



INTERNATIONAL CIVIL AVIATION ORGANIZATION
A United Nations Specialized Agency



PBN Procedure Design Course 2026

ICAO APAC FPP

Beijing, China

(7-25/Sep/2026)





INTERNATIONAL CIVIL AVIATION ORGANIZATION

A United Nations Specialized Agency

Doc 8168 Seventh Edition

Doc 8168

PROCEDURES FOR AIR NAVIGATION SERVICES

Aircraft Operations

Volume II – Construction of Visual and Instrument Flight Procedures
Seventh Edition, 2020

RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by
Amendments 1 to 9 incorporated in this edition		
10	28/11/24	ICAO

CORRIGENDA		
No.	Date	Entered by
1	20/11/20	ICAO
2	21/3/22	ICAO

Contents



- **PART 1: Volume III – Aircraft Operating Procedures**
- **PART 2: ICAO Approach Classification**
- **PART 3: VSS- Obstacle Clearance Surface(OCS)**
- **PART 4: Final approach area width**
- **PART 5: MOC Reduction For Turning Departure**
- **PART 6: THE USE OF PBN WITH ILS**
- **PART 7: BARO-VNAV OFFSET PROCEDURES**
- **PART 8: PBN (new) Navigation Application**
- **PART 9: Publication**

PART 1:

Volume III –

Aircraft Operating Procedures

Volume III – Aircraft Operating Procedures



- The Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS) consists of **three** volumes as follows:
- Volume I — Flight Procedures
- Volume II — Construction of Visual and Instrument Flight Procedures
- Volume III — Aircraft Operating Procedures

Volume III – Aircraft Operating Procedures



- The division of the PANS-OPS into the **two** volumes was accomplished in 1979 as a result of an extensive amendment to the obstacle clearance criteria and the construction of approach-to-land procedures. Prior to 1979, all PANS-OPS material was contained in a single document.
- PANS-OPS, Volume III, applicable in 2018, was created from **Part III of Volume I** with the intention to separate the provisions related to aircraft operating procedures from the requirements for flying the procedures designed in accordance with the criteria provided in Volume II.

Volume III – Aircraft Operating Procedures



- **Volume I** describes the **operational requirements** for flying the procedures designed in accordance with the criteria provided in Volume II.
- **Volume II** is intended for **the guidance of procedures specialists** and describes the essential areas and obstacle clearance requirements for the achievement of safe, regular instrument flight operations. It provides the basic guidelines to States, and those operators and organizations producing instrument flight charts that will result in uniform practices at all aerodromes where instrument flight procedures are carried out.
- **Volume III** describes **operational procedures** recommended for the guidance of flight operations personnel and flight crew.

PART 2:

ICAO Approach Classification

ICAO New Approach Classification

- **Coherence across all ICAO Documentation (approach operations and runway**
- **Requirements in Annex 2, 10, 14 and PANS OPS**
- **Removes the terms Non Precision, APV & Precision from the operation**

ICAO New Approach Classification

- Approach operations are classified according to the designed lowest operating minima of an approach procedure
 - **Type A** : Instrument approach operation 250 ft or above
 - **Type B** : Instrument approach operation below 250 ft

ICAO New Approach Classification

- Facilitates all type of approaches operations
- Performance- based approach for RWY infrastructure, function of published minima
- **Type A** Operations only require the Non - precision RWY infrastructure and related visual aids
- All **Type B** Operations will require a Precision RWY Infrastructure and related visual aids.

ICAO New Approach Classification

New Approach Classification							
Domain	Document	Aspect					
Approach Operations	Annex 6	Classification	Type A		Type B		
			(>= 250')		CAT I (>= 200')	CAT II (>= 100')	CAT III (<100')
		Method	2D	3D			
		Minima	MDA/H	DA/H*			
Approach Runways	Annex 14	M(DA/H) >= VMC	Non Instrument RWY				
		M(DA/H) >= 250' Visibility=1 000m	Non Precision Approach RWY				
		DA/H >= 200' Visibility>=800m or RVR >= 550m	Precision Approach RWY, Category I				
		DA/H >= 100' RVR >= 300m	Precision Approach RWY, Category II				
		DA/H >= 0' RVR >= 0m	Precision Approach RWY, Category III (A, B & C)				
System Performance Procedures	Annex 10 PANS-OPS Vol. II	NPA	NDB, Lctr, LOC, VOR, Azimuth, GNSS				
		APV		GNSS/Baro/SBAS			
		PA		ILS, MLS, SBAS, GBAS			

PART 3:

VSS- Obstacle Clearance Surface(OCS)

VSS- Obstacle Clearance Surface(OCS)



- If the VSS is penetrated, the approach procedure **shall not be promulgated** without an aeronautical study.
- Mitigation action as a result of such a study may result in **the removal or lowering of the obstacle, an increase of the descent gradient/angle, and/or runway threshold displacement.**
- Obstacles with **a height less than 15 m** above the threshold may be disregarded when assessing the VSS.
- Temporary **moving obstacles** such as aircraft holding at the runway hold-point are allowed.
- Any penetration of the VSS shall be identified **on the instrument approach chart.**

VSS- Obstacle Clearance Surface(OCS)



- If **no mitigation** action has been deemed operationally acceptable and **obstacles remain penetrating** the visual segment surface (VSS), none of these obstacles shall require the pilot to destabilize the approach to avoid them.
- **For this purpose, no obstacle shall penetrate an obstacle clearance surface (OCS) .**

VSS- Obstacle Clearance Surface(OCS)



➤ Laterally:

- a) for procedures with localizer or localizer look-alike lateral guidance (LOC only, APV 1 and PA approaches),
- where the final approach track is aligned with the runway centre line:
- 1) the OCS begins at the THR/LTP;
- 2) the beginning width is 30 m each side of the runway edge;
- 3) it extends from the THR up to the point 60 m before the THR at the VSS width and continues with the same width up to the point where the OCH is reached on the promulgated profile (“OCH point”).

VSS- Obstacle Clearance Surface(OCS)

➤ Laterally:

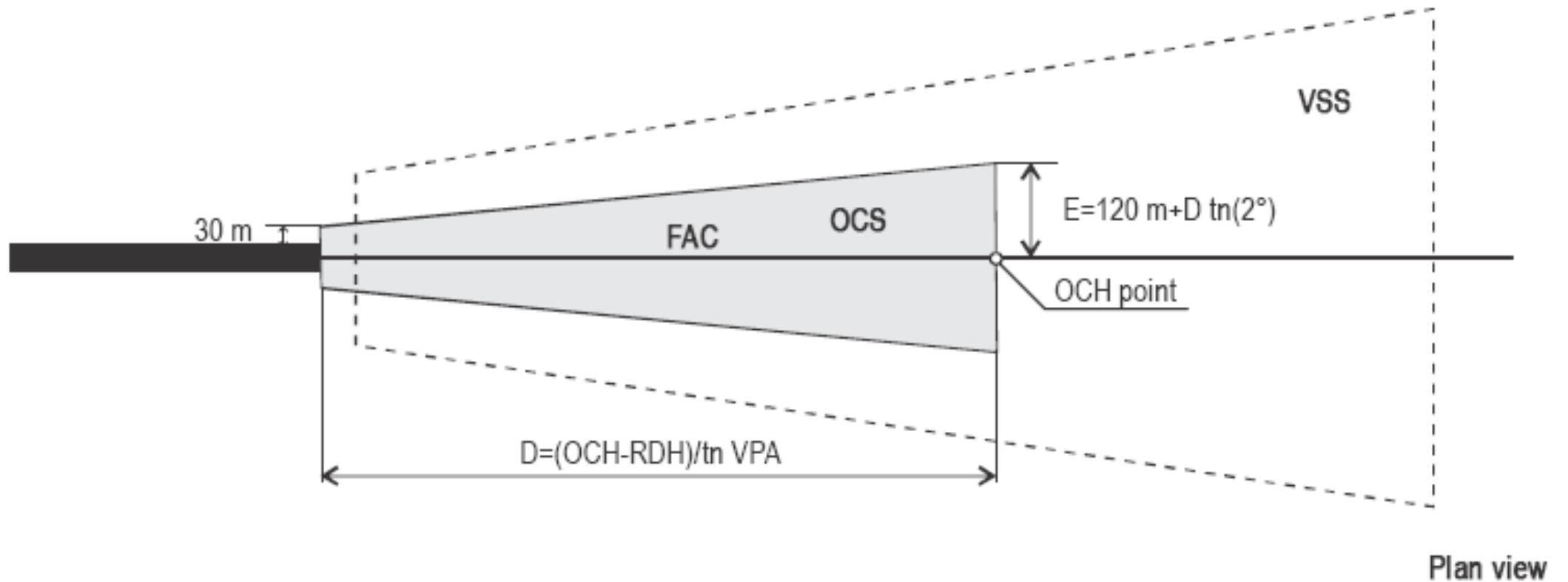
➤ b) **for all other straight-in instrument approach procedures:**

➤ - the OCS begins at the **THR/LTP** and extends up to the point where the OCH is reached on the promulgated profile (“OCH point”);

➤ - the beginning width is **30 m** each side of the **runway edge**;

➤ - the semi-width at “OCH point” is equal to **$E = 120 \text{ m} + D \cdot \tan(2^\circ)$** where D is the distance between the THR/LTP and the “OCH point”.

VSS- Obstacle Clearance Surface(OCS)



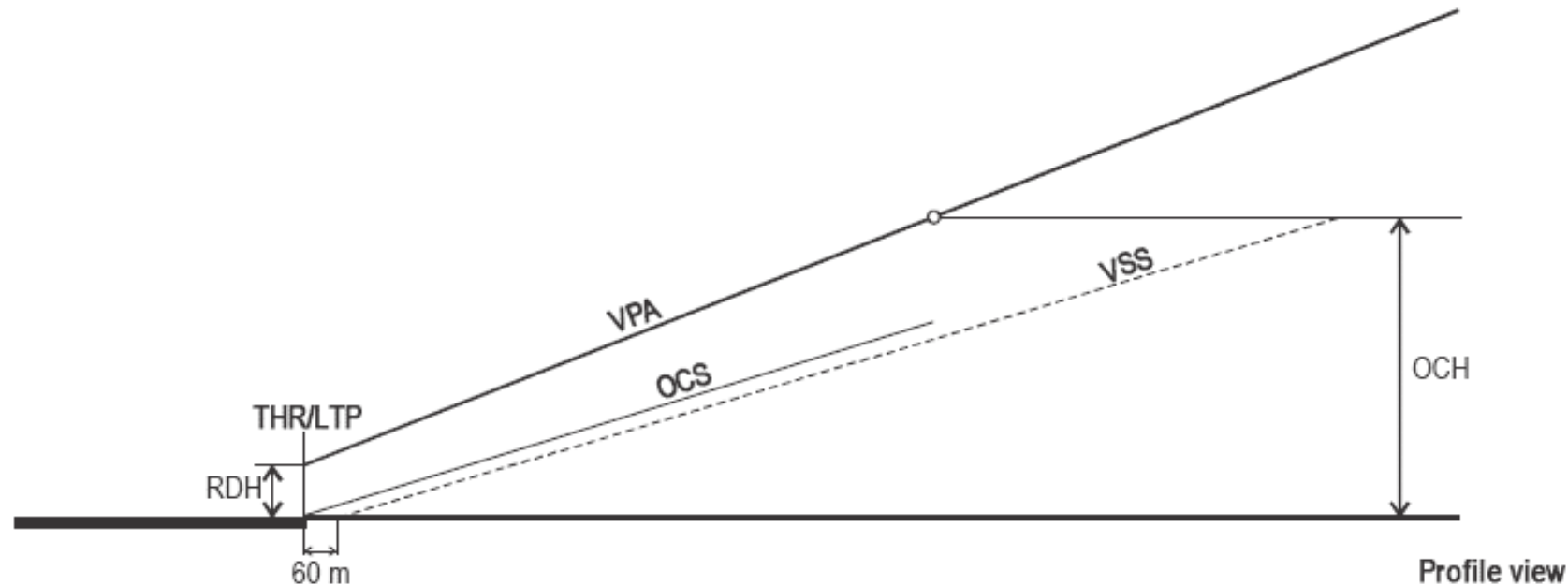
VSS- Obstacle Clearance Surface(OCS)



➤Vertically:

- The OCS originates at the **runway threshold height** where RDH is 15 m or smaller and **at(RDH-15 m) above runway threshold height** where RDH is greater than 15 m.
- the OCS has a slope of θ defined as follows:
 - for **NPA**: θ = promulgated approach procedure angle **minus 1°**
 - for **APV Baro**: θ = minimum cold temperature VPA **minus 0.5°**
 - for **APV with geometric vertical guidance**: θ = **promulgated VPA minus 0.5°**

VSS- Obstacle Clearance Surface(OCS)



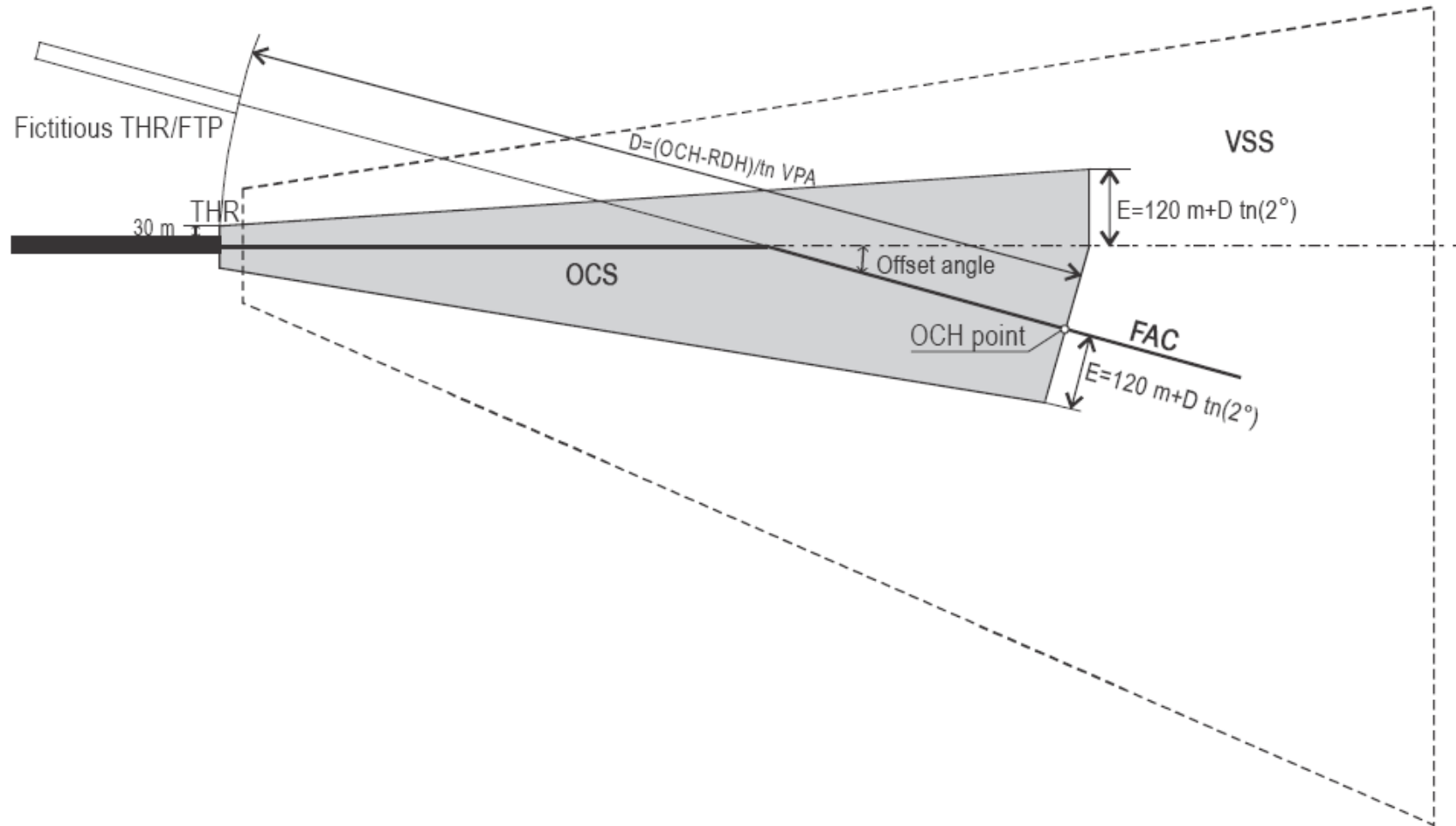
➤ **Note 1.** Penetrations caused by airport lighting, airport signage, and their associated equipment may be **disregarded** when installed in accordance with ICAO Standards.

➤ **Note 2.** These values are not applicable for approaches above **3.5°**.

VSS- Obstacle Clearance Surface(OCS)

- Where the final approach course is offset and intersects the extended runway centre line, the OCS at the point where the OCH is reached extends perpendicularly to the final approach course on the side of the offset for **distance E**.
- On the side closest to the centre line, the area extends perpendicularly to the FAC until intersecting the runway centre line. It then extends perpendicularly to the runway centre line for **distance E**.

VSS- Obstacle Clearance Surface(OCS)

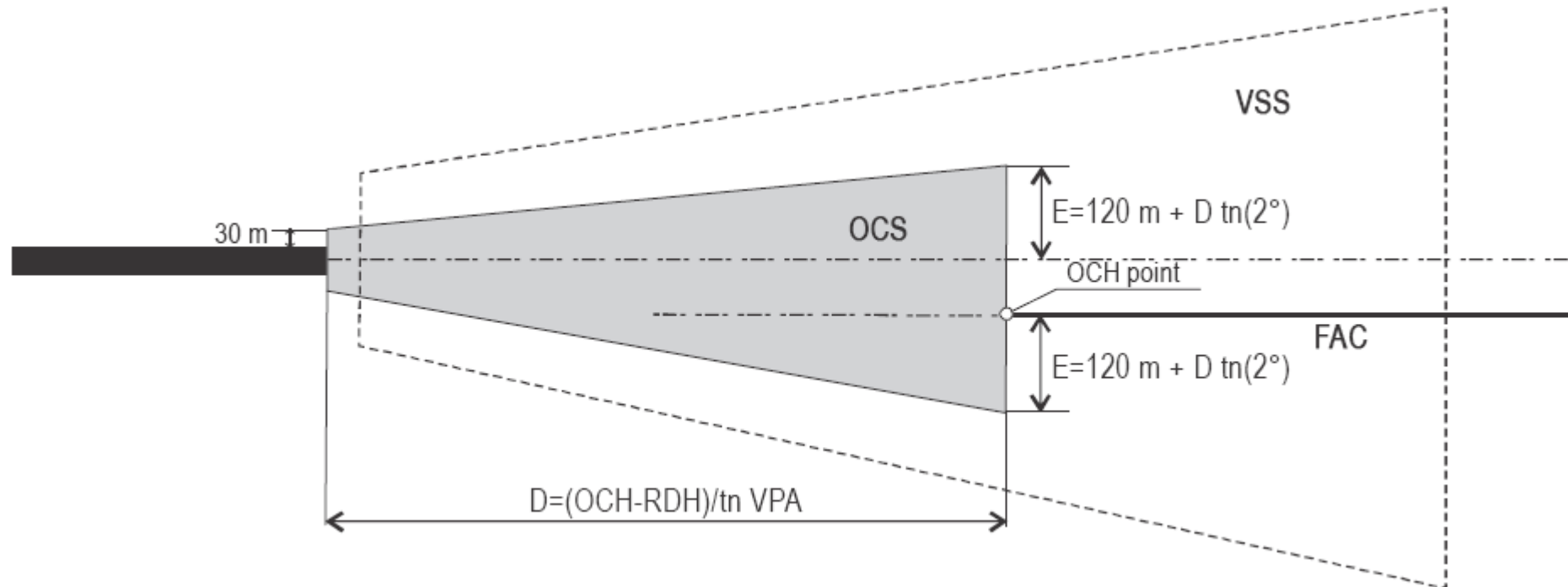


VSS- Obstacle Clearance Surface(OCS)



➤ Where the final approach course is offset but does not intersect the extended runway centre line, the OCS at the point where OCH is reached extends perpendicularly to the final approach course on the side of the offset for **distance E**.

VSS- Obstacle Clearance Surface(OCS)



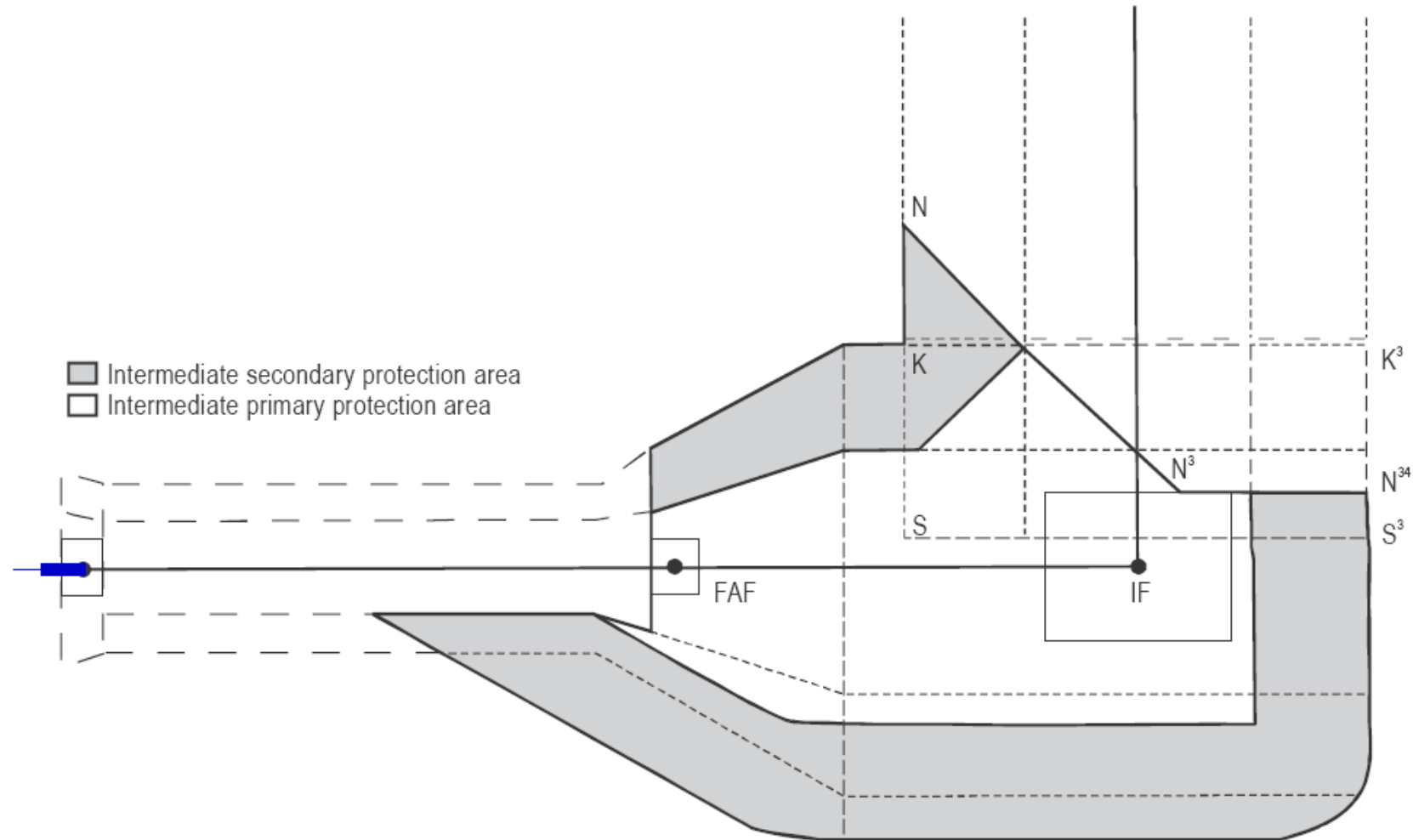
PART 4:

Final approach area width

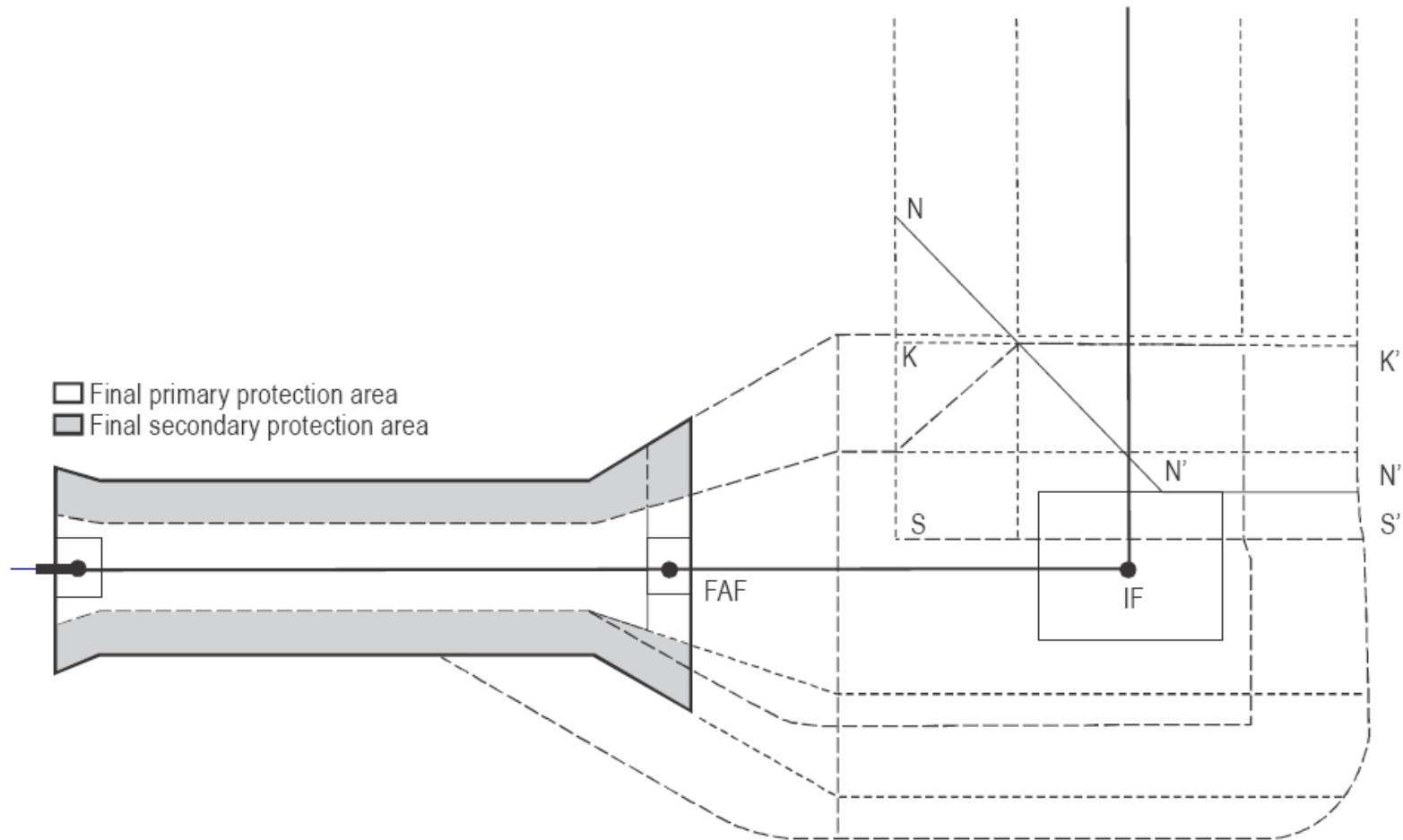
Final approach area width

➤ Obstacles located on the final approach segment beyond the FAF/FAP location and in the expansion of turn prescribed before the FAF, within the intermediate approach segment area and outside the straight final approach segment area, **are not considered** for **final approach** obstacle clearance computation.

Final approach area width



Final approach area width



PART 5:

MOC Reduction For Turning Departure

MOC Reduction For Turning Departure

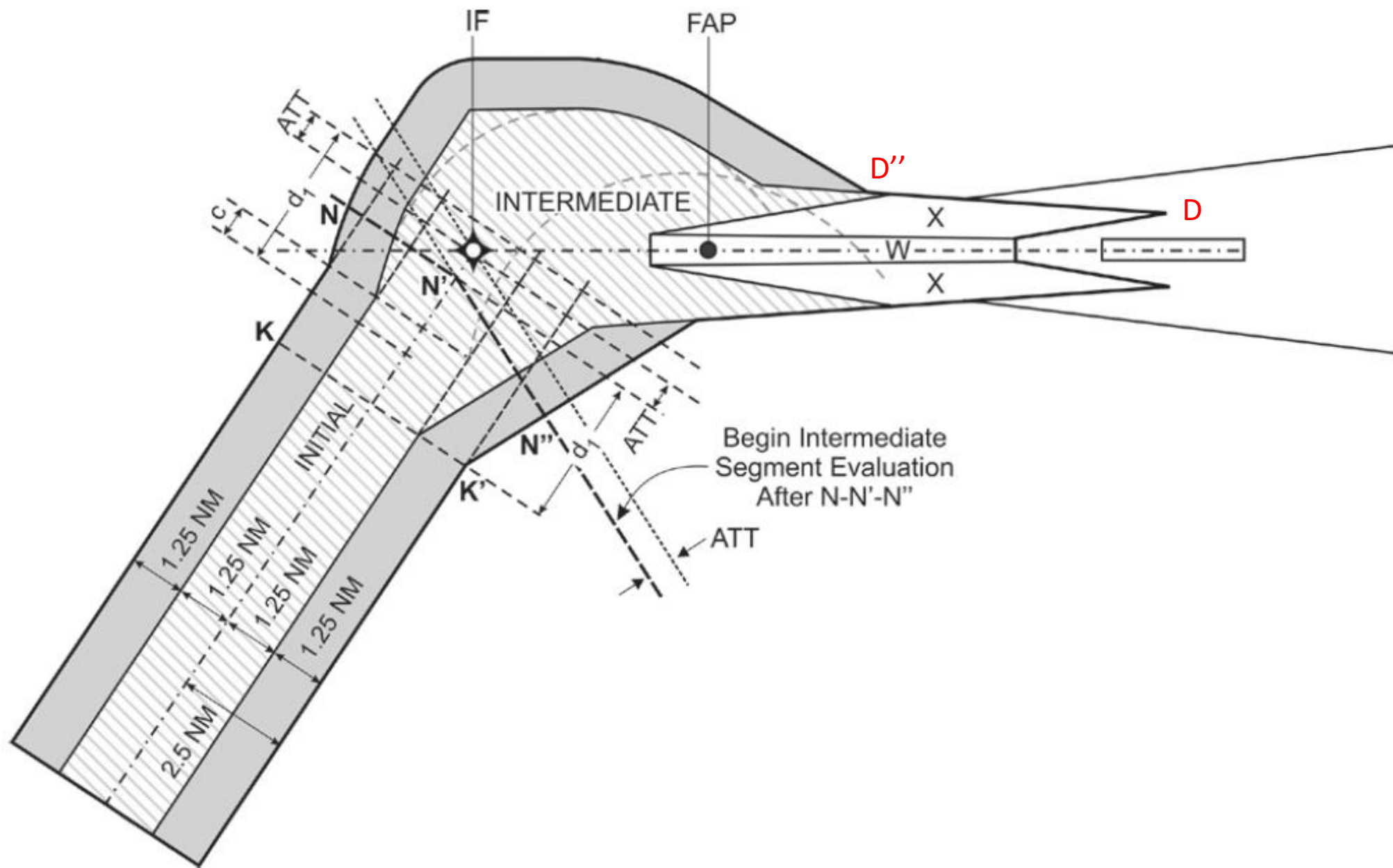
- According to Annex 14 — Aerodromes provides requirements to limit the obstacle growth to a height of **45 m (150 ft)** above the runway through the means of the inner horizontal surface.
- As a consequence, the current MOC of 90 m (295 ft) is too restrictive as it would further limit the obstacle height down to 30 m (98 ft), respecting the minimum turn altitude of 120 m (400 ft).
- In the turn initiation area and turn area, a minimum obstacle clearance reduces to **75 m (246 ft) (CAT H, 65 m (213 ft))** .

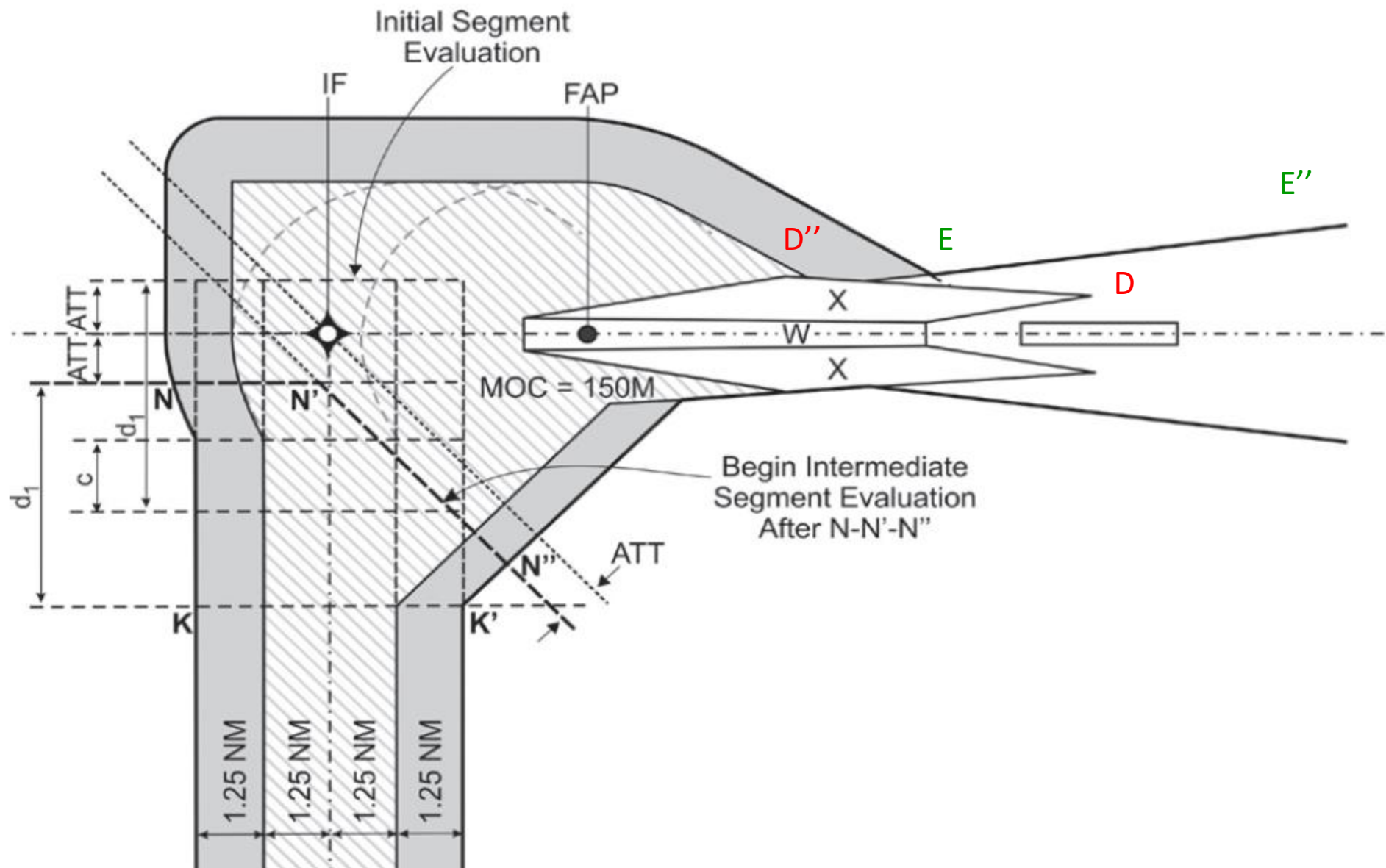
PART 6:

THE USE OF PBN WITH ILS

INITIAL APPROACH SEGMENT

- The initial approach segment may be defined by an RNAV or RNP route, using RNAV or RNP systems for track guidance.
- Only the systems capable of navigation accuracy of **1 NM** or lower in this phase of flight can be considered.
- The RNAV or RNP route shall terminate at an IF defined by RNAV or RNP located on the LOC course.
- If a course reversal is required with an RNAV or RNP initial approach segment, only a racetrack can be used. The fix and the inbound leg shall be located on the LOC course and the inbound segment defined by the LOC.



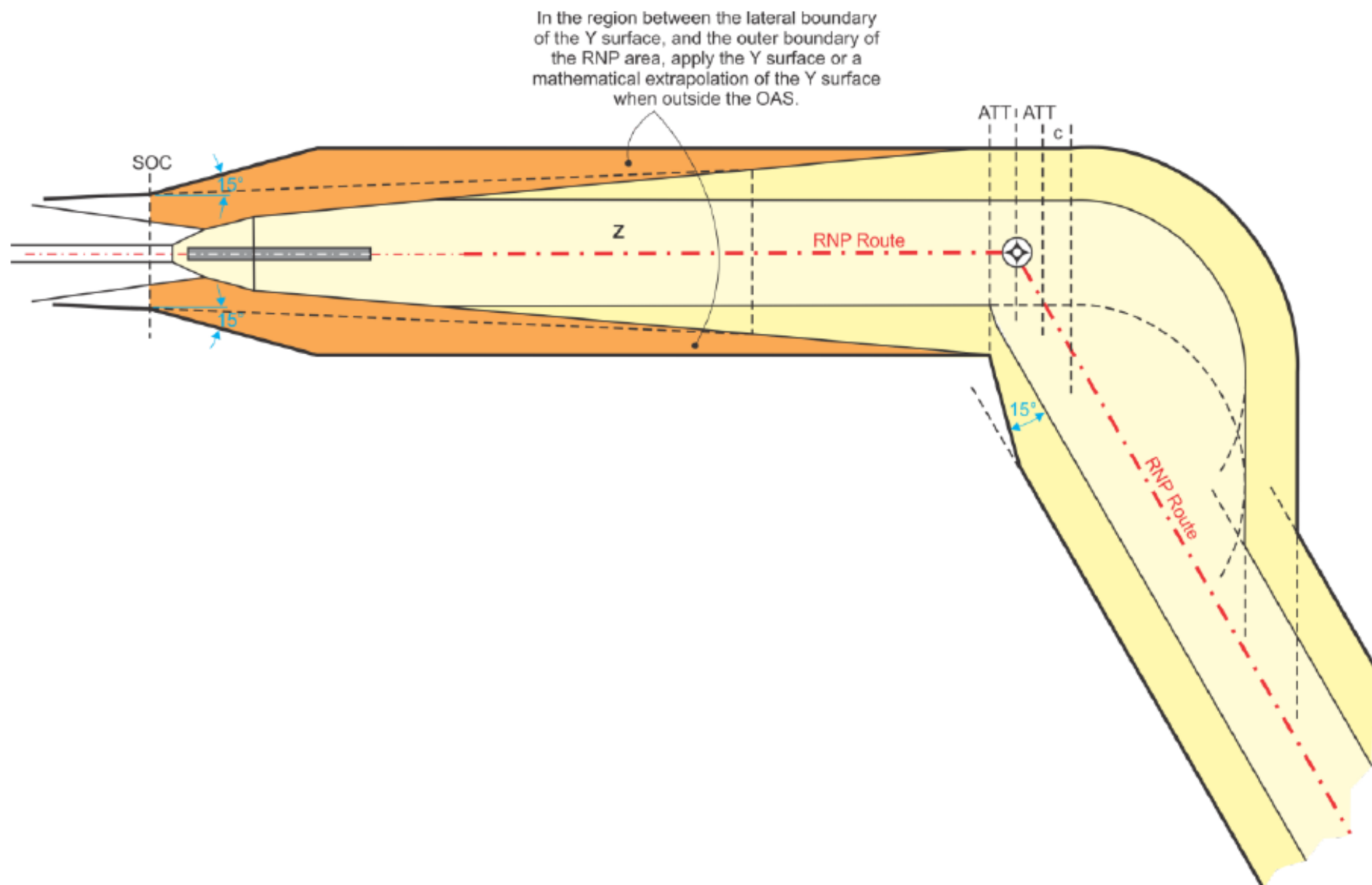


MISSED APPROACH SEGMENT

- A missed approach can be based on RNAV or RNP navigation specifications. Only the systems capable of navigation accuracy of **1 NM** or better in this phase of flight can be considered.
- Transition from conventional navigation to an RNAV or RNP missed approach may be defined by an RNAV or RNP fix located on the extended LOC course, or by a turn at an altitude direct to a waypoint .

MISSED APPROACH SEGMENT

- If the RNAV or RNP track is collinear with the LOC course, the area abeam the **SOC** shall be expanded at a **15** degree angle from the track course until it reaches the applicable width of the RNAV or RNP area constructed on the extended LOC course.
- In the region between the lateral boundaries of the Z surface and the outer boundaries of the area, the obstacle evaluation shall be based on the **Y** surface and a mathematical extrapolation of the Y surface where the area is outside the lateral boundaries of the OAS 300 m contour.

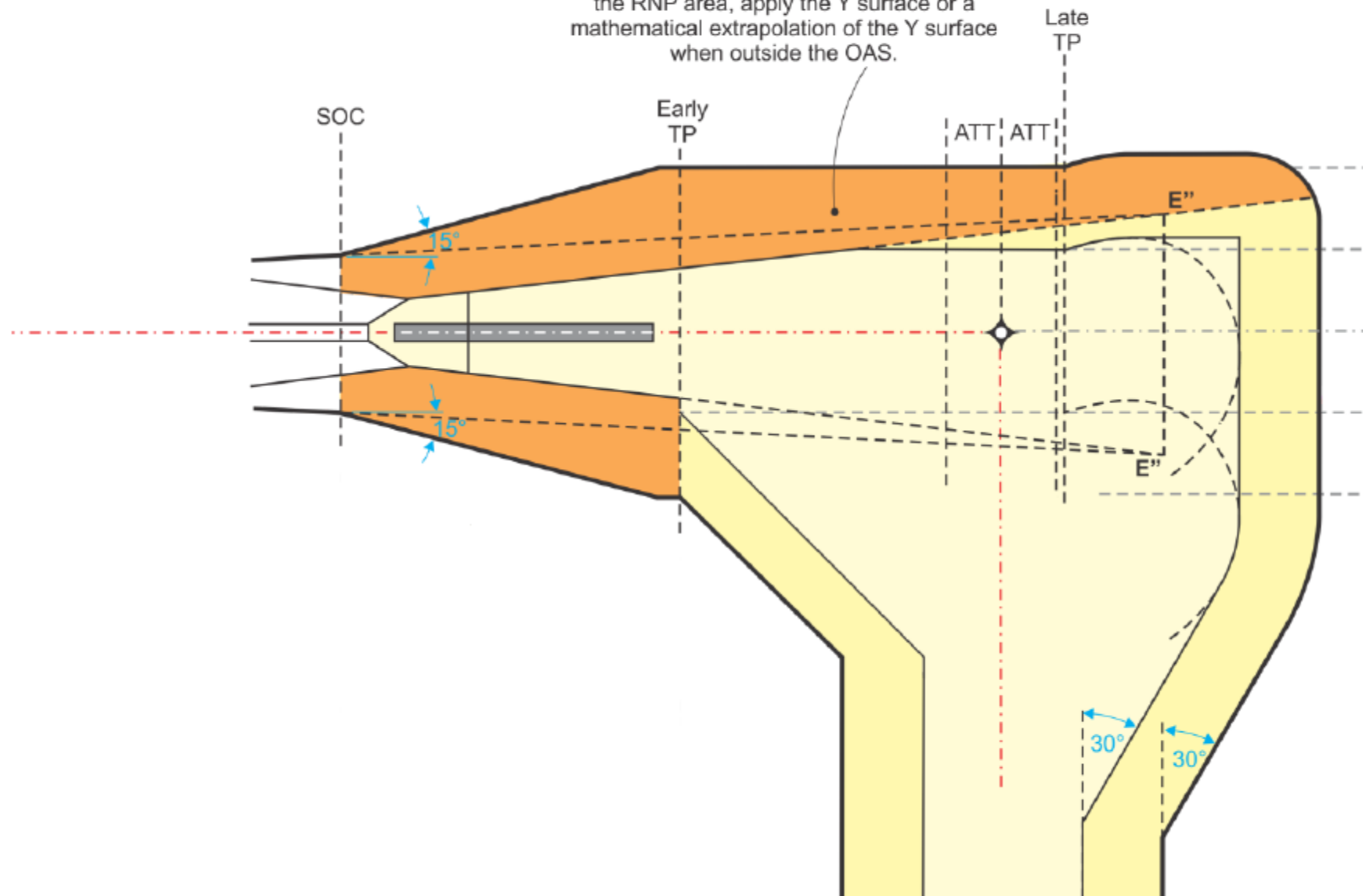


MISSED APPROACH SEGMENT

- The Z surface shall continue to splay at the same angle until reaching the width of the RNAV or RNP area.
- Secondary areas shall apply from the point where the width of Z surface reaches the width of RNAV or RNP primary area .
- Obstacle clearance up to this point for the extended Y and Z surfaces shall be the same as in the precision segment. its elevation/height shall be less than:

$$(OCA/Hps - HL) + d \tan Z + MOC$$

In the region between the lateral boundary of the Y surface, and the outer boundary of the RNP area, apply the Y surface or a mathematical extrapolation of the Y surface when outside the OAS.



Turning missed approach



- For missed approaches using RNAV or RNP, fly-by or flyover turns should be limited to **90** degrees.
- **RF turns** are **not** permitted as the **first** RNP leg of the missed approach since there would be no tangent RNP entry track specified. In this case a TF leg with the first waypoint located on the extended azimuth course is required preceding the RF leg.

Turning missed approach



- for an RNAV or RNP missed approach, standard turn construction and turning MOC (**50 m** (164 ft) for turns of more than 15 degrees and **30 m** (98 ft) for all other turns) shall apply after the earliest turning point.
- Secondary areas shall apply between the standard width of the RNAV or RNP primary area and the edge of the total area, except that obstacles located under the **Y** surface on the outer side of the turn need not be considered.

PART 7:

BARO-VNAV OFFSET PROCEDURES

(to be discussed in the APV Baro-VNAV PART)

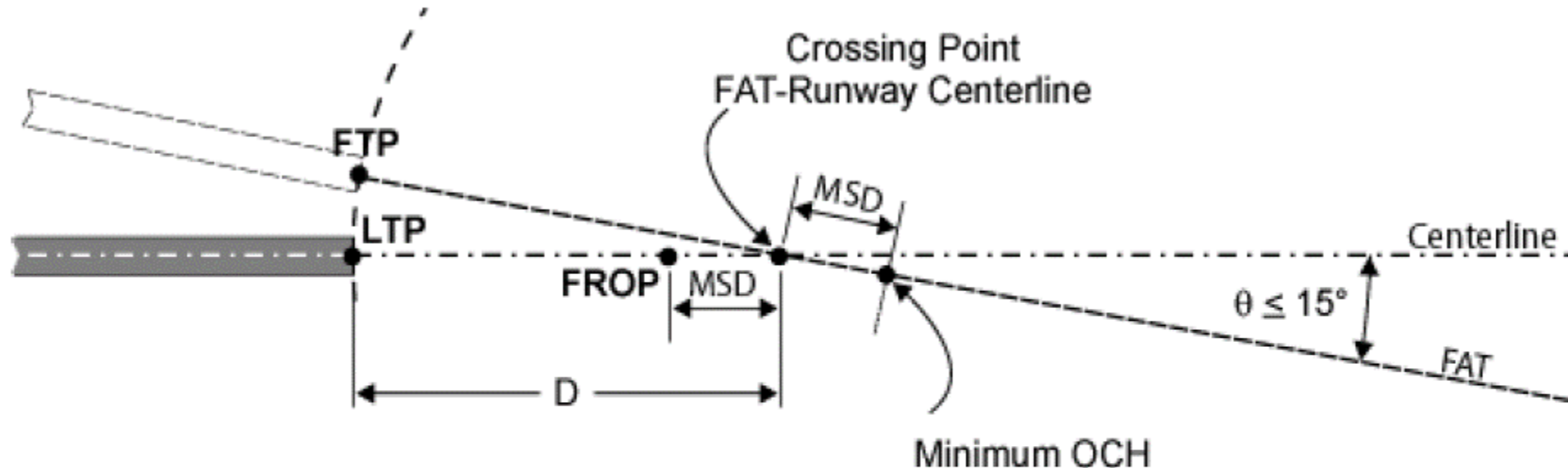
BARO-VNAV Offset Procedures

- In certain cases it may not be physically practicable to align the final approach segment with the runway centerline because of obstacle problems.
- An offset final approach track shall not be established as a noise abatement measure.

BARO-VNAV Offset Procedures

- The final approach track shall **intersect** the runway extended centerline:
 - a) at an angle not exceeding **15** degrees; and
 - b) at a distance **D** before threshold providing at least a minimum stabilization distance **(MSD)** before the point **(FROP)** where the promulgated VPA reaches a height of 75 m (246 ft) above threshold elevation .
- The minimum stabilization distance (MSD) is the sum of **L1** and **L2**.

BARO-VNAV Offset Procedures



$$D \geq \frac{75\text{m} - \text{RDH}}{\tan \text{VPA}} + \text{MSD}$$

$$\text{MSD} = r \times \tan(\theta/2) + 3 \times V/3600$$

$$\text{Minimum OCH} = \text{RDH} + D \times \tan \text{VPA} + \text{MSD} \times \tan \text{VPA}$$

PART 8:

PBN (new) Navigation Application

	Flight Phase							
	Oceanic/ Remote	En-route	Arrival	Approach				Departure
				Initial	Intermediate	Final	Missed ¹	
RNAV 10	10							
RNAV 5		5	5 ²					
RNP 4	4							
RNP 2	2	2						
RNAV 2		2	2					2
Advanced RNP ³	2	2 or 1	1 - 0.3	1 - 0.3	1 - 0.3	0.3	1 - 0.3	1 - 0.3
RNP 1			1	1	1		1	1
RNAV 1		1	1	1	1		1	1
RNP 0.3 (Cat H)		0.3	0.3	0.3	0.3		0.3	0.3
RNP APCH (Part A) ⁴				1	1	0.3	1	
RNP APCH (Part B) ⁴				1	1	Angular	1 or 0.3 (initial straight MISAP)	
RNP AR APCH				1-0.1	1-0.1	0.3-0.1	1-0.1	

PART 9: Publication

MAGNETIC BEARING ON A PBN (RNAV OR RNP) ROUTE SEGMENT



➤ Part III - Section 1 - Chapter 1.3

- Based on True course and magnetic variation
- At the Origin of the PBN route segment
- Charted to the nearest degree.
- When overlays an existing conventional airway
 - VOR radial or the NDB magnetic bearing shall be charted.

New RNP Approach name

➤ RNP APCH :

➤ ~~Until 1/12/2022 :~~

~~shall include the term RNAV(GNSS) in the identification
(e.g. RNAV(GNSS) RWY 23) or~~

➤ From 1/12/2022 :

shall RNP in the identification (e.g. RNP RWY 23).

New RNP Approach name

➤ **Parenthesis for exeptional situation:(mainly when no LNAV)**

<i>Condition</i>	<i>Suffix</i>	<i>Example</i>
Procedure has only an LPV line of minima	LPV only	RNP RWY 23 (LPV only)
Procedure has only an LNAV/VNAV line of minima	LNAV/VNAV only	RNP RWY 23 (LNAV/VNAV only)
Procedure has both LPV and LNAV/VNAV lines of minima but no LNAV minima	LPV, LNAV/VNAV only	RNP RWY 23 (LPV, LNAV/VNAV only)
Procedure has only an LP line of minima	LP only	RNP RWY 23 (LP only)

If the procedure has at least a line of “LNAV” minima, no designator suffix in parenthesis is required.

New RNP Approach name

➤ RNP AR APCH :

➤ ~~Until 1/12/2022:~~

~~shall include the term RNAVRNP in the identification : e.g.
RNAV RNP RWY 23~~

➤ From 1/12/2022 :

shall include the term RNP in the identification with a parenthesis AR : e.g. RNP RWY 23(AR) .

PBN box

- **Additional PBN requirement as chart note :**

- **PBN Nav specification**

- RNAV 1, RNP 1, RNP APCH, RNP AR APCH ,Advanced RNP, RNP 0.3

- **Optional requirements:**

- RNP APCH: RF required, RNP AR APCH: RF required

- RNP < 0.3, Missed approach RNP < 1

- Advanced RNP: RNP < 1 in initial segments

Minima

Minima label	Associated navigation
LNAV	RNP APCH
LNAV/VNAV	RNP APCH
LP	RNP APCH
LPV	RNP APCH
RNP 0.x	RNP AR APCH

Amendments 10 to PAN-OPS VOL II

- GBAS Approach Service Type (GAST)
 - airborne and ground performance and functional requirements
 - GAST A ➡ APV I
 - GAST B ➡ APV II
 - GAST C ➡ CAT I
 - GAST D ➡ CAT III

Further details regarding GBAS approach services can be found in Annex 10, Volume I

Amendments 10 to PAN-OPS VOL II



- Chapter 4 QUALITY ASSURANCE: IFP process
 - Conceptual design
 - Procedure design documentation
 - Validation
 - Independent procedure design review
 - Flight operational review of flight procedure design
 - Flight validation

Amendments 10 to PAN-OPS VOL II

- Chapter 4 QUALITY ASSURANCE
 - PROCEDURE DESIGN AUTOMATION
 - DOCUMENTATION FOR REGULATORY APPROVAL

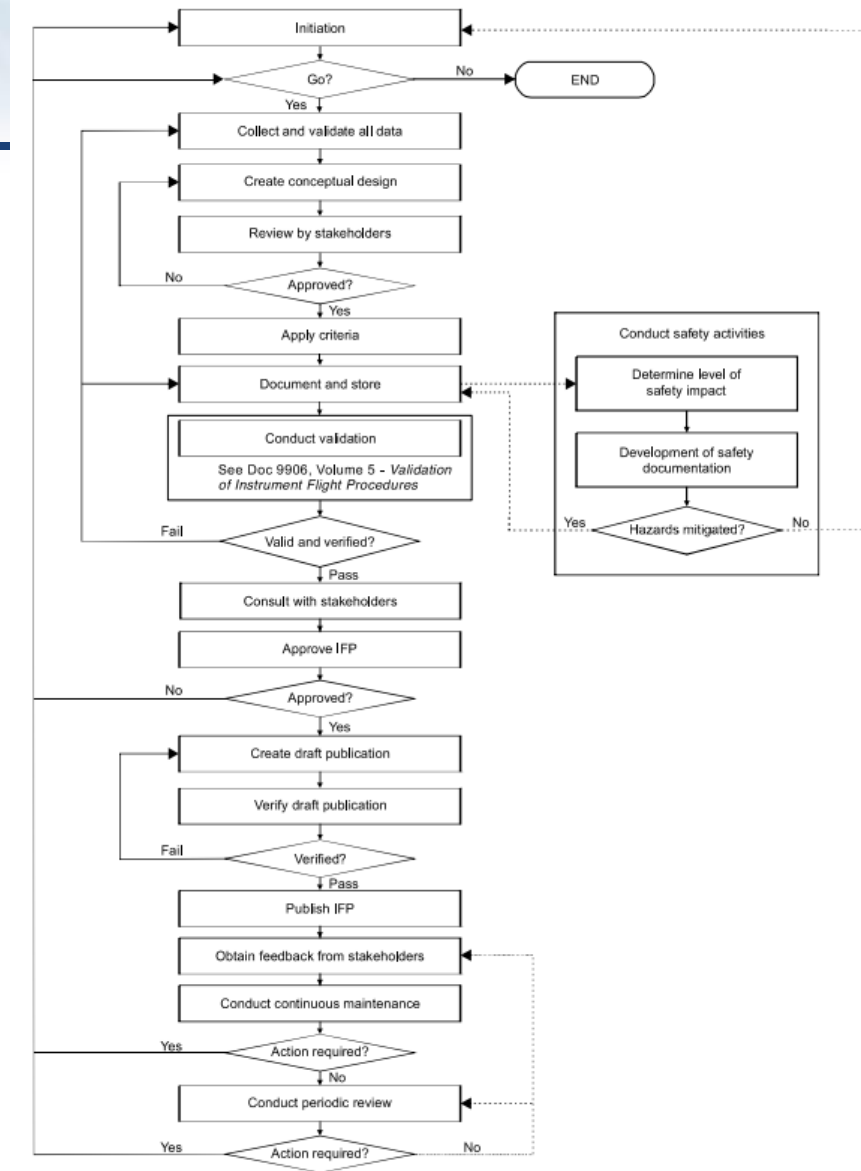


Figure I-2-4-1. Instrument flight procedure process

Amendments 10 to PAN-OPS VOL II



- ~~minimum altitudes~~
- ➔ Minimum obstacle clearance altitudes (MOCAs)
- Maximum lateral displacement
 - Minimum distance

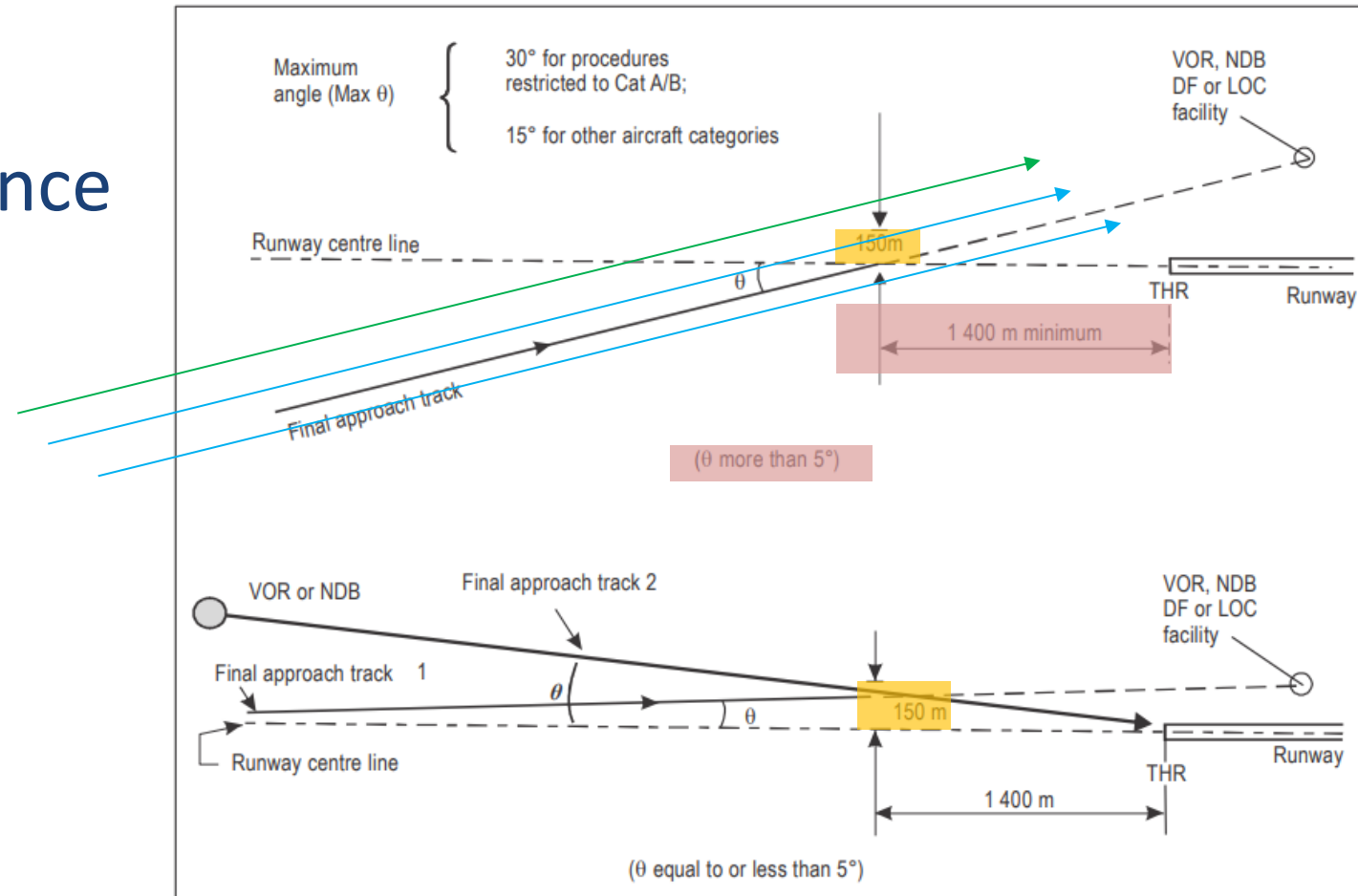


Figure I-4-5-1. Final straight-in approach alignment

Amendments 10 to PAN-OPS VOL II



- Part III PERFORMANCE-BASED NAVIGATION PROCEDURES
- GNSS RNAV

2.2 XTT, ATT AND AREA SEMI-WIDTH

2.2.3 Area semi-width

Table III-1-2-5. XTT, ATT and area semi-width for RNP-1 in arrival and departure phases of flight (m)

STAR/SID/missed approach (>56 km ARP)			STAR/IF/IAF/SID/missed approach (≤56 km ARP)			SID/missed approach (≤28 km ARP)		
XTT	ATT	½ A/W	XTT	ATT	½ A/W	XTT	ATT	½ A/W
1 852	1 482	6 482	1 852	1 482	4 630	1 852	1 482	3 704

Table III-1-2-6. XTT, ATT and area semi-width for RNP-1 (aceroplane) in arrival and departure phases of flight (NM)

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 A/W	XTT	ATT	½ A/W	XTT	ATT	½ A/W
1.00	0.80	3.50	1.00	0.80	2.50	1.00	0.80	2.00

Table III-1-2-7. XTT, ATT and area semi-width for RNP-1 (CAT H) in arrival and departure phases of flight (m)

STAR/SID/missed approach (>56 km ARP)			STAR/IF/IAF/SID/missed approach (≤56 km ARP)			SID/missed approach (≤28 km ARP)		
XTT	ATT	½ A/W	XTT	ATT	½ A/W	XTT	ATT	½ A/W
1 852	1 482	4 630	1 852	1 482	4 074	1 852	1 482	3 426

Table III-1-2-8. XTT, ATT and area semi-width for RNP 1 (CAT H) in arrival and departure phases of flight (NM)

STAR/SID/missed approach			STAR/IF/IAF/SID/missed			SID/missed approach		
--------------------------	--	--	------------------------	--	--	---------------------	--	--

Table III-1-2-17. XTT, ATT and area semi-width for RNAV 1 and RNAV 2 (Cat A to E) in en-route, arrival, initial/intermediate approach and departure phases of flight (m)

En-route/STAR/SID/missed approach (>56 km ARP)			STAR/IF/IAF/SID/missed approach (≤56 km ARP)			SID/missed approach (≤28 km ARP)		
XTT	ATT	½ A/W	XTT	ATT	½ A/W	XTT	ATT	½ A/W
3 704	2 963	9 260	1 852	1 482	4 630	1 852	1 482	3 704

Table III-1-2-18. XTT, ATT and area semi-width for RNAV 1 and RNAV 2 (Cat A to E) in en-route, arrival, initial/intermediate approach and departure phases of flight (NM)

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 A/W	XTT	ATT	½ A/W	XTT	ATT	½ A/W
2.00	1.60	5.00	1.00	0.80	2.50	1.00	0.80	2.00

Table III-1-2-19. XTT, ATT and area semi-width for RNAV 1 and RNAV 2 (Cat H) in en-route, arrival, initial/intermediate approach and departure phases of flight (m)

En-route/STAR/SID/missed approach (>56 km ARP)			STAR/IF/IAF/SID/missed approach (≤56 km ARP)			SID/missed approach (≤28 km ARP)		
XTT	ATT	½ A/W	XTT	ATT	½ A/W	XTT	ATT	½ A/W
3 700	2 960	7 400	1 850	1 480	4 070	1 850	1 480	3 420

Table III-1-2-20. XTT, ATT and area semi-width for RNAV 1 and RNAV 2 (Cat H) in en-route, arrival, initial/intermediate approach and departure phases of flight (NM)

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 A/W	XTT	ATT	½ A/W	XTT	ATT	½ A/W
2.00	1.60	4.00	1.00	0.80	2.20	1.00	0.80	1.85

Amendments 10 to PAN-OPS VOL II



- Part III PERFORMANCE-BASED NAVIGATION PROCEDURES
- PBN T- OR Y-BAR PROCEDURE CONSTRUCTION

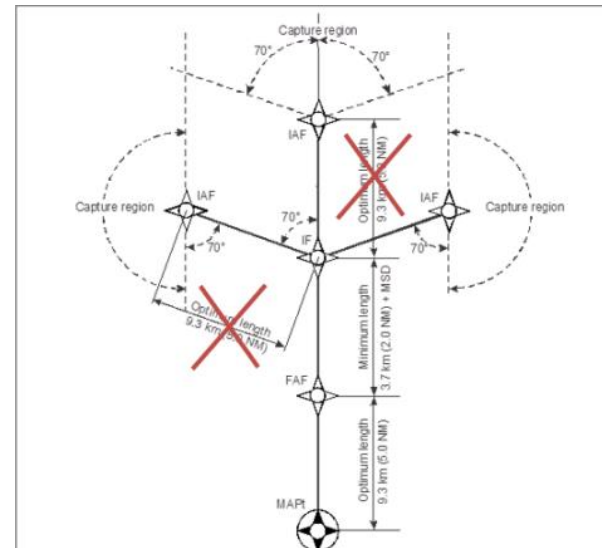


Figure III-2-3-2. Y-bar general arrangement

2.3.1.2 *Initial approach area length.* The optimum length is dictated by the necessary descent to be achieved with an optimum descent gradient. The minimum length is dictated by the maximum allowed descent gradient as well as the required minimum distance between waypoints for turn stabilization and anticipation.

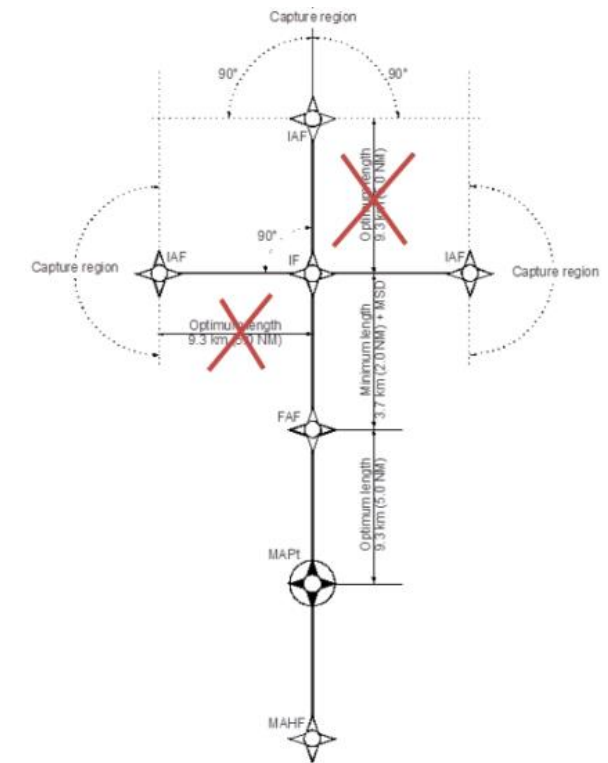


Figure III-2-3-1. T-bar general arrangement

Amendments 10 to PAN-OPS VOL II



- HOLDING PROCEDURES

- Advanced RNP (A-RNP) requiring an area navigation system capable of RNP holding

4.1.2 Advanced RNP functional capabilities

4.1.2.1 States and service providers should understand that the functional capabilities specified in the A-RNP navigation specification were specifically chosen to encompass those included in RNAV 5, RNAV 2, RNAV1, RNP 2, RNP 1 and RNP APCH applications (excluding the final approach segment) and as shown in Table II-A-1-1 and Table II-A-1-2.

RNP holding procedures were added in 1998. In the 5th edition of PANS-OPS.

Radius to fix (RF) legs are expected to be implemented where there is an operational requirement for reliable, repeatable and predictable turn performance from one flight plan fix to the next fix (the RF path terminator). This will require the specification of RF legs for charting information, AIP, etc. See the guidance for use of the RF leg contained in Volume II, Appendix 1 to Part C.

4.1.2.3 **RNP holding**

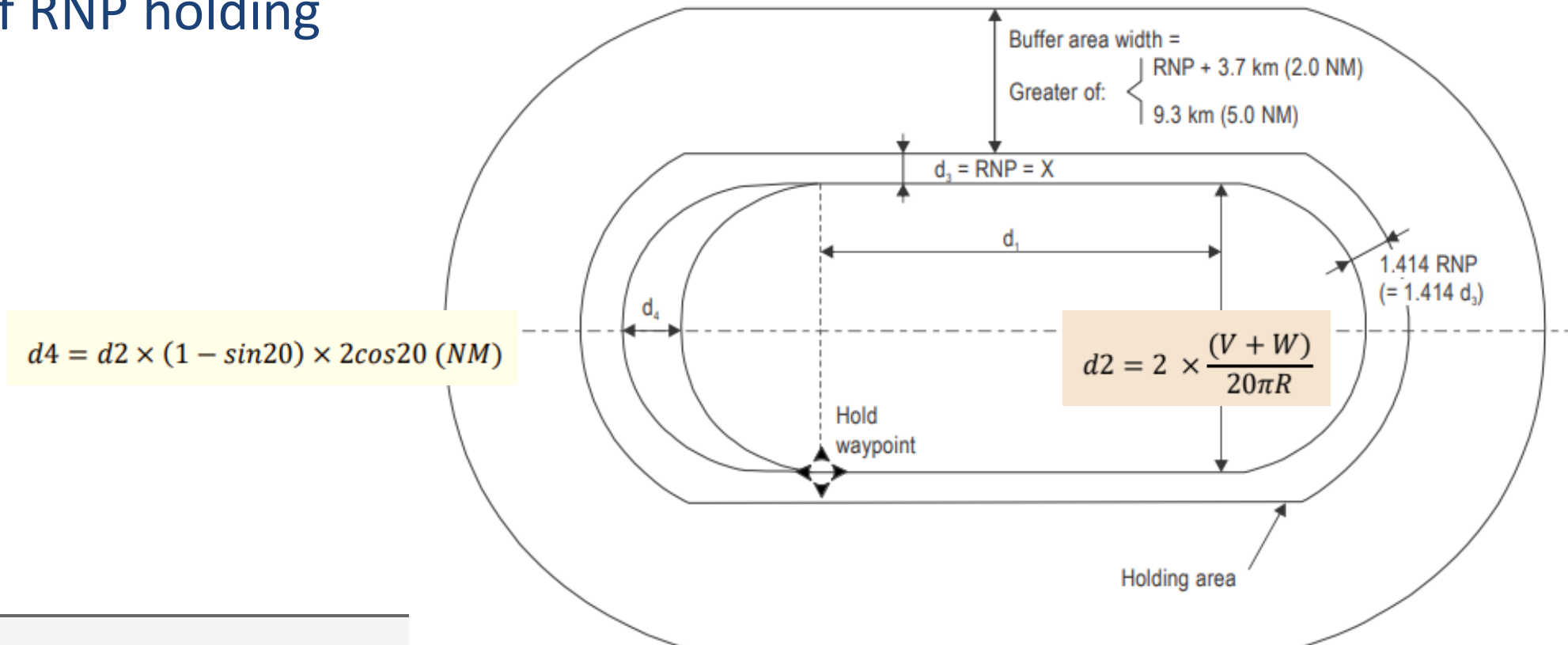
The **RNP holding** operational concept is not yet defined. Upon its development, **RNP holding** should be specified when an operational need arises to aid airspace management, traffic flow, etc. with a racetrack holding pattern. This will require **RNP holding** to be identified on charts, AIP, etc.

Amendments 10 to PAN-OPS VOL II



- HOLDING PROCEDURES

- Advanced RNP (A-RNP) requiring an area navigation system capable of RNP holding





INTERNATIONAL CIVIL AVIATION ORGANIZATION

A United Nations Specialized Agency

Doc 9613 PBN Manual

Virtual Classroom

Doc 9613 PBN Manual



Third
edition.
2008

Fourth
Edition
2013

Fifth
Edition
2023

Doc 9613 PBN Manual



- For this manual:
- RNP 1 refers to the navigation specification
- RNP 0.3 refers to the navigation specification
-
- RNP 1.0 is an RNP value (lateral navigation accuracy)
 - expressed in NM.
- RNP 0.30 is an RNP value (lateral navigation accuracy)
 - expressed in NM.

- **Fifth Edition 2023**
- **VOLUME I CONCEPT AND IMPLEMENTATION GUIDANCE**
 - Chapter 1. Description of performance-based navigation
 - Chapter 2. Airspace concepts
 - Chapter 3. Stakeholder uses of performance-based navigation (PBN)
 - Chapter 4. Introduction to performance-based navigation implementation
- **ATTACHMENTS TO VOLUME I**
 - Attachment A. RNAV and RNP systems
 - Attachment B. Data processes

- **Fifth Edition 2023**
- **VOLUME II IMPLEMENTING RNAV AND RNP OPERATIONS**
 - **PART A – GENERAL**
 - Chapter 1. Introduction
 - Chapter 2. On-board performance monitoring and alerting
 - Chapter 3. Safety assessment considerations
 - Chapter 4. Navigation service monitoring .
 - **PART B – IMPLEMENTING RNAV OPERATION**
 - **PART C – IMPLEMENTING RNP OPERATIONS**
 - Chapter 6. Implementing RNP with Authorization Required (RNP AR APCH and RNP AR DP)

- **Fifth Edition 2023**
- **VOLUME II IMPLEMENTING RNAV AND RNP OPERATIONS**
 - ~~PART C – IMPLEMENTING RNP OPERATIONS~~
 - **APPENDICES TO PART C**
 - Radius to fix (RF) path terminator
 - Fixed radius transition (FRT)
 - Time of arrival control (TOAC)

- **Fifth Edition 2023**
- **VOLUME II IMPLEMENTING RNAV AND RNP OPERATIONS**
 - ~~APPENDICES TO PART C~~
 - ATTACHMENTS TO VOLUME II
 - Attachment A. Vertical navigation in the final approach segment
 - Attachment B. RNP APCH and RNP AR APCH operations in non-standard temperature conditions
 - Attachment C. Sample airspace concepts based on navigation specifications
 - Attachment D. Magnetic Variation
 - Attachment E. Document references for navigation specifications

Doc 9613 PBN Manual



Table II-A-1-1. Navigation specification, flight phase, navigation application, and associated RNAV/RNP value (lateral navigation accuracy) (NM)

Part, chapter	Navigation specification	Navigation application, flight phase and RNAV/RNP value (NM)							
		ATS or user-defined routeing		Arrival procedures	Approach procedures				Departure procedures
		En-route oceanic/remote	En-route continental	Arrival	Initial	Intermediate	Final	Missed ¹	Departure
B, Ch.1	RNAV 10	10							
B, Ch.2	RNAV 5 ²		5	5					
B, Ch.3	RNAV 2		2	2					2
B, Ch.3	RNAV 1		1	1	1	1		1	1
C, Ch.1	RNP 4	4							
C, Ch.2	RNP 2	2 ³	2						
C, Ch.3	RNP 1 ⁷			1	1	1		1	1
C, Ch.4	Advanced RNP (A-RNP)	2 ³	2 or 1	0.3	0.3	0.3		1 ⁹	0.3
C, Ch.5	RNP APCH ⁴				1	1	0.3 ⁵	1 ⁸	
C, Ch.6	RNP AR				1-0.1	1-0.1	0.3-0.1	1-0.1	1-0.3
C, Ch.7	RNP 0.3 ⁶		0.3	0.3	0.3	0.3		0.3	0.3





Let's **F**ocus/**P**ropose/**P**lan
Together