ft

2- 150 ft above the heliport/landing location elevation

Proceed visually

Proceed VFR

- From the heliport or landing location to the IDF, pilot can comply with VFR to see and avoid obstacles until crossing the IDF at or above the IDF MCA. It is based on State regulatory for VFR operations. No obstacle protection area in the VFR segment. IFR clearance shall be obtained prior to reaching the IDF

- Since there is no obstacle protection area, IMC shall not be entered until crossing the IDF

Questions ?

E

PINS RNP APCH LPV MINIMA

SBAS vertical guidance benefits

Lot of IFR helicopters are SBAS receivers equipped

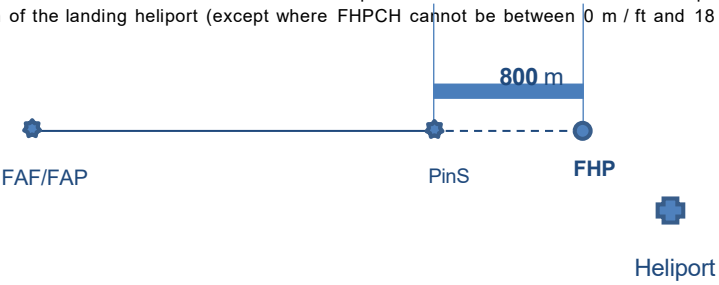
- Integrity and accuracy improvement
- Higher availability
- A nominal path can be defined everywhere thanks to FAS data block (does not depend on any local ground aid or infrastructure)
- Lateral and vertical guidance
- Reduced landing minima (descend to 250ft)
- Easy to fly

POINT-IN-SPACE RNPAPCH APPROACH PROCEDURES FOR HELICOPTERS DOWN TO LPV MINIMA

- The general criteria in Part III, Section III, Chapter 5 and Part IV, Chapter 2, as amplified or modified by the criteria in this chapter, apply to PinS RNP APCH approaches for helicopters down to LPV minima.
- FHP (fictitious heliport point) and PinS locations

The final approach segment, ending at the PinS, is oriented on a Fictitious Heliport Point (FHP).

The distance between the PinS and the FHP is equal to 800 m. The FHP elevation is equal to the elevation of the landing heliport (except where FHPCH cannot be between 0 m / ft and 18 m / 60 ft).

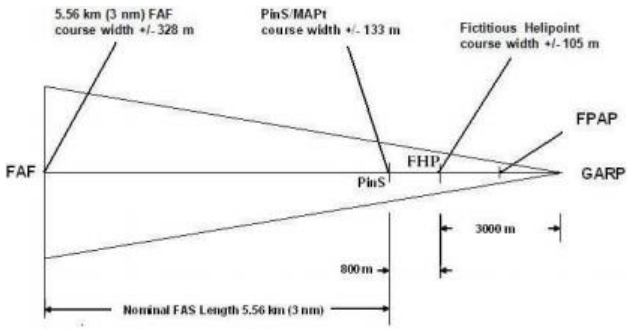


Note: Where the requirement that the FHP elevation be equal to the landing heliport elevation restricts the flexibility in design to an unacceptable level, another reference point may be used. Attention should be given to ensure that obstacles and OAS are based on the appropriate reference point.

Display Scaling and Fictitious Helipoint Orientation

Lateral display

- At the FHP, the lateral course width is **+/-105 m**. With **the 3000 m** distance between the FHP and GARP, the resulting angular splay is 2 . Extensive flight testing has demonstrated the best combination of procedure flyability and obstacle protection requirements results in a distance of **800 m** between the PinS/Mapt and the FHP with a lateral course width of +/- 133 m at the PinS/MAPt location.
- FPAP is 305 m before the GARP



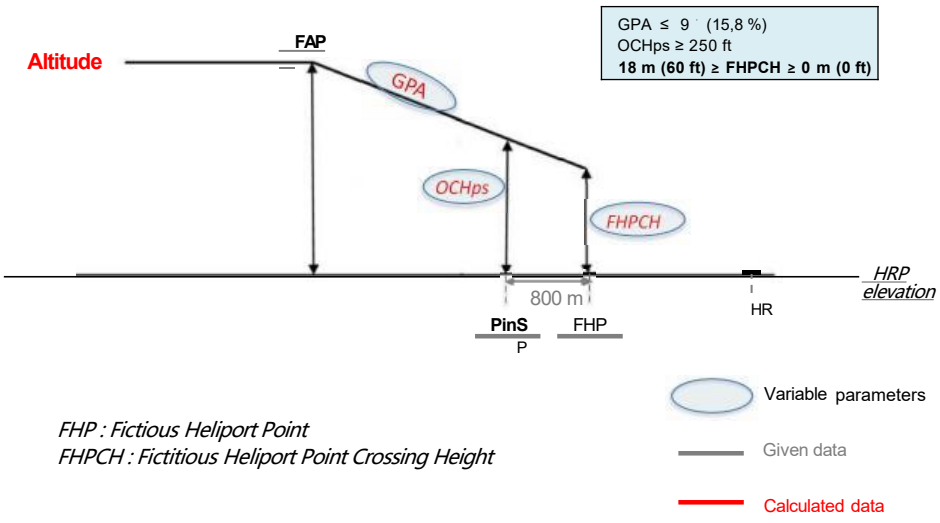
Definition of an operational FAS

- Once the PinS and the FHP locations have been defined, an operational FAS can be defined. The following assumption is used: the **OCA/H of the precision segment (called OCA/Hps) is equal to the altitude/height of the nominal glide path at the PinS location.**
- Based on this assumption, the **operational** FAS is defined by **fixing two** of the following three values: the **Glide Path Angle** (GPA), the **OCA/Hps** at the PinS and the crossing height of the flight path angle above the FHP (**FHPCH**). The following constraints apply for those values:
  - a) ~~GPA ≤ 6.3 (11%)~~ **GPA ≤ 9 (15.8%);**
  - b) OCHps ≥ 250 ft;
  - c) ~~FHPCH ≥ 0~~ **18 m (60 ft) ≥ FHPCH ≥ 0 m (0 ft).**

*Note: The **OCHps** is always referenced to the **heliport or landing location elevation***

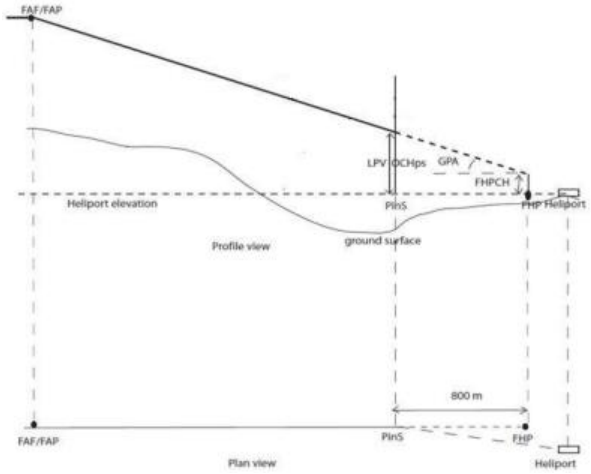
Amendment 10
When an FHP elevation equal to the elevation of the landing heliport leads to an FHPCH greater than 18 m or less than 0 m, a different FHP elevation shall be determine using an FHPCH value of 15 m.

Vertical profile



FHP : Fictious Heliport Point
FHPCH : Fictitious Heliport Point Crossing Height

Representation of the LPV PinS APCH

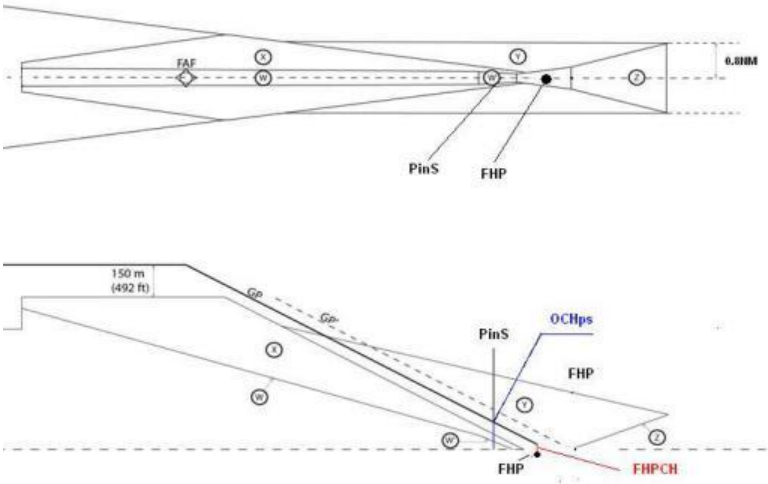


For FHPCH = 18 m and OCHps = 250ft:
- GPA : 4.2 (7.3 %)

For FHPCH = 15 m and OCHps = 250ft:
- GPA = 4.4。 (7,7%)

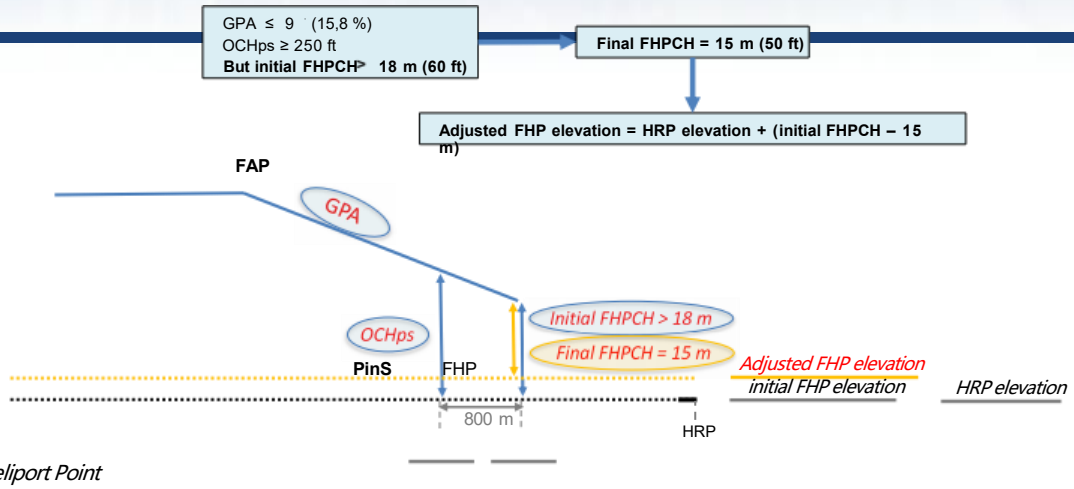
For FHPCH = 0 m and OCHps = 250ft:
- GPA = 5.4 (9.5%)

Representation of the LPV PinS APCH



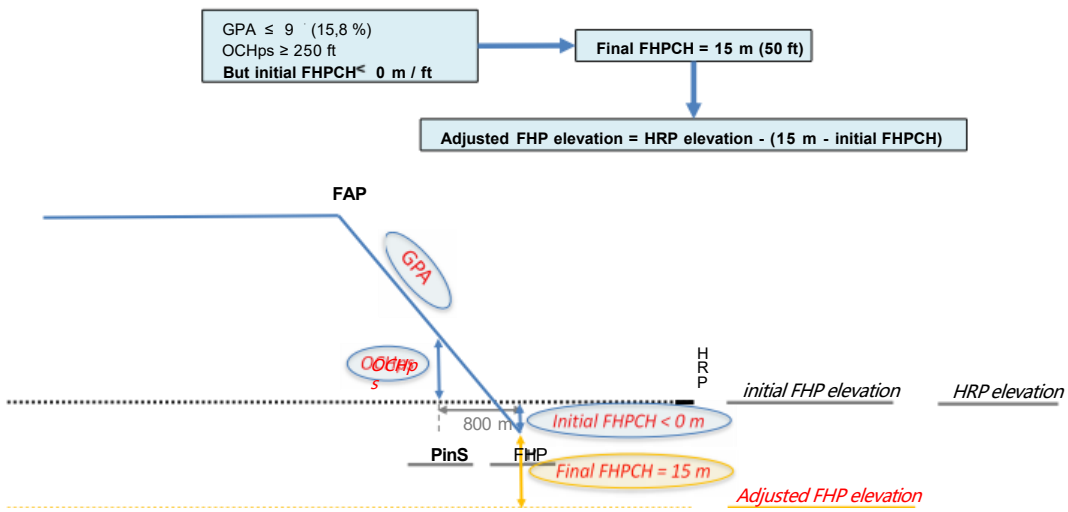
The system of coordinates used to express protection surfaces shall be based on the FHP location.
General protection criteria shall be applied using Cat H parameters

FHP adjustment for FHPCH > 18 m



FHP : Fictious Heliport Point
FHPCH : Fictitious Heliport Point Crossing Height

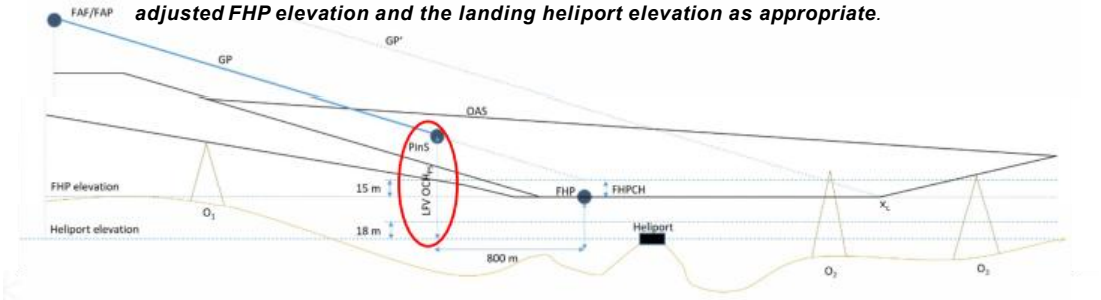
FHP adjustment for FHPCH 0 m



FHP : Fictious Heliport Point
FHPCH : Fictitious Heliport Point Crossing Height

OCHps computation with adjusted FHP elevation

- *The FHP, with its **adjusted FHP elevation**, defines the **new frame of reference for the obstacle assessment**, causing the OAS to rise or drop accordingly.*
- *When reducing the heights ofall missed approach obstacles to the heights of equivalent approach obstacles to determine the OCA/H, the **heights of the missed approach obstacles shall refer to the adjusted FHP elevation** and consequently the **resulting equivalent approach obstacle heights are referenced to the adjusted FHP elevation**.*
- *The **OCA/H** shall be determined by **adding the appropriate "height loss altimeter margin"** to the height of the highest approach obstacle (real or equivalent), and, in order to account for the adjustment of the FHP elevation, **by adding or subtracting the difference between the adjusted FHP elevation and the landing heliport elevation as appropriate**.*



ENCODING OF THE FAS DATA BLOCK with an adjusted FHP elevation

- *The coding of the FAS data block shall ensure in any case that **the nominal GP crosses the PinS/MAPtat the appropriate OCHps for which obstacle protection is guaranteed**.*
- *This shall be done by **coding the ellipsoidal height of the adjusted FHP** along **with the nominal FHPCH of 15 m (50 ft).***

STEEP GLIDE PATH ANGLE APPROACHES greater than **6.3 degrees** (11 per cent)

- New **Appendix C to chapter 3 (amendment 10)**

- *HL should be adjusted for the specific GPA* ° °
  - Increase the HL of 5 % of the radio altimeter margin per 0,1 above 3,2

- *W and W' surfaces:* The coefficients for 6.3。 glide path are used for all glide path angles greater than 6.3 .

- *X and Y surfaces: The coefficients for 3.5。 glide path at the appropriate GARP/threshold distance are used for all glide path angles greater than 6.3 .*

- *Z surface: The Z surface coefficients are used for all glide path angles*

- *Use the ha formula as usual:*

With Xe = -1000 APVland -700 CATI

ha = [hma cot Z + (x – Xe)]/(cotZ + cot⊖)

STEEP GLIDE PATH ANGLE APPROACHES greater than **6.3 degrees** (11 per cent)

- *As the configuration of the SBASAPV I OAS is changed, a re-survey of obstacles may be required.*

- *If the glide path angle exceeds the standard values, a special note shall be included on the instrument approach chart stating that appropriate aircraft and crew authorizations are required to use such a procedure (see Annex 4, 11.10.8.8).*

- *For PinS approaches with glide path **angles smaller than or equal to 6.3 。 (11 per cent), refer to Part III, Section 3, Appendix to Chapter 5***
  - *Specific formulas or values to have Wand W' surfaces coefficients*

Validation of the chosen operational FAS

- Once the operational FAS has been defined, the general protection criteria described in Part III, Section III, Chapter 5 shall be applied.
- Because the OCA/Hps is geometrically fixed by the operational FAS, the following iterative process shall be performed to achieve the most efficient procedure, through application/determination of the lowest possible OCH and the lowest acceptable GPA:

  – a) if there is no penetration of the protection surfaces by an obstacle leading to an OCA/H greater than the OCA/Hps, the defined operational FAS is acceptable. However, if the FAS is not the most efficient, a different FAS may be defined (for instance by decreasing the OCA/Hps and FAF elevation or by keeping the same FAF elevation and increasing the GP) and the obstacle protection surfaces shall be checked to determine if lower minima can be achieved;

  – b) if there is a penetration of the protection surfaces leading to an OCA/H greater than the OCA/Hps, the defined FAS is not acceptable. In this case, a new operational FAS shall be defined (for instance by increasing both the OCA/Hps and FAF elevation or by keeping the same FAF elevation and decreasing the GP) and the new protection surfaces shall be checked.

Visual phase, vertical profile

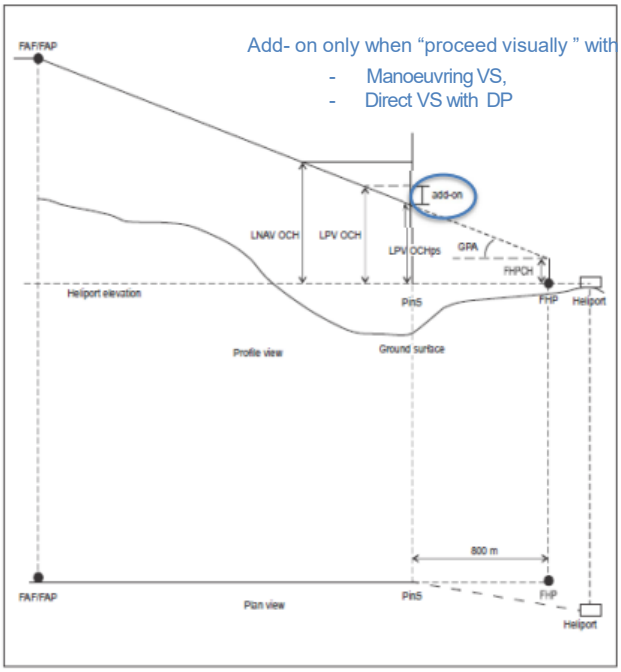
- For procedures with “proceed visually” with “manoeuvring VS” or “direct VS” with DP:
  – In order to ensure adequate transition between the instrument phase of flight and the visual phase of flight, the final OCA/H is calculated by including an “add-on” value to the OCA/Hps
- Criteria for the protection of the visual segment «Direct-VS» or «Manoeuvring-VS » have been defined by using MDA. PinS LPV using a DA, an « **add-on value** » is added to the computed **OCAps**.
  - Add-on value (en ft) = 1460/102 x GPA (in degrees)
- This increase of OCA ensures that if the descent is stopped at OCA, the helicopter will be in level flight at OCAps at the location of the PinS before flying visually.

Note : No add-on applies to procedures with :
- “proceed visually” with direct visual segment without DP
- “proceed VFR”

GPA	Add-on value (ft)	Add-on value (m)
3°	43	13.1
3.5°	50	15.3
4°	57	17.5
5°	72	21.9
6°	86	26.2
7°	100	30.5
8°	115	34.9
9°	129	39.3

New values with amendment 10

Representation of a PinS RNP APCH supporting LNAV and LPV minima



PINS RNPAPCH with LNAV MINIMA

- When LNAV and LPV minima for a PinS RNPAPCH procedure are depicted on the same chart, the PinS and GPA of the two approaches shall be the same. The LNAV GPA shall equal the LPV GPA and shall not be calculated in accordance with paragraph 2.7.5 (see note). As per definition, the LPV OCA/Hps shall be reached at the PinS location and the LNAV OCA/H shall be reached before the PinS.

Note: The GPA LNAV will be equal to the GPA LPV and will not be computed as it is in general criteria §2.7.5 :

The final segment is calculated from the FAF altitude at the plotted position of the FAF to the OCA/H at the plotted position of the MAPt (PinS location)

Missed Approach

- The missed approach turn shall be prescribed at a designated Turning Point (TP) (See Part III, Section III, Chapter 5).

- *Note.— Currently criteria for turns at a designated altitude/height or "as soon as practicable" are not defined but are under development. Such criteria may be necessary in some locations, due to specific obstacle limitations, to optimize the LPV minima.*
- If a missed approach climb gradient higher than the nominal climb gradient (4.2%) allows an operational benefit, it may be considered the minimum practicable gradient. In this case, the OCA/H applicable to the nominal gradient cannot be shown. If a nominal missed approach climb gradient of 4.2% is operationally required, a separate procedure shall be published with its applicable OCA/H.

Protection of the visual segment

Criteria used for the definition and the protection of the visual segment described in general criteria for visual segment with the following exceptions:

- As the SBAS OAS do not have primary and secondary areas the OIS outer edge should be connected to a semi-width of 741 m (0.4 NM) and the level OIS should be connected to a semi-width of 1 482 m (0.8 NM) at the nominal location of the PinS (MAPt)

- The OCA/H shall be replaced by the OCA/Hps value

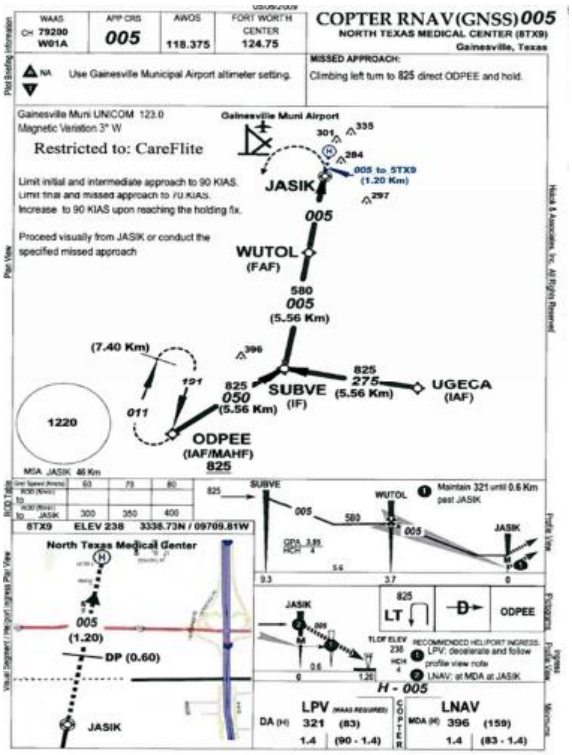
- The MOC shall be replaced by the applicable height loss margin (35 m or more)
- The MDA/H shall be replaced by the (DA/H – "add-on") value

Promulgation

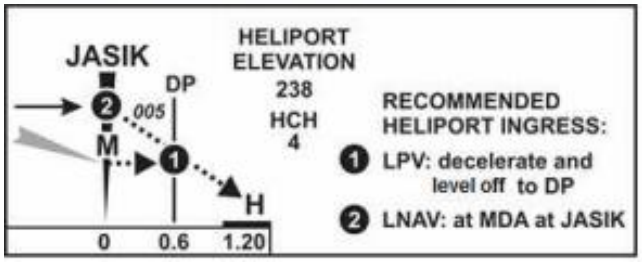
- PinS approaches to LPV minima shall be promulgated in accordance with Volume II, Part III, Section 5, Chapter 1 and Volume II, Part IV, Chapter 2, paragraph 2.11.
- A vertical profile inset shall be charted for these procedures. Information depicted in the vertical profile inset shall include the:
  - a) visual segment profile;
  - b) heliport or landing location;
  - c) location of the MAPt;
  - d) final portion of the final approach segment;
  - e) heliport elevation;
  - f) HCH;
  - g) range scale originating from the MAPt to the heliport, which is also used to identify the DP, if one exists in the visual segment;
  - h) visual segment track; and
  - i) necessary notes needed to highlight certain attributes of the visual segment profiles.

Example

PinS
LPV and LNAV Chart



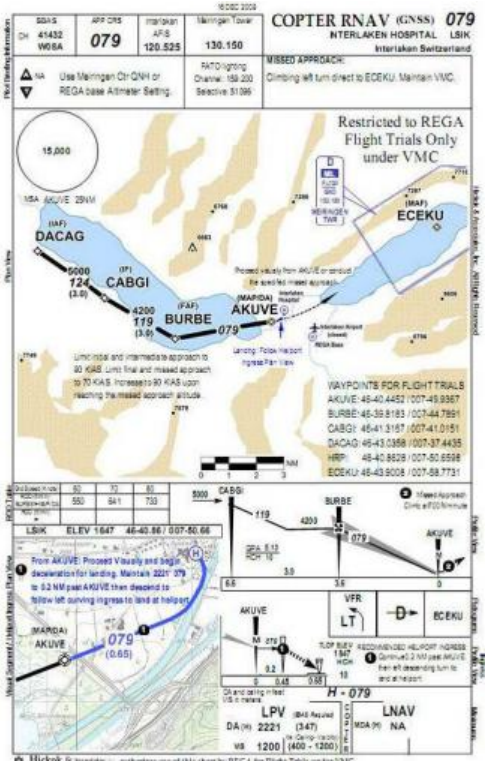
LPV/LNAV Visual Segment Vertical Profile



- There are two different vertical visual segment profiles starting at JASIK, the MAPt. The first is the vertical profile for the LPV procedure. The example depicts an initial level visual segment low at the decision altitude to 0.6 km past JASIK. This is the DP where the final visual decent to landing at the heliport is begun. Ball note 1 provides information for the LPV visual segment vertical profile. The second is the vertical profile from JASIK to the HCH for the LNAV procedure. It is highlighted with ball note 2.
- Ball Note 1 in the profile view inset indicates for the LPV procedure the initial portion of the visual segment is flown level from the Pins location until reaching the descent point which is located 0.6 km past JASIK. Final descent to landing is then begun at 0.6 km past JASIK.

PinS LPV approach

- SUISSE (REGA)
  - Specific PinS LPV with :
    - Proceed visually
    - DP
    - LPV only



Encoding of the FAS DATA BLOCK (1)

- **a. Operation Type: 0** is reserved for straight-in or **PinS procedures**.
- **b. Service Provider Identifier:** 0 for WAAS, **1** for EGNOS, 2 for MSAS, 3 for GAGAN, 4 for SDCM. A service provider ID of 15 indicates that any service provider may be used and a service provider ID of 14 indicates the FAS data block is not intended for SBAS use.
- **c. Airport Identifier:** If the heliport has an identifier, it is encoded. If the heliport does not have an identifier, the procedure **MAPt** waypoint name should be used, since it is the closest described point in the procedure database to the heliport. For procedures serving multiple heliports, the procedure MAPt waypoint name should be used.
- **d. Runway Number:** Runway number is interpreted as the final approach course rounded to the nearest 10 degrees (2 digits).
- **e. Runway Letter:** Since there is not a letter associated with the procedure, the field is encoded as **00.**
- **f. Approach Performance Designator:** The Approach Performance Designator field is intended for the use by GBAS equipment and not used for SBAS operations.
- **g. Route Indicator:** Encode the same as in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **h. Reference Path Data Selector (RPDS):** A numerical identifier used to select the FAS data block (desired approach). It is intended for GBAS and is not used for SBAS operations.
- **i. Reference Path Identifier:** Since these procedures are not flown to runways, the two-digit runway number is replaced with the FAS track rounded to the closest 10 degrees. For FAS tracks 355 to 004 , the runway number portion of the field should be encoded to 36
  - *Note: This coding is consistent with a PinS procedure that supports approaches to more than one landing site.*
- **j. Landing Threshold Point (LTP)/Fictitious Threshold Point (FTP)-Latitude:** Encode the **helipoint/fictitious helipoint (HP/FHP)** latitude the same as the LTP/FTP is encoded in Vol. II, Part III, Section 2, Chapter 6 Appendix A.

Encoding of the FAS DATA BLOCK (2)

- **k. Landing Threshold Point (LTP)/Fictitious Threshold Point (FTP)-Longitude:** Encode the **HP/FHP** longitude the same as the LTP/FTP is encoded in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **l. LTP/FTP Height Above Ellipsoid (HAE):** Encode the **HP/FHP** height above ellipsoid the same as the LTP/FTP HAE is encoded in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **m. Δ Flight Path Alignment Point (FPAP)-Latitude.** This is the Δ latitude of a point located on a geodesic line beyond the **HP/FHP** that is aligned with the PinS FAS. Encode the same as in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **n. Δ Flight Path Alignment Point (FPAP)-Longitude.** This is the Δ longitude of a point located on a geodesic line beyond the **HP/FHP** that is aligned with the **PinS FAS**. Encode the same as in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **o. Threshold Crossing Height (TCH):** The designated crossing height of the flight path angle above the helipoint/fictitious helipoint (**FHPCH**). Encode the same as in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **p. TCH Units Selector:** Encode the same as depicted in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **q. Glidepath Angle:** Encode the same as shown in Vol. II, Part III, Section 2, Chapter 6 Appendix A.
- **r. Course Width at Threshold:** This is replaced with the course width at the helipoint/fictitious helipoint. For SBAS APV PinS approaches the FHP course width is equal to +/- **105 m**
- **s. Δ Length Offset:** Since there is not a runway associated with the procedure, the field is encoded with a 0.
- **t. Horizontal Alert Limit (HAL):** Encode as shown in Vol. II Part III Section 2, Chapter 6 Appendix A. PinS procedures have HAL=40.
- **u. Vertical Alert Limit (VAL):** For PinS procedures with lateral only guidance, VAL=0. When vertical guidance is provided, VAL ≤ 50
- **v. Final Approach Segment CRC Remainder:** Calculate and encode as shown in Vol. II, Part III, Section 2, Chapter 6 Appendix A

Example : FAS DATA BLOCK PinS 212

PINS 212 AD LFLG

Operation Type	0
SBAS Provider	1
Airport Identifier	LFLG
Runway	21
Runway Direction	0
Approach Performance Designator	0
Route Indicator	
Reference Path Data Selector	0
Reference Path Identifier	E21A
LTP/FTP Latitude	451447.0480N
LTP/FTP Longitude	0055220.4130E
LTP/FTP Ellipsoidal Height (metres)	271.0
FPAP Latitude	451333.8980N
Delta FPAP Latitude (seconds)	-73.1500
FPAP Longitude	0055112.9790E
Delta FPAP Longitude (seconds)	-67.4340
Threshold Crossing Height	15.0
TCH Units Selector	1
Glidepath Angle (degrees)	3.60
Course Width (metres)	105.00
Length Offset (metres)	0
HAL (metres)	40.0
VAL (metres)	35.0

Questions ?

IFR procedures

Charting

Regulation

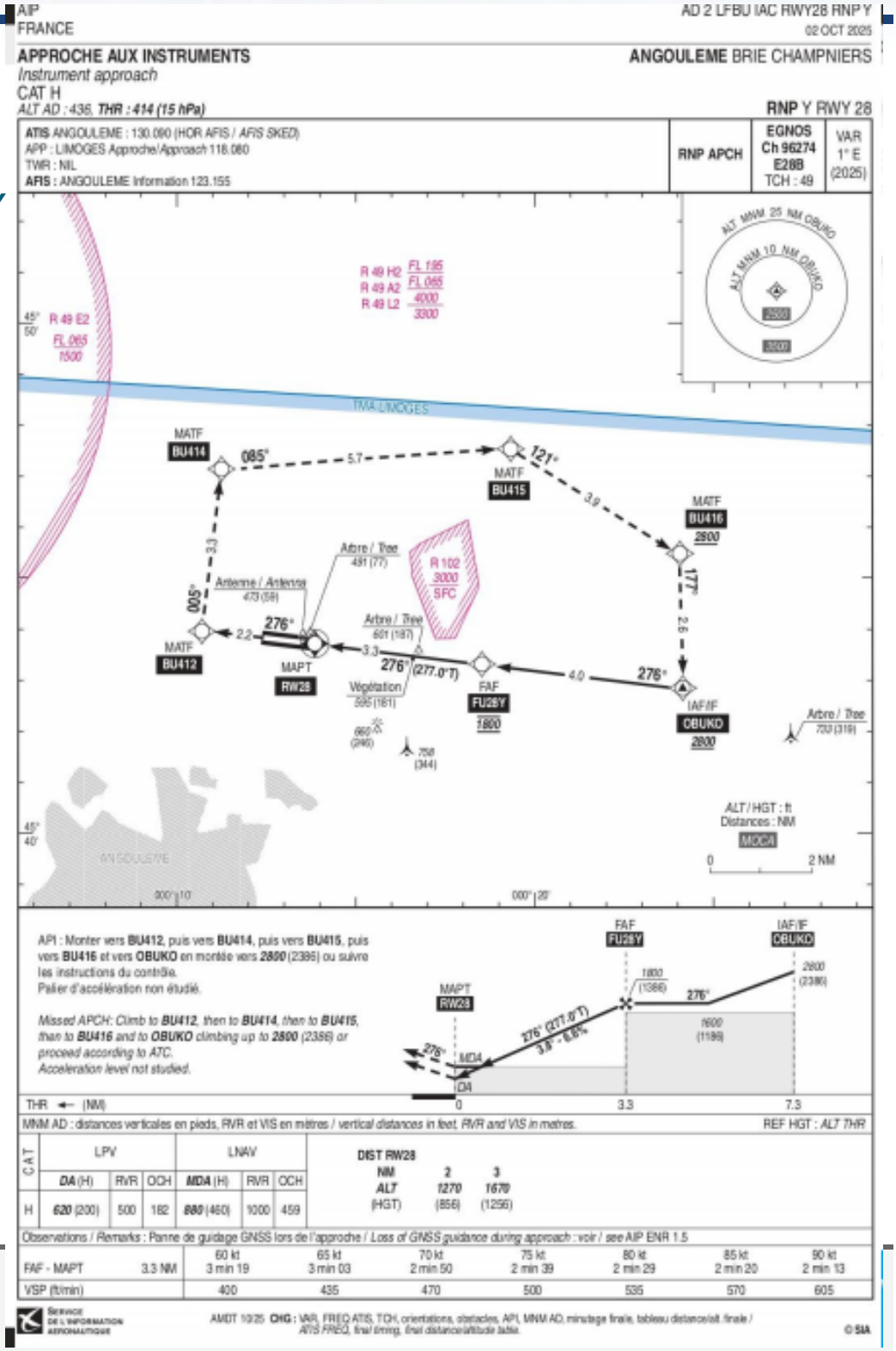
- ICAO Annex IV
- Doc 8697
- Doc 8168 vol 2 part IV

Contents

- Approach charts to RWY
- Pins approach charts
- Pins departure charts

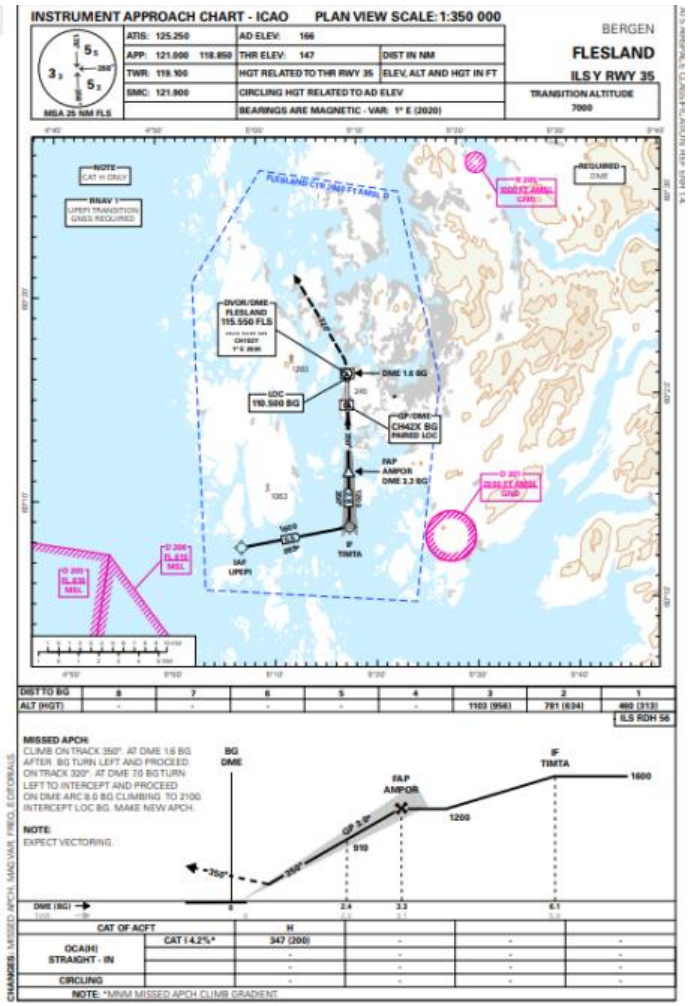
Approach to RWY

- French publication
  - LFBU
  - RNP Y RWY 28
  - Helicopter approaches to a runway are identified in the same way as fixed wing approaches with the Category H included in the minima box



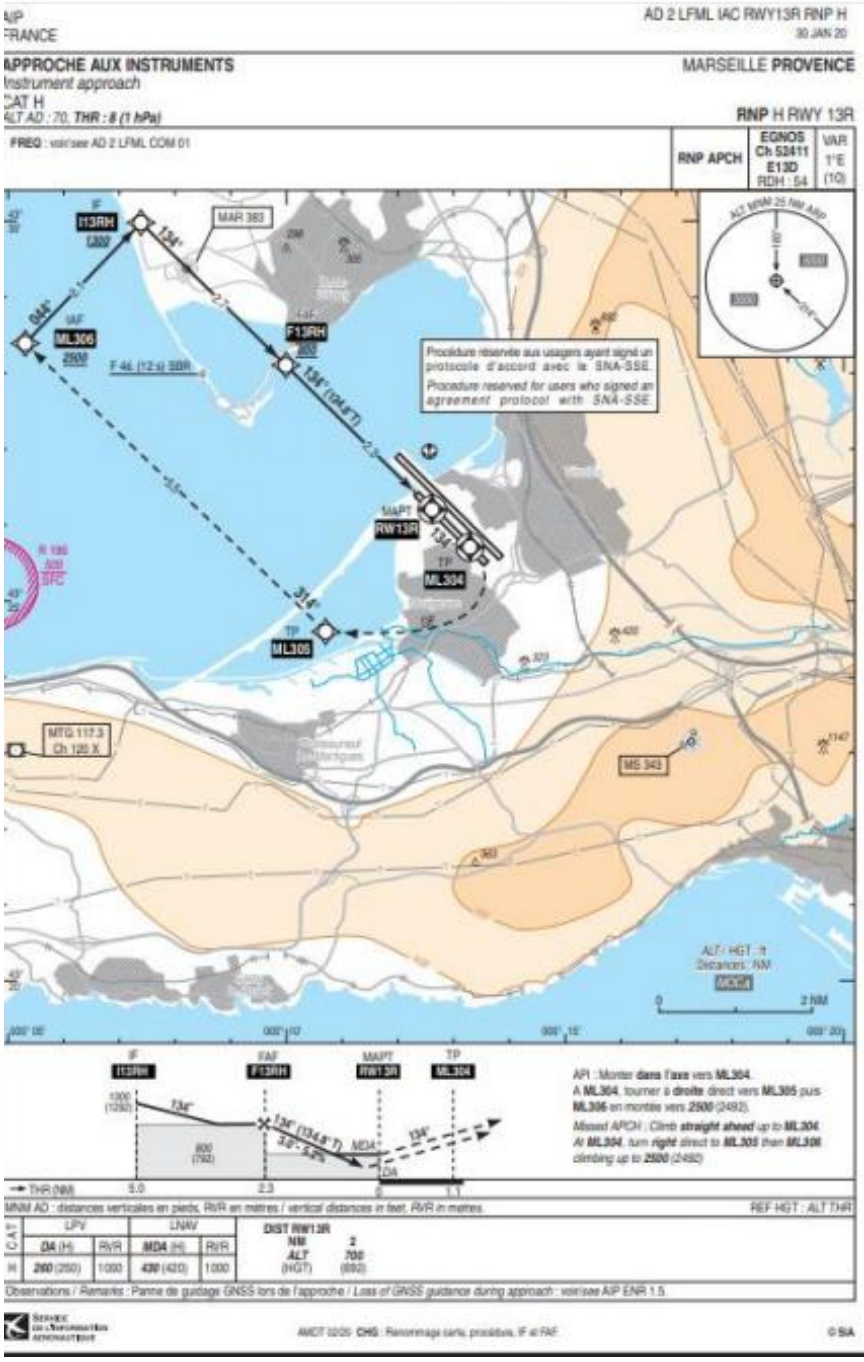
Approach to RWY

- Norway publication
  - BERGEN Flesland
  - ILS Y RWY 35



Approach to RWY (1)

- French publication
  - LFML
  - RNP H RWY 13R



Approach to RWY

(2)

LFML RWY 13R

Coding table

Identification Procedure		RNP H 13R						Dec MAG 2020 1,9°E				
Leg sequence	*P/T*	*ID*	*Fly Over*	*Direction MAG °*	*Direction True °*	*Distance (NM or min)*	*Turn*	*MNM level (FL or AMSL ft)*	*MAX level (FL or AMSL ft)*	*IAS (kt)*	*vertical angle (°) / TCH (m)*	*Nav Spec*
APCH	IF	ML306						2500				
	TF	I13RH		043	044.7	2.1		1300				RNP APCH
	TF	F13RH		133	134.7	2.7	R	800	800			RNP APCH
	TF	RW13R	Yes	133	134.8	2.3					-3,0° / 16,46	RNP APCH
	TF	ML304	Yes	133	134.8	1.1						RNP APCH
	DF	ML305					R					RNP APCH
	TF	ML306		313	314.8	5.5		2500	2500			RNP APCH

Approach to RWY

(3)

LFML RWY 13R

FAS DATA BLOCK

MARSEILLE **PROVENCE**
SBAS FAS DATA BLOCK RNP H RWY 13R

Input Data

Parameters	Values
Operation Type	0
SBAS Provider	1
Airport Identifier	LFML
Runway	13
Runway Direction	1
Approach Performance Designator	0
Route Indicator	H
Reference Path Data Selector	0
Reference Path Identifier	E13D
LTP/FTP Latitude	432627.3210N
LTP/FTP Longitude	0051212.7710E
LTP/FTP Ellipsoidal Height (metres)	51.4
FPAP Latitude	432533.1090N
Delta FPAP Latitude (seconds)	-54.2120
FPAP Longitude	0051327.6680E
Delta FPAP Longitude (seconds)	74.8970
Threshold Crossing Height	16.45
TCH Units Selector	1
Glidepath Angle (degrees)	3.00
Course Width (metres)	105.00
Length Offset (metres)	0
HAL (metres)	40.0
VAL (metres)	50.0

Output Data

Data Block	10 0C 0D 06 0C 4D 40 00 04 33 31 05 F2 8F A4 12 C6 AD 3B 02 02 16 78 58 FE 22 49 02 49 81 2C 01 64 00 C0 FA C1 EF 33 8D
Calculated CRC Value	C1EF338D
Supplied CRC Value	C1EF338D
Comparison Result	OK

Required Additional Data (not CRC wrapped)

These additional data are not required for CRC calculation, but they need to be provided to datahouses for procedure coding in ARINC 424 records.

Parameters	Values
ICAO Code	LF
LTP/FTP Orthometric Height (metres)	2.4
FPAP Orthometric Height (metres)	2.4

PinS Approach

- PinS approaches shall be titled RNP XXX where XXX is the final approach course.
- The plan view of the chart shall include:
  - Heliport/landing location name and elevation to the nearest meter or foot
  - Bearing to the nearest degree, and distance to the nearest tenth of a nautical mile from the missed approach point (MAPt) to the heliport/landing location
  - textual instructions : “Proceed VFR from xxxx” (MAPt identifier) or “Proceed visually from xxxx” (MAPt identifier) or “Manoeuvre visually from (MAPt)” as appropriate (see inset)
  - obstacles, if not included in an inset
  - a note that the procedure is for CAT H only
- For point-in-space approaches annotated “Proceed visually from (MAPt)” serving more than one heliport, the heliport name(s), heliport elevation(s), the bearing (to the nearest degree) and the distance (to the nearest two-tenths of a kilometer (tenth NM)) from MAPt to each HRP shall be included
- Airspeed restrictions shall be depicted on the chart textually as “Maximum airspeed when less than 90 KT

PinS Approach

- An inset shall be used to show the following:
  - obstacles that penetrate the OIS
  - final approach course to the MAPt
  - text for either “Proceed VFR from (MAPt)” or “Proceed visually from (MAPt)”, as appropriate
  - for “Proceed visually” PinS procedures with a direct visual segment, the descent point (DP), if established, and bearings and distances from MAPt to DP and from MAPt or DP to the heliport/landing location
  - for “Proceed visually” PinS procedures with a manoeuvring visual segment(s), only the ingress track(s) and the boundary of the manoeuvring area without dimensions are charted
  - for “Proceed visually” PinS procedures with a “no manoeuvring” area, the text “no manoeuvring” will be shown, along with the boundary of the “no manoeuvring” area. The “no manoeuvring” area shall be hachured
  - for “Proceed VFR” procedures, only a height above surface (HAS) diagram, which shall include the difference in height between the OCA and the elevation of the highest terrain or water surface and any relevant obstacles within 1.5 km (0.8NM) of the MAPt

E

PinS Approach

- The profile view shall contain information relating to the instrument procedure profile and the direct visual segment profile, if it exists, with the text “Proceed VFR” or “Proceed visually”, as appropriate. There is no profile view information for either “Proceed VFR” or “Proceed Visually” with a manoeuvring visual segment procedures.

- The profile view shall include:
  - fixes, altitudes and distances up to the MAPt
  - the profile and track from the MAPt to the heliport or landing location
  - the descent point (DP) if established
  - the descent angle from the MAPt or DP
  - the heliport crossing height (HCH)
  - the text “Proceed visually”, which is located under the visual segment profile
  - a descent table should be shown indicating descent angle and descent rate in metres per minute (feet per minute) for appropriate speeds for applicable segments, i.e. final approach fix (FAF) to step down fix (SDF), SDF to missed approach point (MAPt), and descent point (DP) to heliport reference point (HRP)
- for “Proceed visually” PinS procedures with a direct and/or a manoeuvring visual segment, the VSDA and/or the descent gradient for final landing track

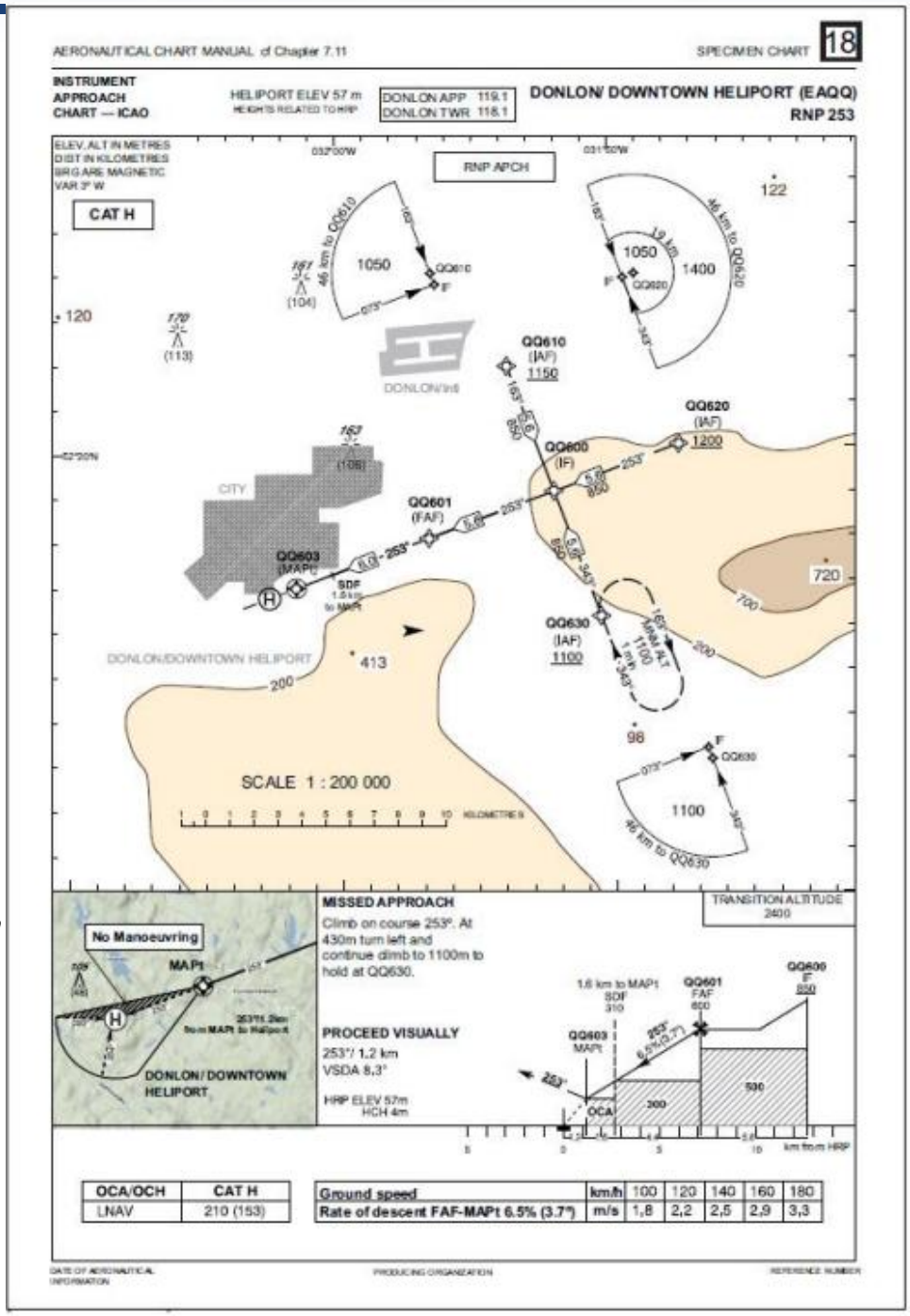
PinS Approach

- Appropriate obstacles shall be charted
- An inset shall be used to show the following:
  - for “Proceed visually” obstacles that penetrate the OIS
  - final approach course to the MAPt
  - heliport and elevation
  - for “Proceed visually” with a “manoeuvring” area the manoeuvring area boundaries
  - for “Proceed visually” PinS procedures with a “no manoeuvring” area, the text “no manoeuvring” will be shown, along with the boundary of the “no manoeuvring” area. The “no manoeuvring” area shall be hachured
  - for “Proceed visually” PinS procedures where over-flight of the heliport or landing location is prohibited, the bearing and distance, from the MAPt to the heliport or landing location, on a line *from the MAPt to the boundary of the prohibited over-flight area*
  - for “Proceed VFR” procedures, only a height above surface (HAS) diagram, which shall include the difference in height between the OCA and the elevation of the highest terrain or water surface and any relevant obstacles within at least 0.8NM of the MAPt
  - For “Proceed VFR” serving more than one heliport, the heliport name(s), heliport elevation(s), the bearing (to the nearest degree) and the distance (to the nearest two-tenths of a kilometre (tenth NM)) from MAPt to each HRP shall be included

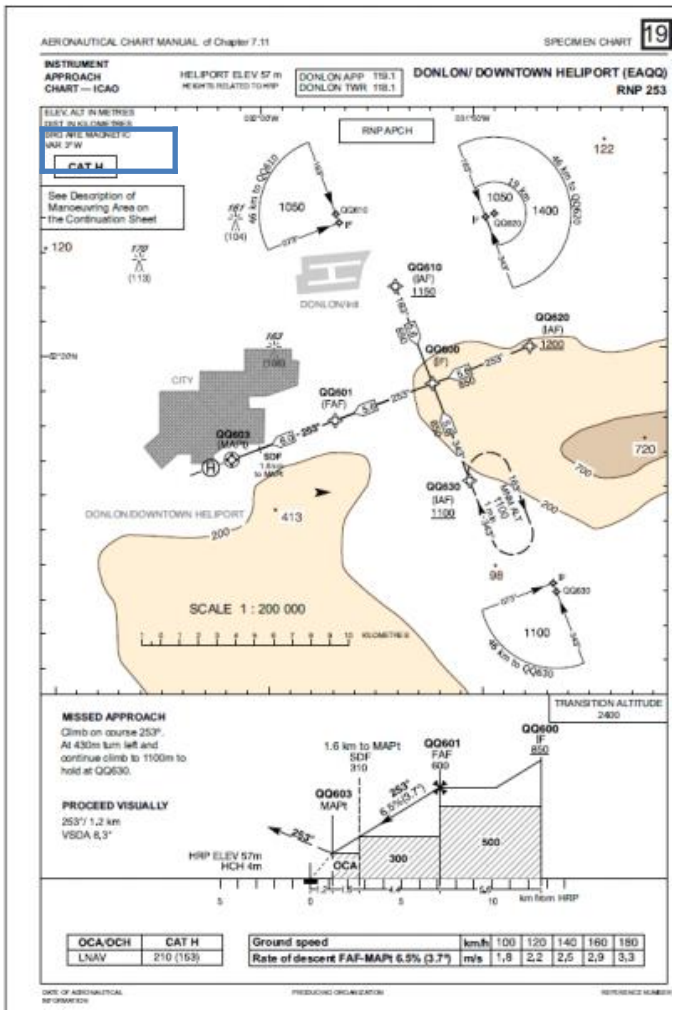
Pins Approach « proceed visually » with 1 chart

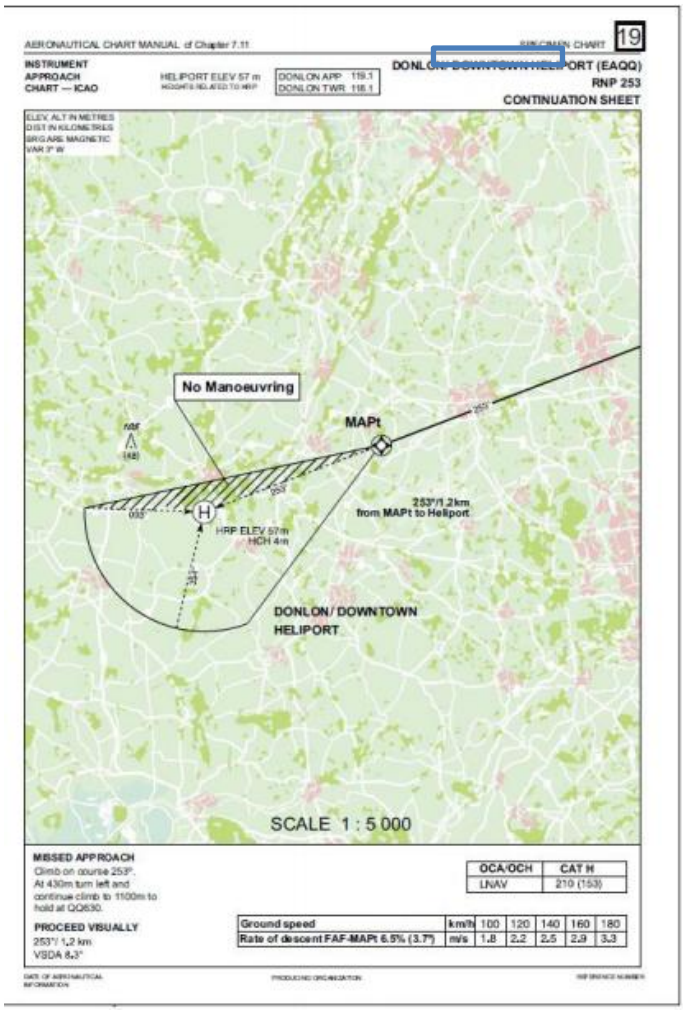
- ICAO sample chart
  - PinS approach chart to LNAV and LPV minima
  - RNP 253
  - Manoeuvring VS
  - No manoeuvring area

Note : Altitudes (Heights) in metres



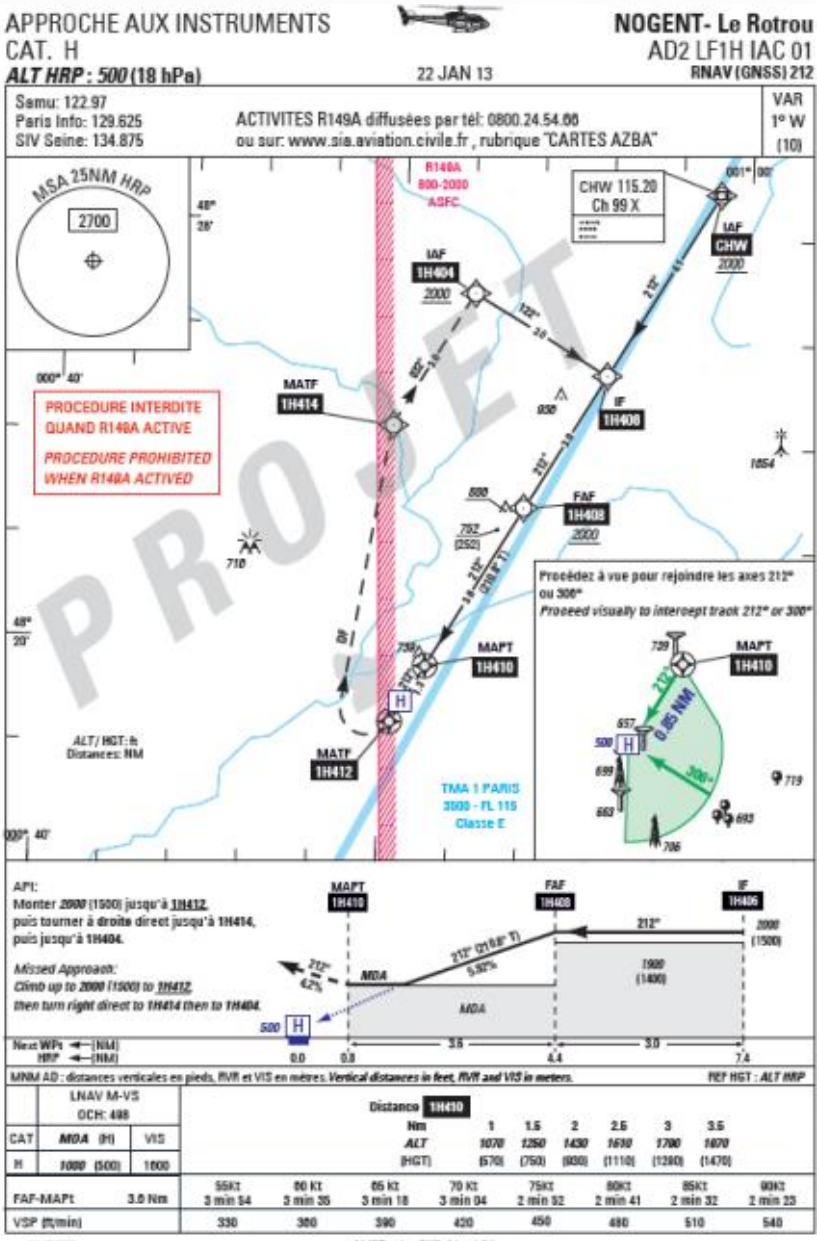
Pins Approach
« proceed visually » with 2 charts





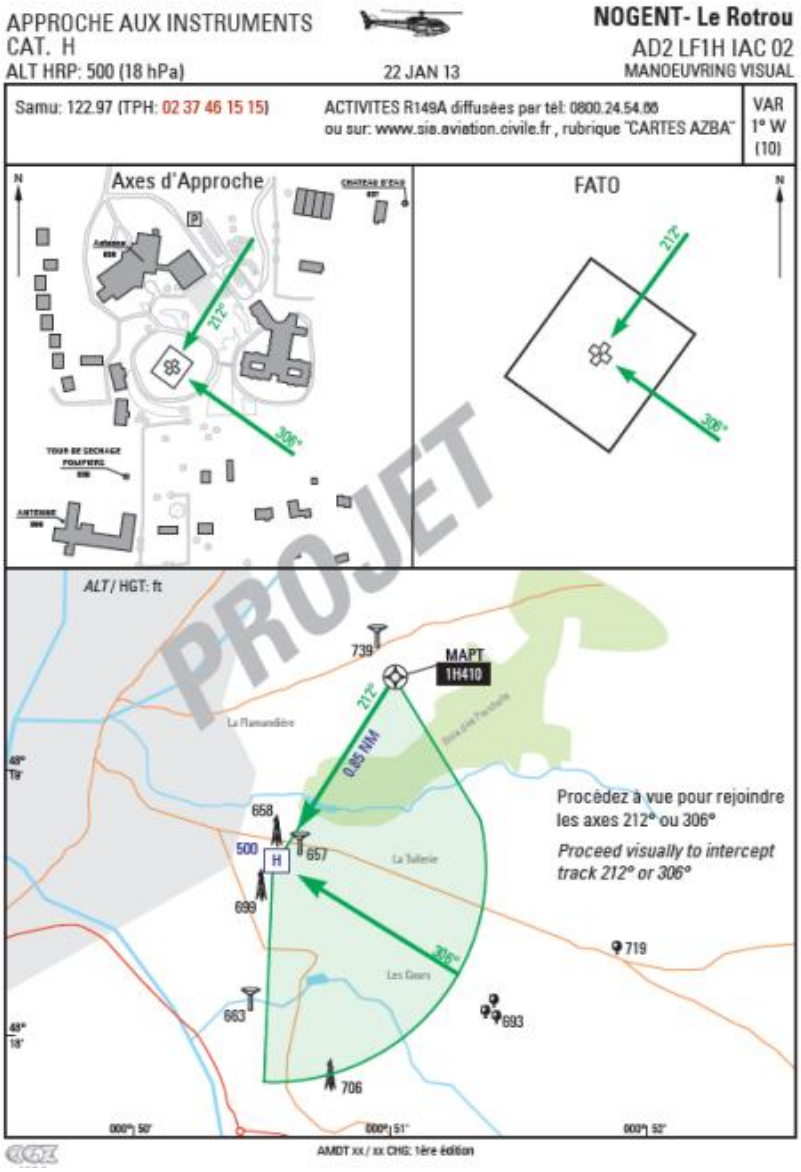
Pins Approach « proceed visually »

- French publication (project)
  - NOGENT- Le Rotrou IAC 01
  - PinS approach chart to LNAV minima
  - RNAV 212
  - Manoeuvring VS
  - Landing VIS : 1000m



Pins Approach « proceed visually »

- French publication (project)
  - NOGENT- Le Rotrou IAC 02
  - Manoeuvring VS chart

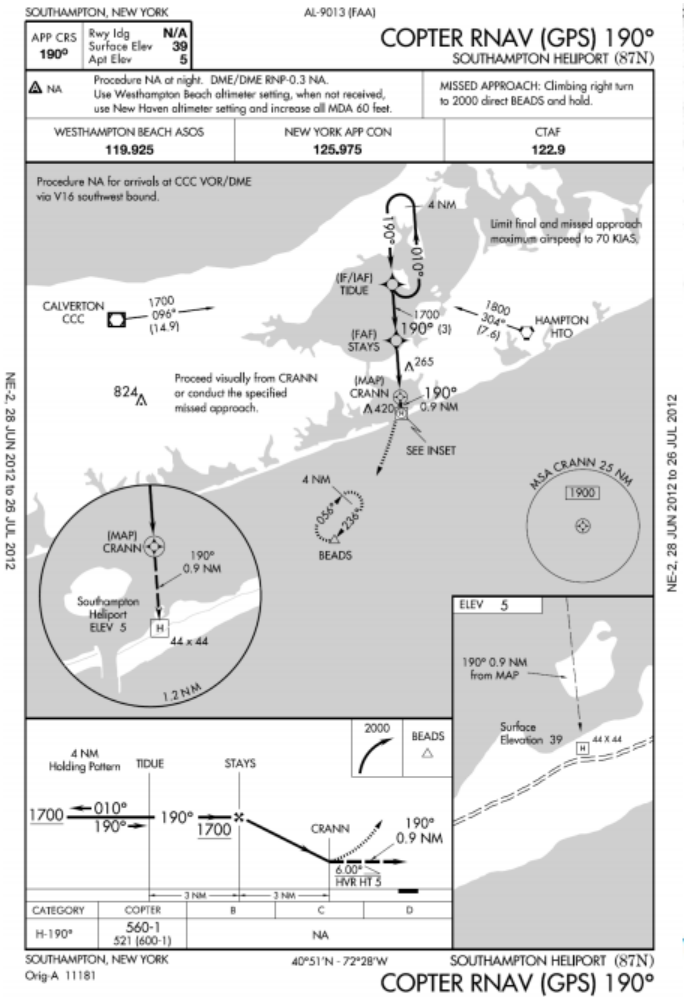


PinS Approach

« proceed visually »

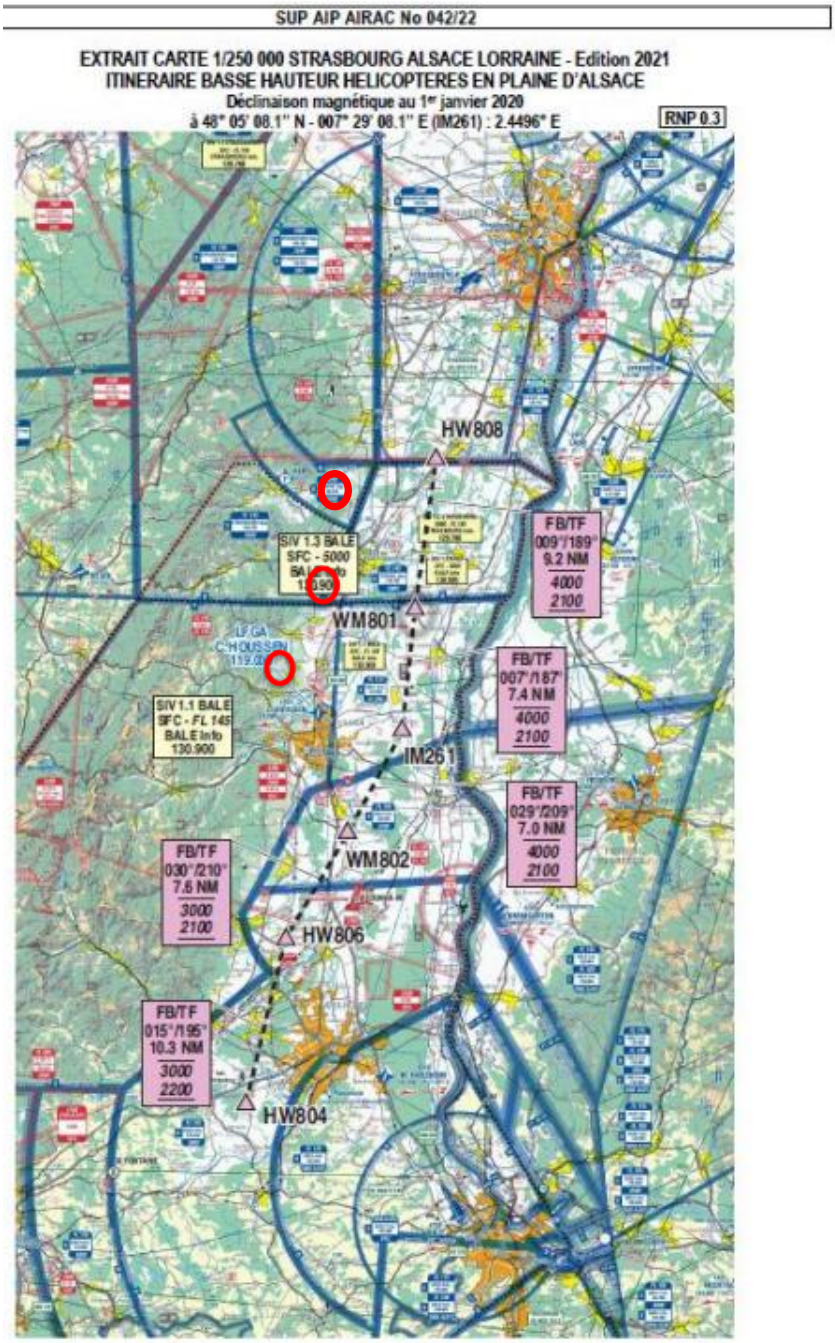
- USA publication
  - SOUTHAMPTON
  - PinS approach to LNAV minima
  - RNAV 190
  - Direct VS

Direct VS without DP and without course change



E

- French publication
  - Low Level Route (LLR)
  - Link with Colmar PINS APP

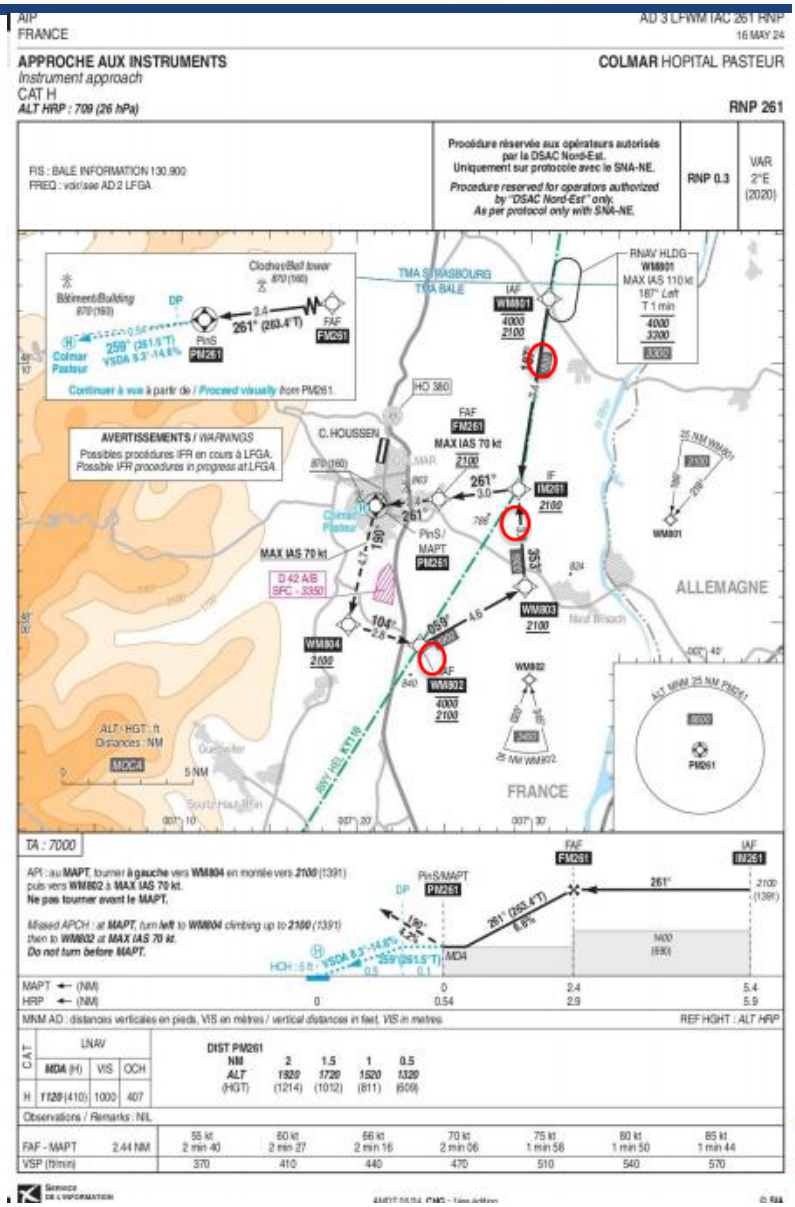


PinS Approach

« proceed visually »

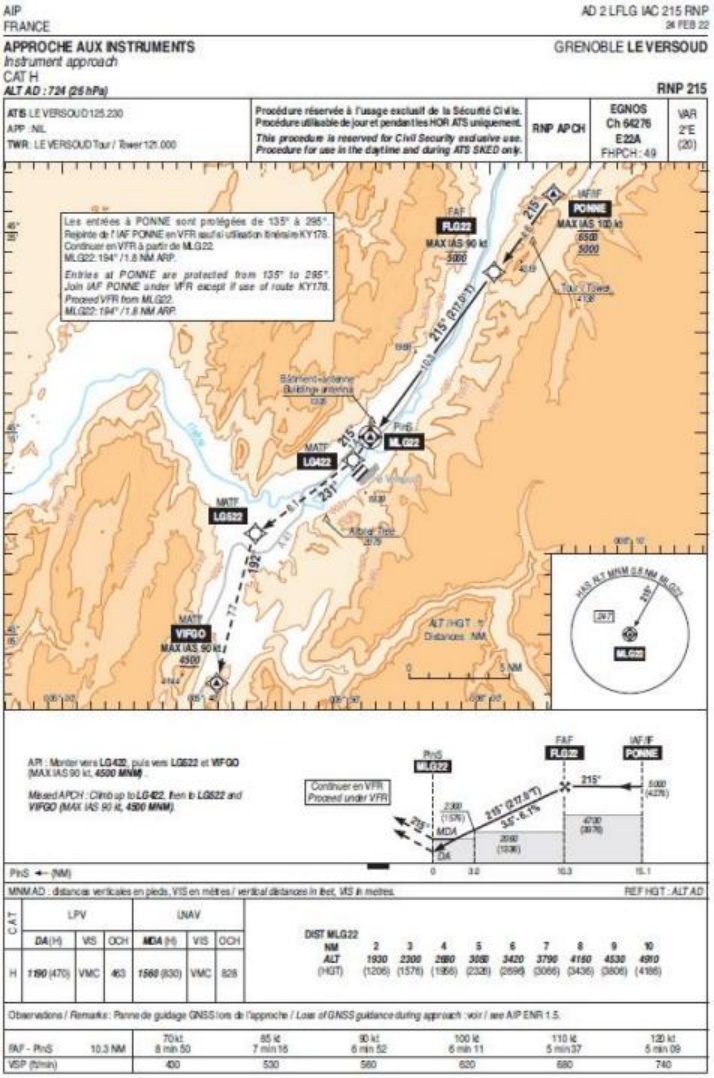
- French publication
  - Colmar
  - PinS approach to LNAV minima
  - RNP 261
  - Direct VS

Direct VS with DP and with course change at MAPt



Pins Approach
« proceed VFR »

- French publication
  - Grenoble Le Versoud
  - PinS approach
  - LPV / LNAV minima
  - RNP 215

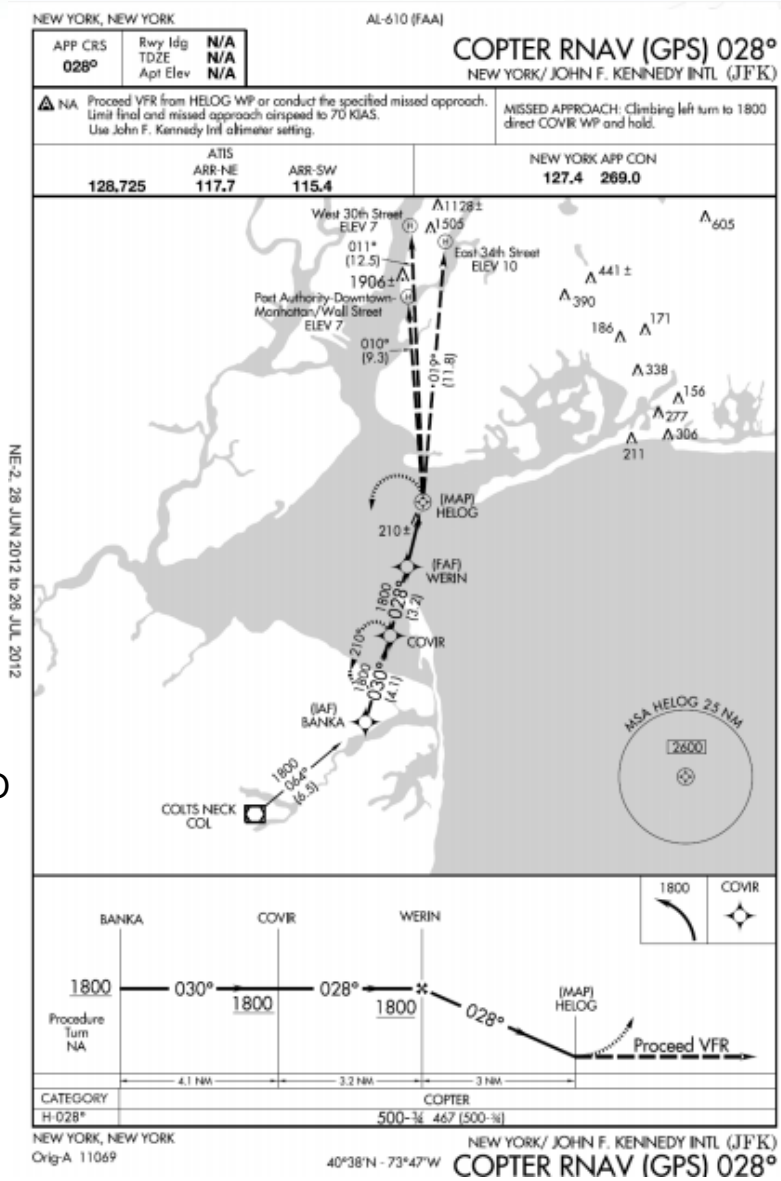


Pins Approach

« proceed VFR »

- USA
  - NEW YORK
  - PinS approach to LNAV minima
  - RNAV 028
  - VFR operations to 3 different FATO

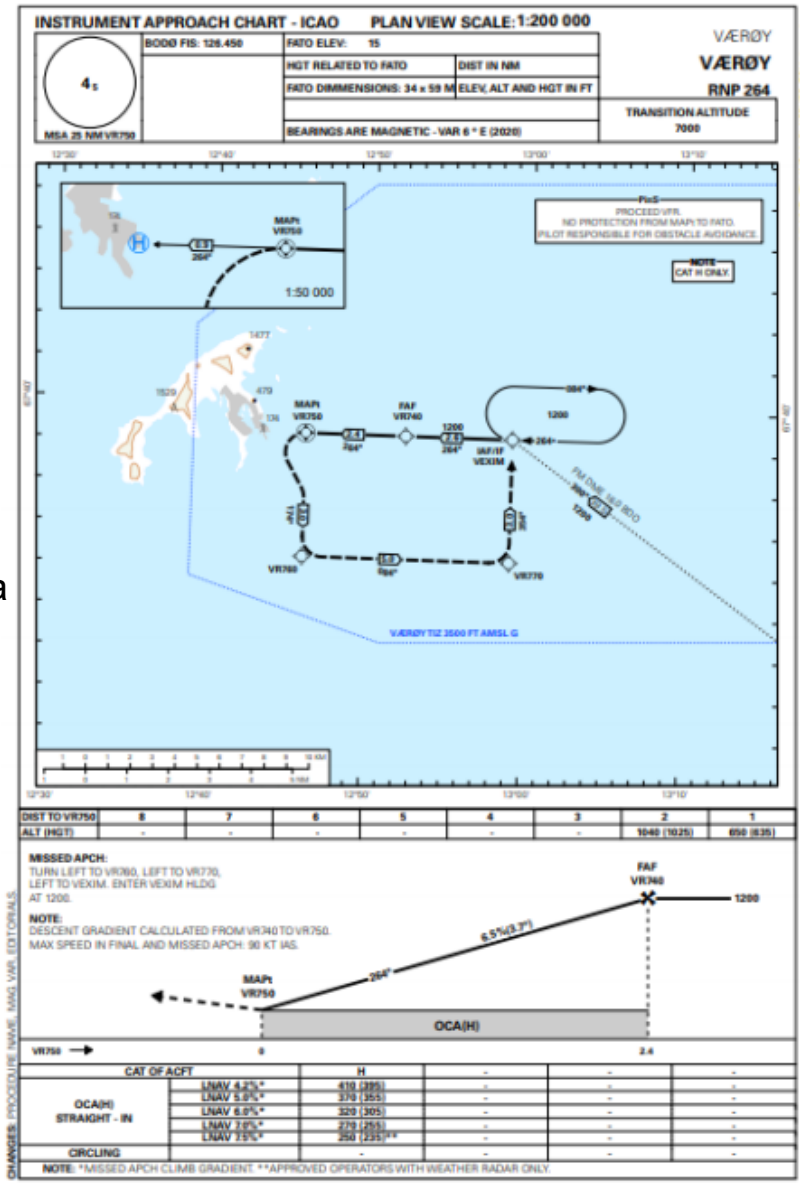
E



Pins Approach « proceed VFR »

- Norway publication
  - VAEROY
  - PinS approach to LNAV minima
  - RNP 264

E



PinS Departure

- PinS departures shall be titled “RNAV/RNP XXX” where XXX is the last waypoint of the departure → example “**RNAV BLV**” of HAGGINGWEL (EADL) in the SPECIMEN charts od ICAO doc 8697
- In France, PinS departures shall be titled “RNAV/RNP XXX” where XXX is the first instrument track orientation of the departure → example “**SID RNP 249**” of Grenoble Le Versoud
- The plan view shall include a note that the procedure is for CAT H only
- IDF shall be charted as a “fly-by” waypoint (could be Fly-over but rarely)
- Procedure Design Gradients greater than 5% together with the point or altitude to which they apply
- The VSDG for the Direct VS and the manoeuvring VS shall be charted
- The IDF MCAs, on the plan view, adjacent to the waypoints to which they apply
- Segment tracks and lengths shall be charted
- Obstacles penetrating the visual OIS shall be charted
- The plan view shall include “Proceed VFR to the IDF” or “Proceed visually to the IDF” as appropriate
- When a PinS departure procedure with a Direct VS is designed with a direct VS early IMC entry OCS, such procedure shall be charted separately from PinS procedures with Manoeuvring VS and a note shall be included on the chart indicating that IMC entry at or above the MCA prior to crossing the IDF is permitted

PinS Departure

Shall be charted : (for Direct and Manoeuvring)

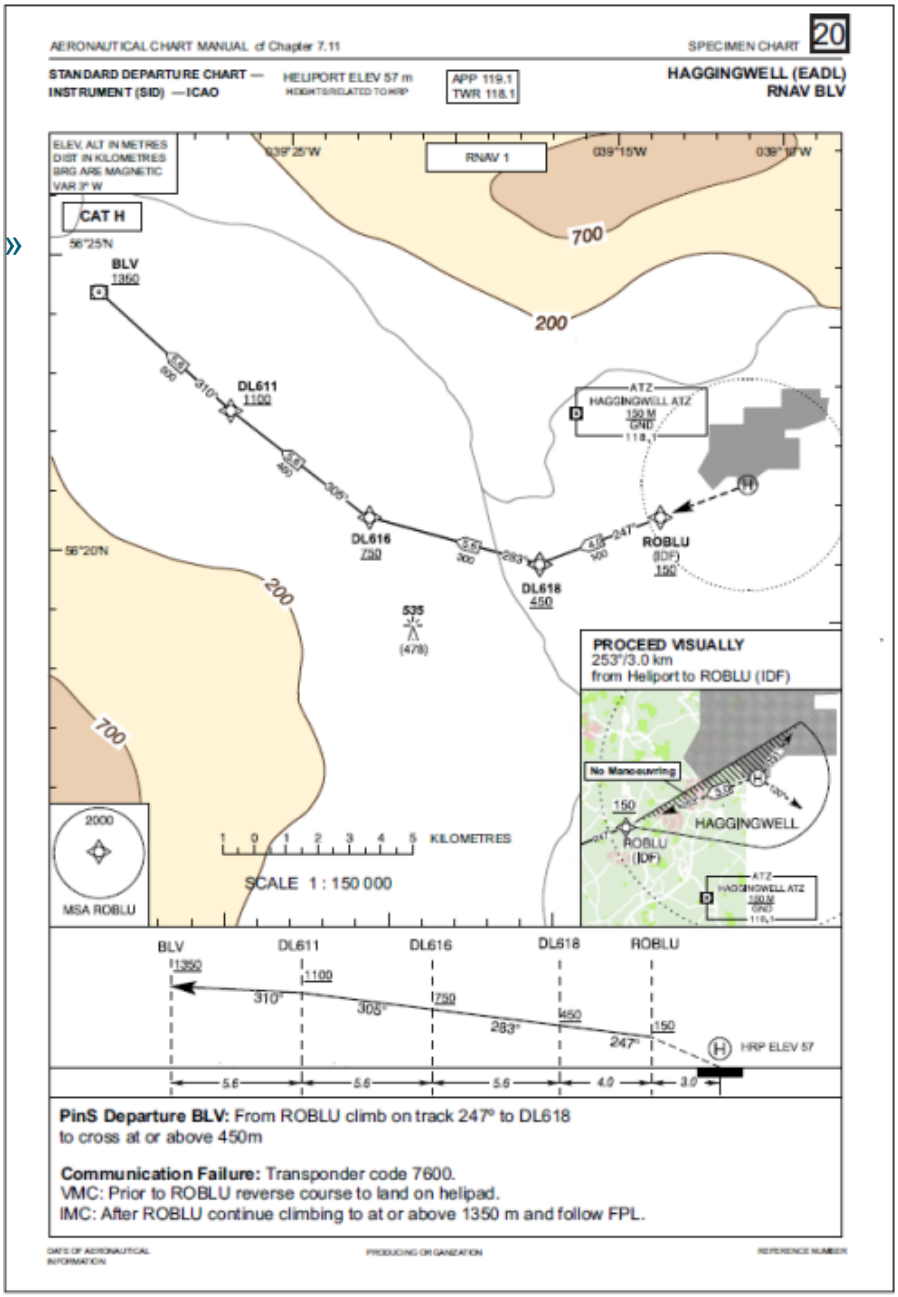
- The centre line(s) and direction(s) of the take-off climb surface(s) taken into account for the protection of the direct and/or manoeuvring visual segment
- The direct and/or manoeuvring visual segment shall be represented on the chart either in an inset on the plan view, or on a continuation sheet or the verso of the chart. Information depicted in the inset shall be charted to scale. If the manoeuvring area direct and/or manoeuvring visual segment is not depicted in an inset, the plan view shall contain an annotation directing the pilot to the continuation sheet or the verso of the chart.

- The “manoeuvring area” shall be depicted
- If the “manoeuvring area” is reduced :
    - the boundaries of the manoeuvring area;
    - the location of the significant obstacle/restricted use airspace/environmentally sensitive area
    - the boundaries of any ‘no manoeuvring’ area annotated ‘No manoeuvring’

Pins
Departure
« proceed visually »

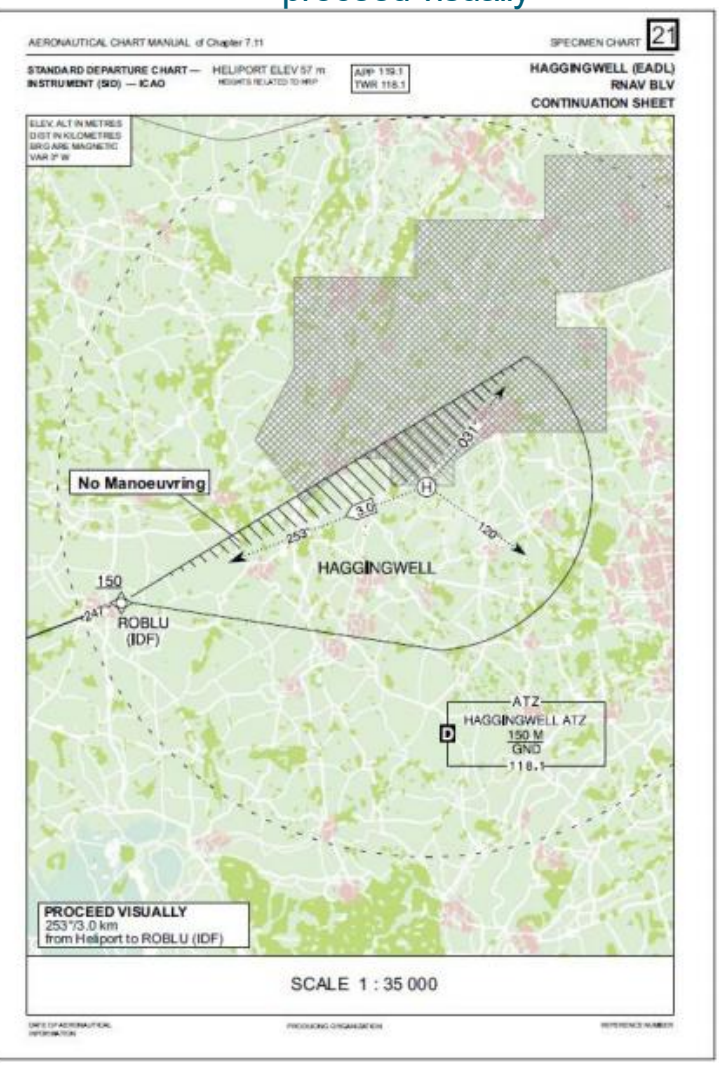
- ICAO sample chart
  - 1 chart
  - RNAV BLV
  - Manoeuvring VS

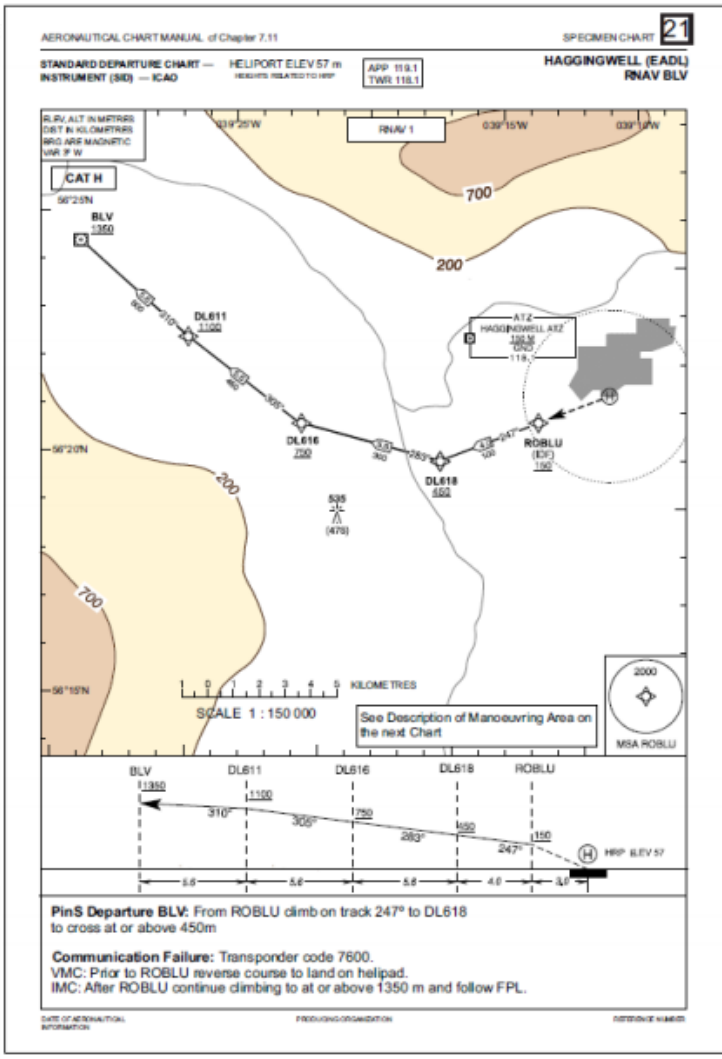
Note : Altitudes (Heights) in metres



Pins Departure
« proceed visually »

- ICAO sample with 2 charts

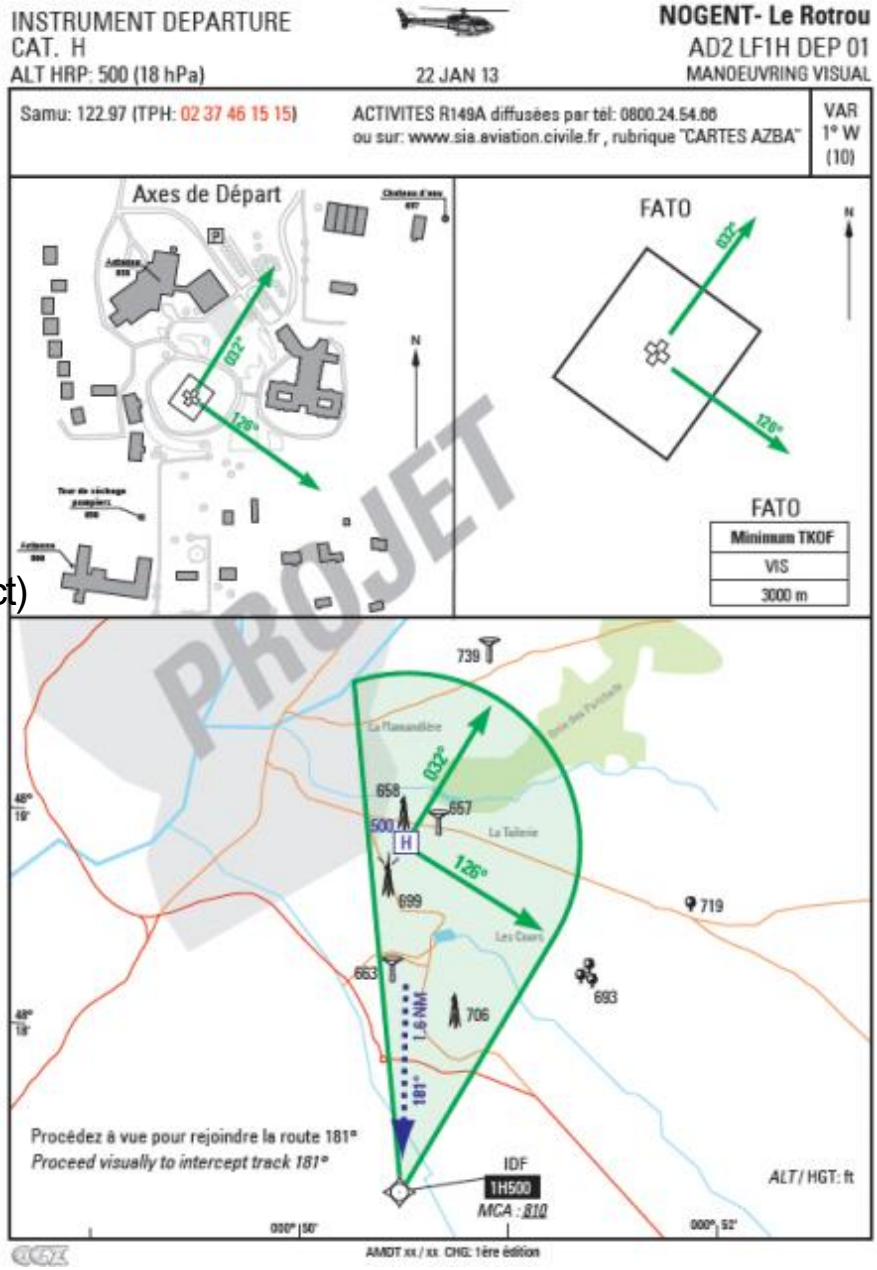




Pins Departure

« proceed visually »

(1)

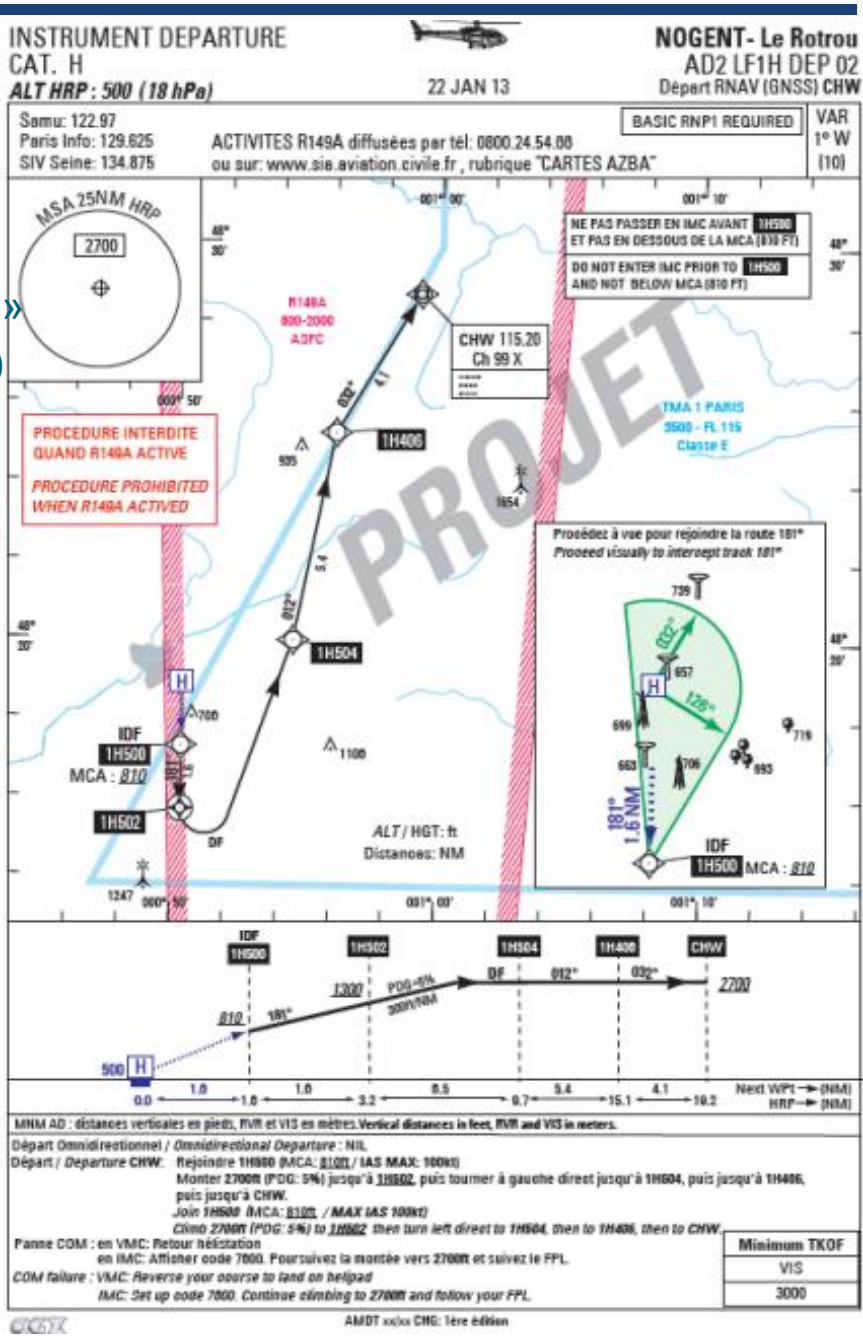


- French publication (project)
  - NOGENT - Le Rotrou
  - Manoeuvring VS chart
  - TKOF VIS : 3000m

Pins Departure

« proceed visually » (2)

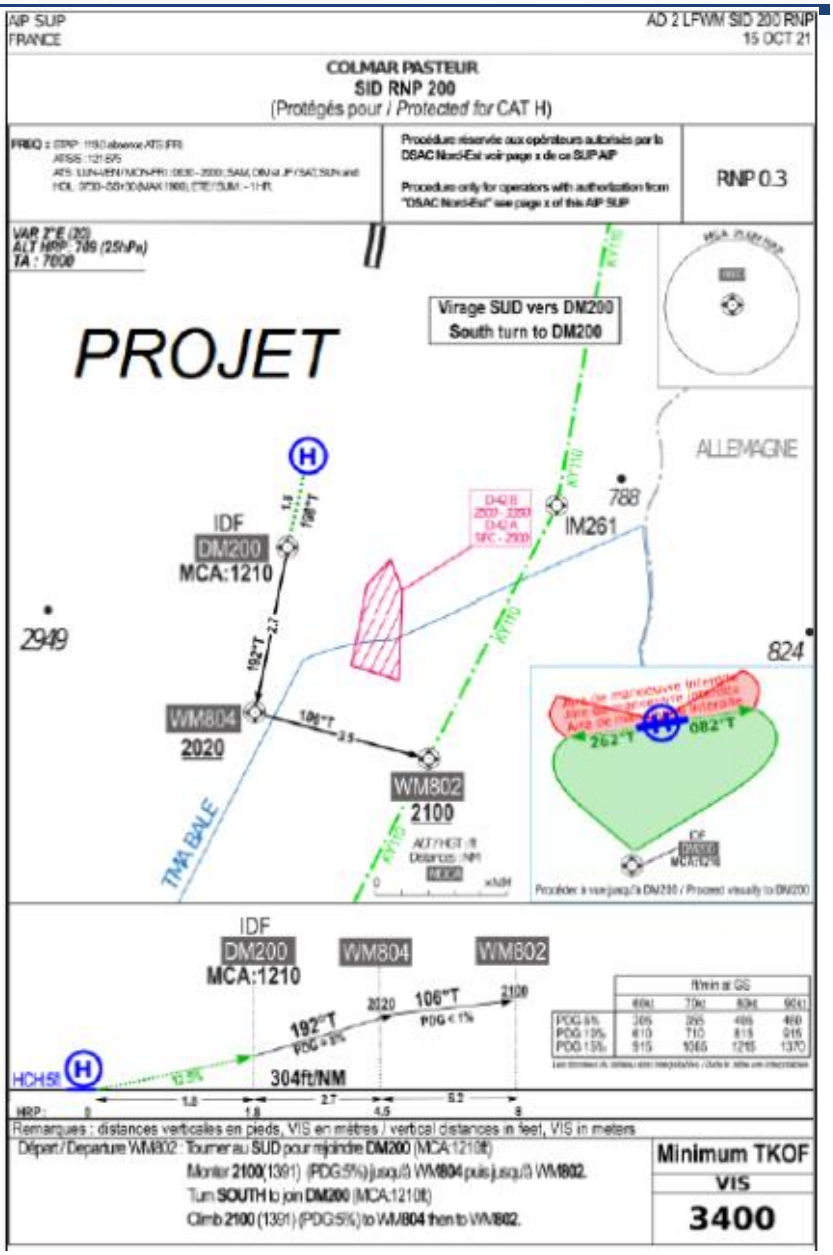
- French publication (project)
  - NOGENT - Le Rotrou
  - RNAV CHW
  - RNP1



Pins Departure

« proceed visually »

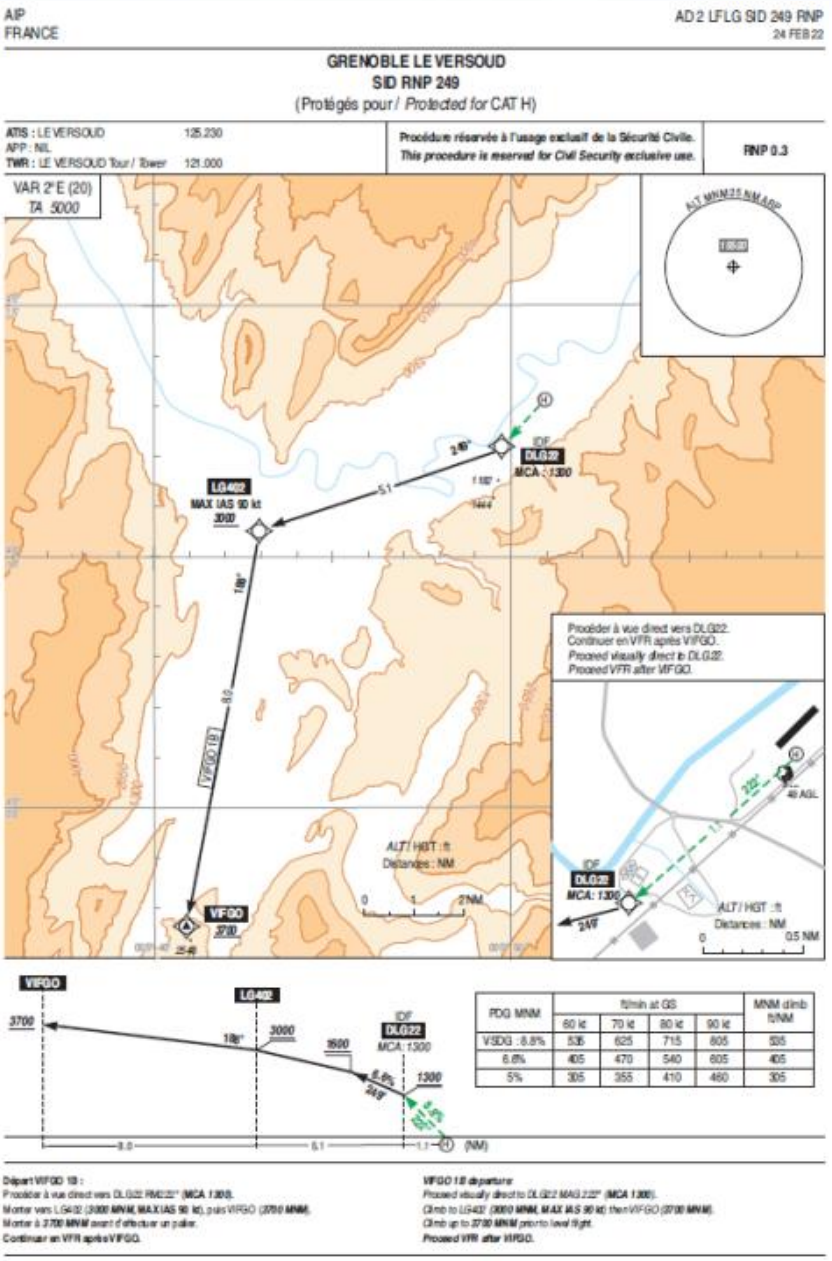
- French publication (project)
  - COLMAR
  - RNP 0.3
  - Manoeuvring VS



Pins Departure

« proceed visually »

- French publication
  - GRENOBLE LE VERSOUD
  - RNP 0.3
  - Direct VS



Pins Departure

« proceed Visually »

- French publication
  - GRENOBLE LE VERSOUD
  - RNAV 1
  - Direct VS