

RNP APCH

Vol II Part I

General criteria

Section 2 : general principle

Section 4 : arrival and approach procedure

Vol II Part III

Non precision Approach procedure

Section 3 chapter 2 : initial and intermediate

*Section 3 chapter 3 : Final and missed
approach*



Objectives



- Which RNP value for each approach segment ?
- Understand how area width are calculated and know their values
- Identify where the merging methodology should be applied
- Identify the possible MAPt Position
- How to design a missed approach turning altitude



RNP APCH



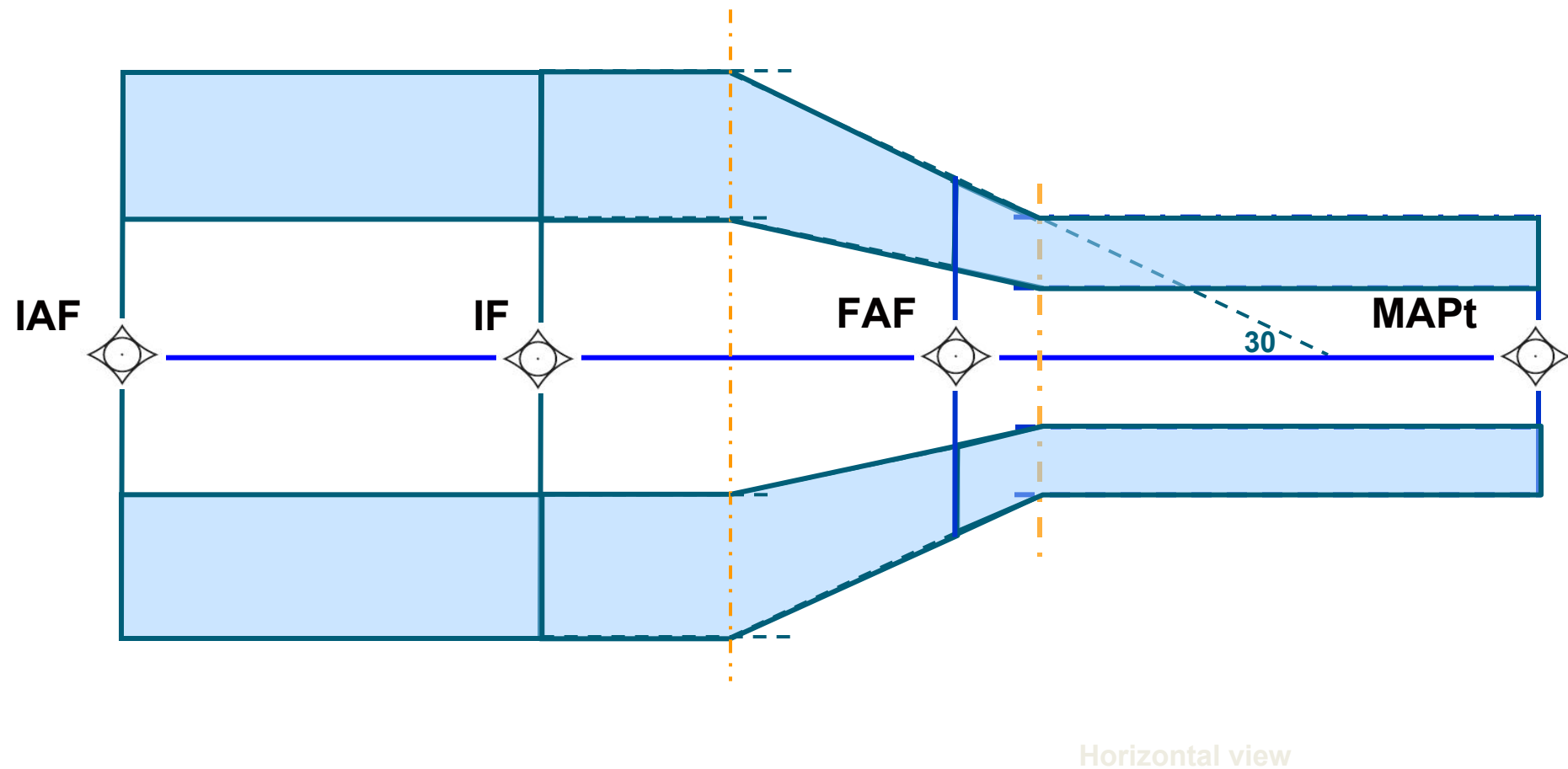
- RNP APCH = Sensor used GNSS (ABAS or SBAS)
- **DMEDME and VORDME are not acceptable for RNP APCH**
- It is an RNP application $\Rightarrow$ OPMA function
- RNP = 1 Nm for initial, intermediate and missed approach
- RNP = 0.3 Nm for final
- No vertical guidance : 2D RNP APCH
 - LNAV
- Vertical guidance : 3 D RNP APCH
 - LNAV VNAV baro vertical guidance
 - LPV SBAS vertical guidance

RNP APCH Tolerances and 1/2 Area Width

Navigation specification		RNP	FTE	ATT	XTT	BV	1/2AW
RNP APCH	Within 30 NM ARP	1	0.5	0.8	1	1	2.5
	FAF	0.3	0.25	0.24	0.3	1	1.45
	MAPT	0.3	0.25	0.24	0.3	0.5	0.95
	MA <15 NM ARP	1	0.5	0.8	1	0.5	2

All values are in NM

Protection Area: Initial – Intermediate Final



MISSED APPROACH

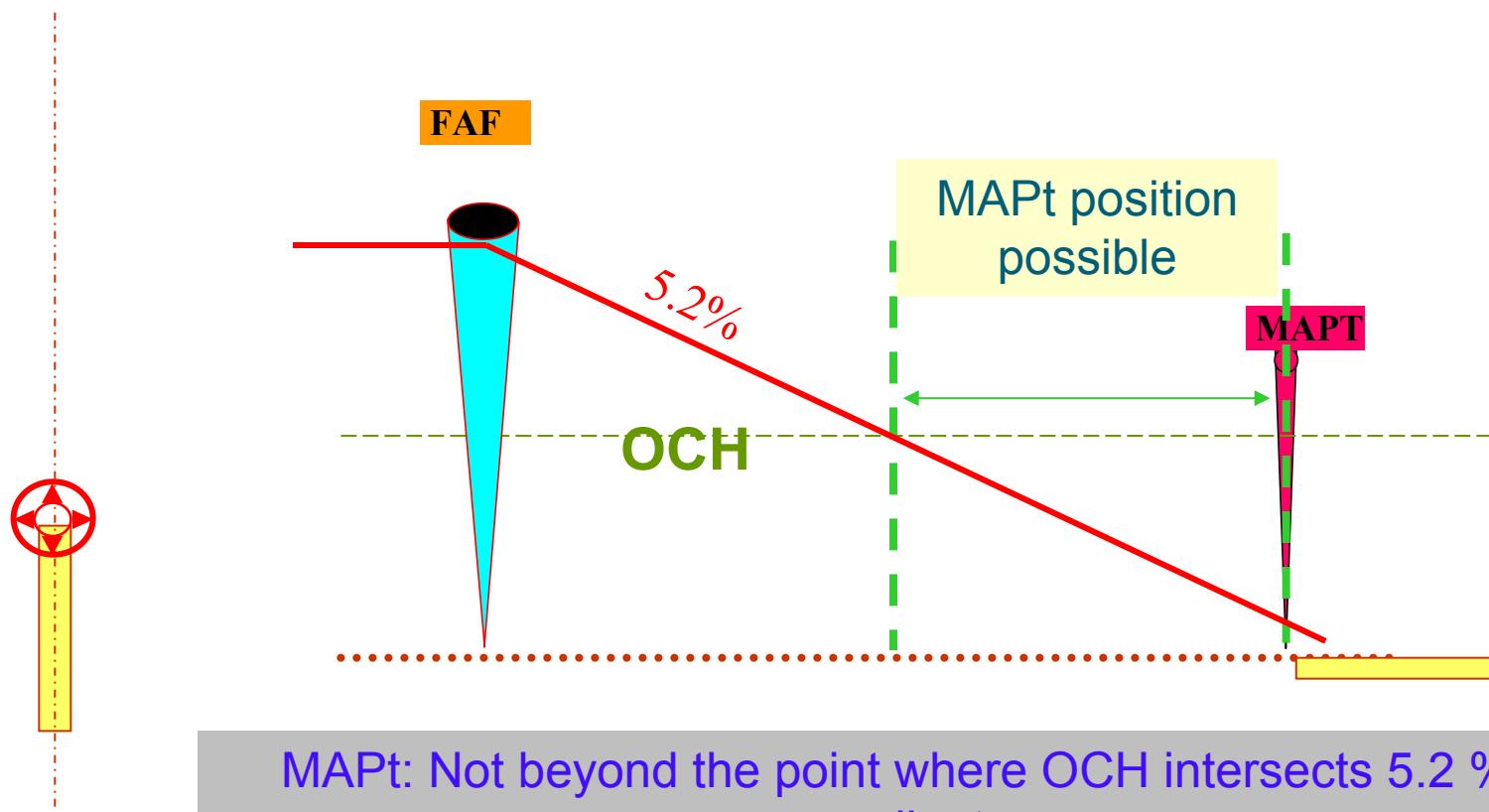


MISSED APPROACH SEGMENT

- Missed approach procedure can be based on
 - Conventional navaid
 - Or RNAV (if a contingency procedure exists)
- A turn at an altitude during missed approach is acceptable
 - Whereas CA, FA or VA are not mandate the lateral guidance is provided and the altitude is managed manually by the pilot

MAPT Location

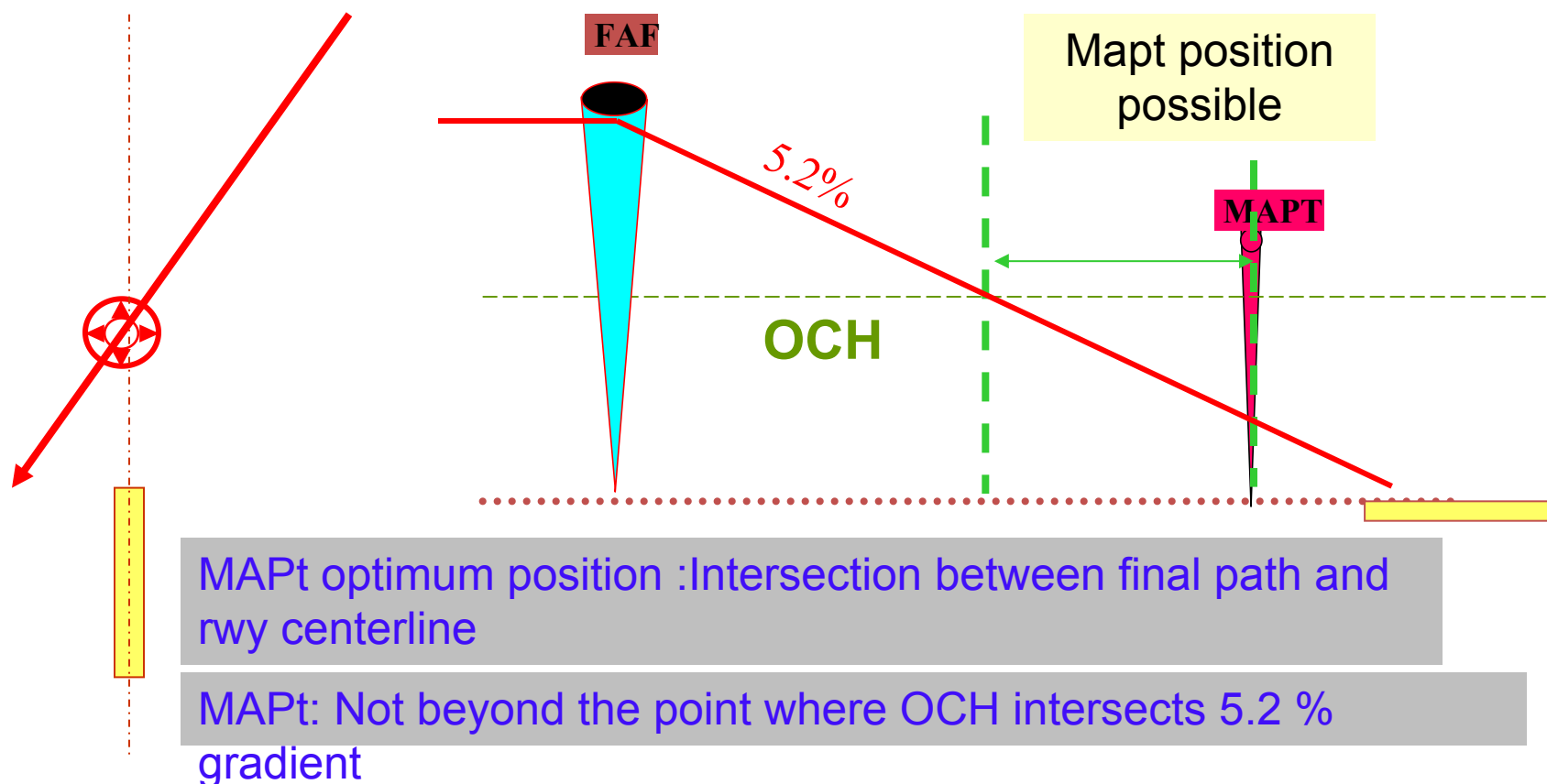
① Final approach aligned with RWY Centerline



MAPt: Not beyond the point where OCH intersects 5.2 % gradient

MAPT Location

② Final approach offset from RWY Centerline



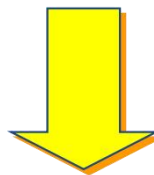
MISSED APPROACH

Area Width at MAPt

+

15 ° Splay from earliest
MAPt

COMPARE



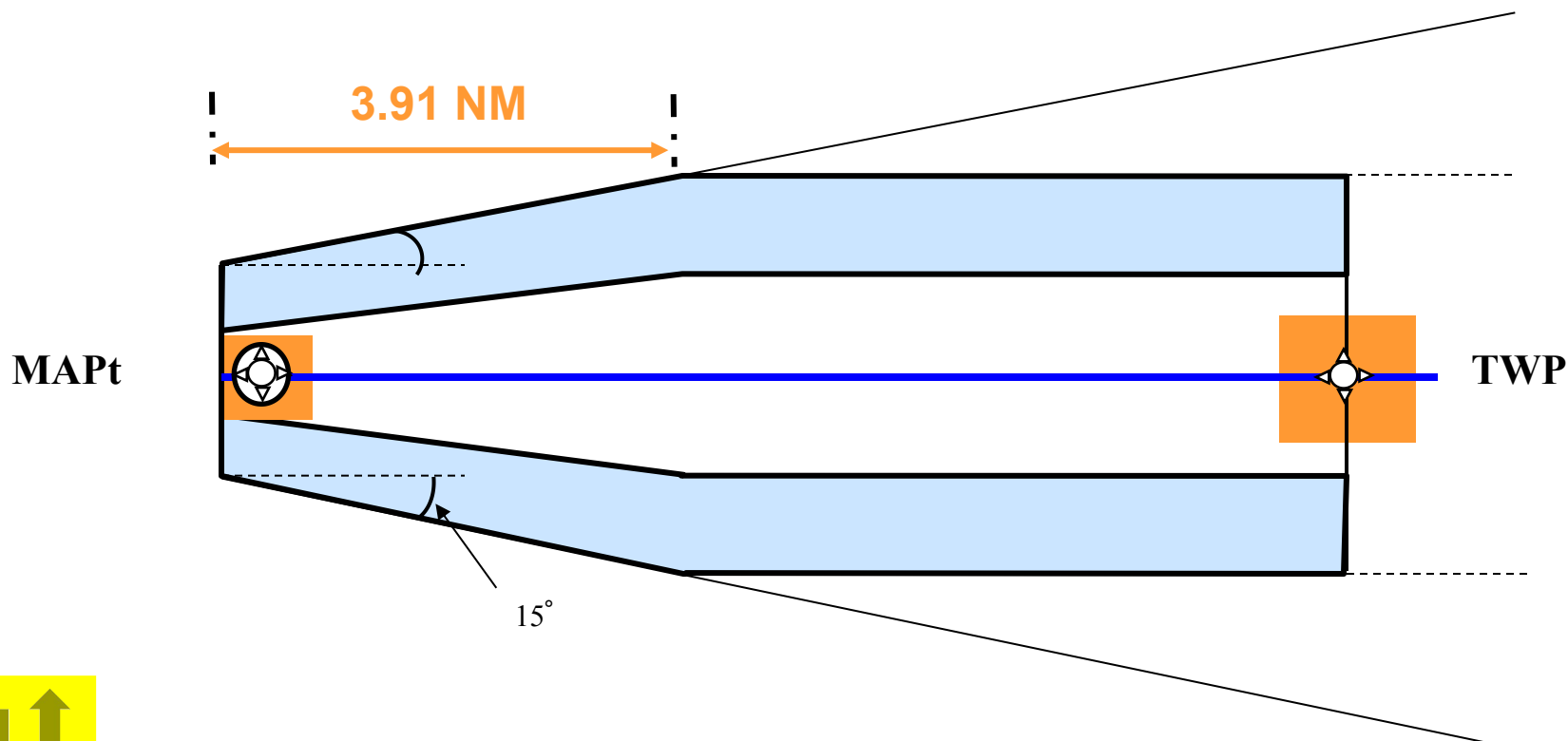
Area Width at Missed approach Turning WP
(MATWP)

> : Solution1

< : Solution2

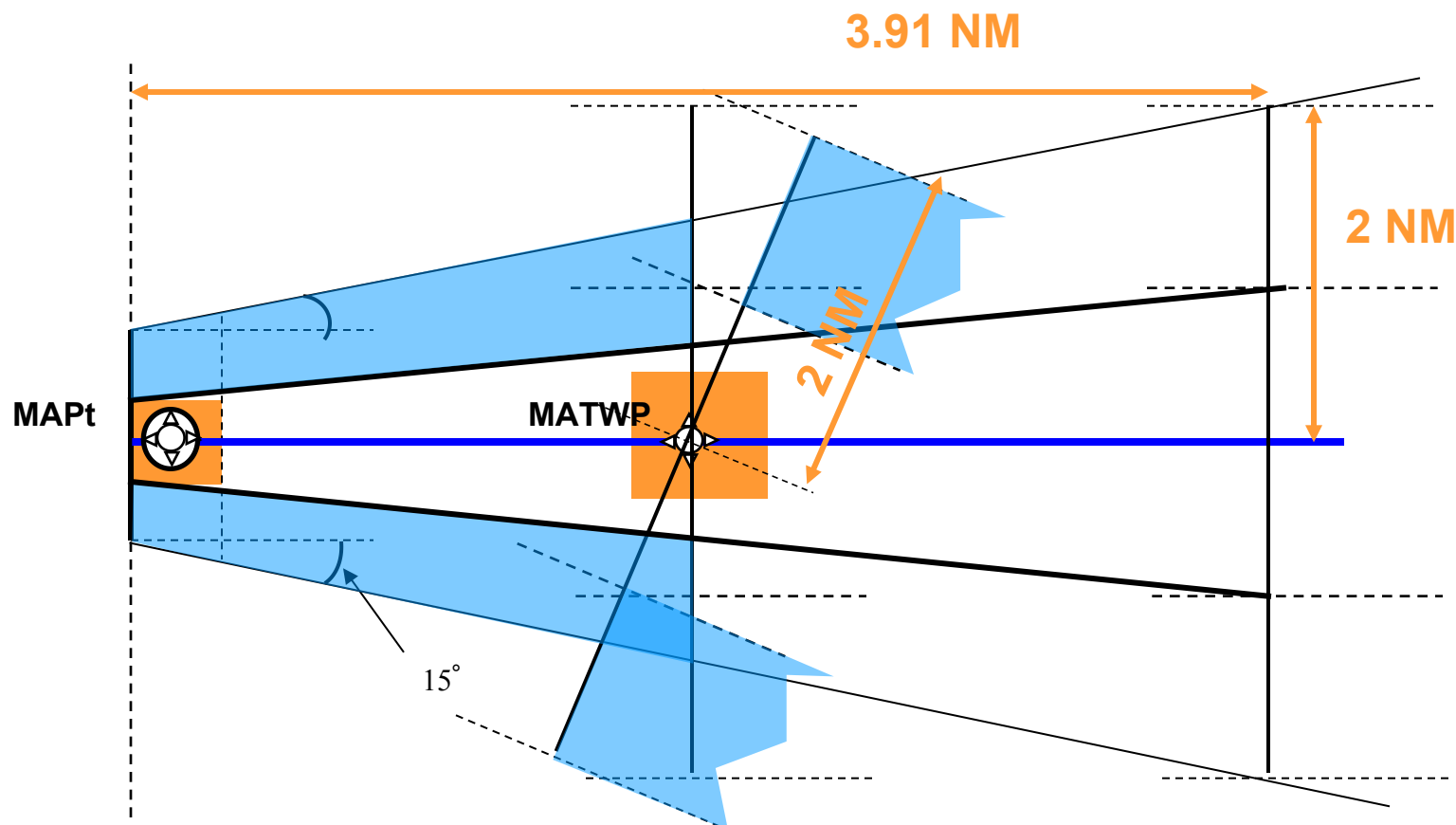
MISSED APPROACH

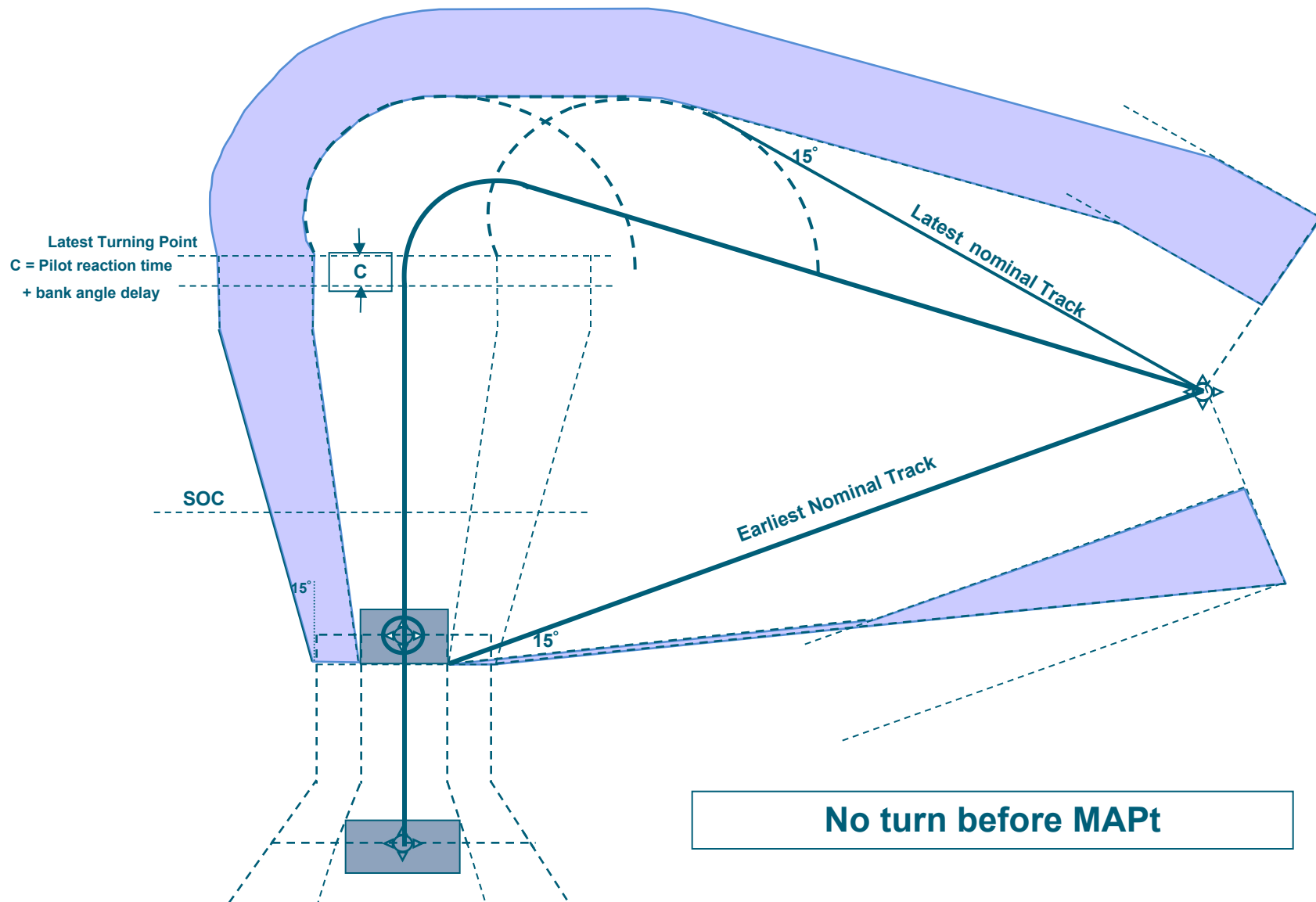
- When distance between MAPt and MATWP is longer than 3.91 Nm



MISSED APPROACH

- When distance between MAPt and MATWP is shorter than 3.91 Nm





Missed approach : Turning altitude FA - DF

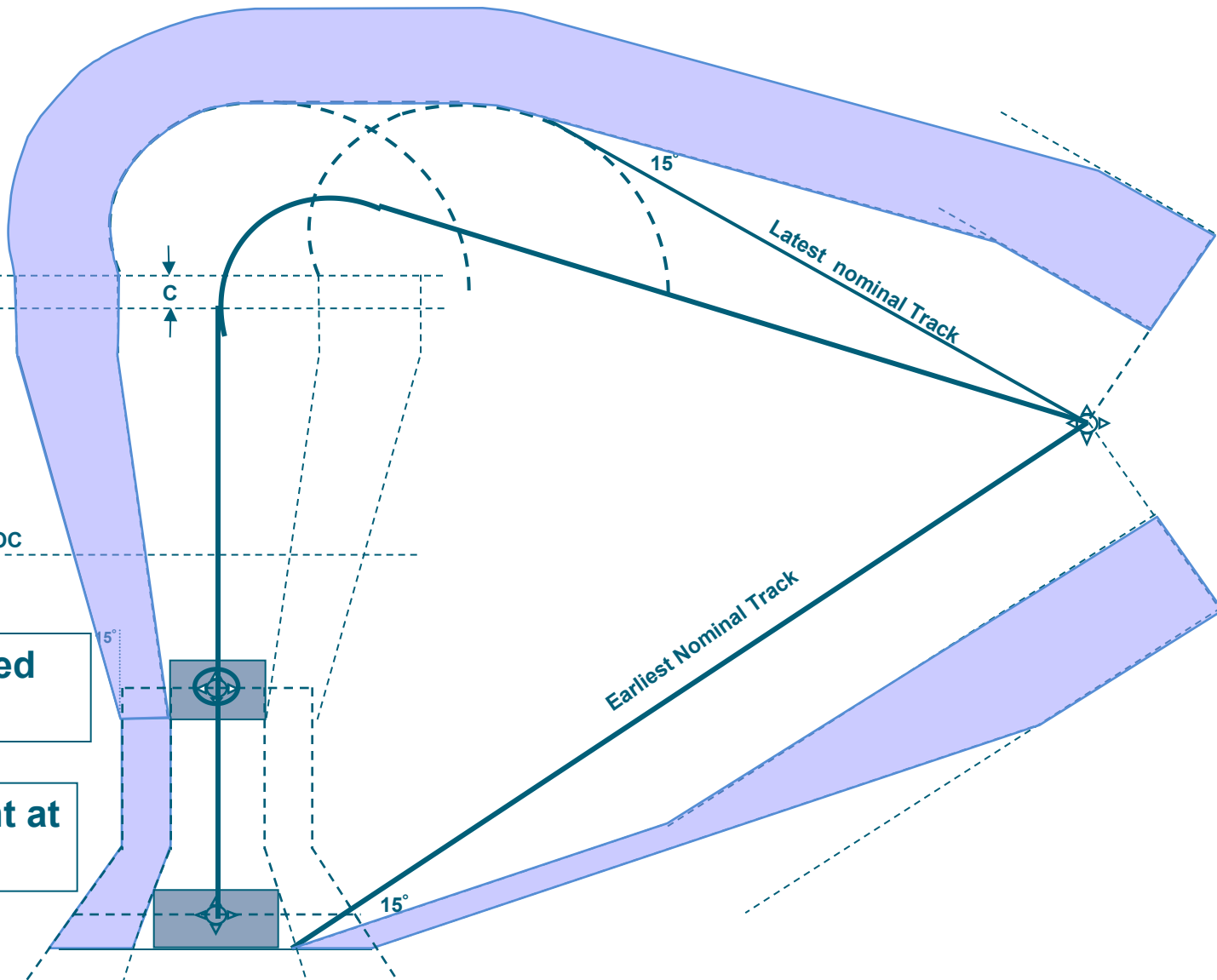
Latest Turning Point
C = Pilot reaction time
+ bank angle delay

SOC

Early turns expected
before MAPt

Earliest Turning point at
earliest FAF

Missed Approach : Turn at Altitude FA - DF



Turn at MAPt

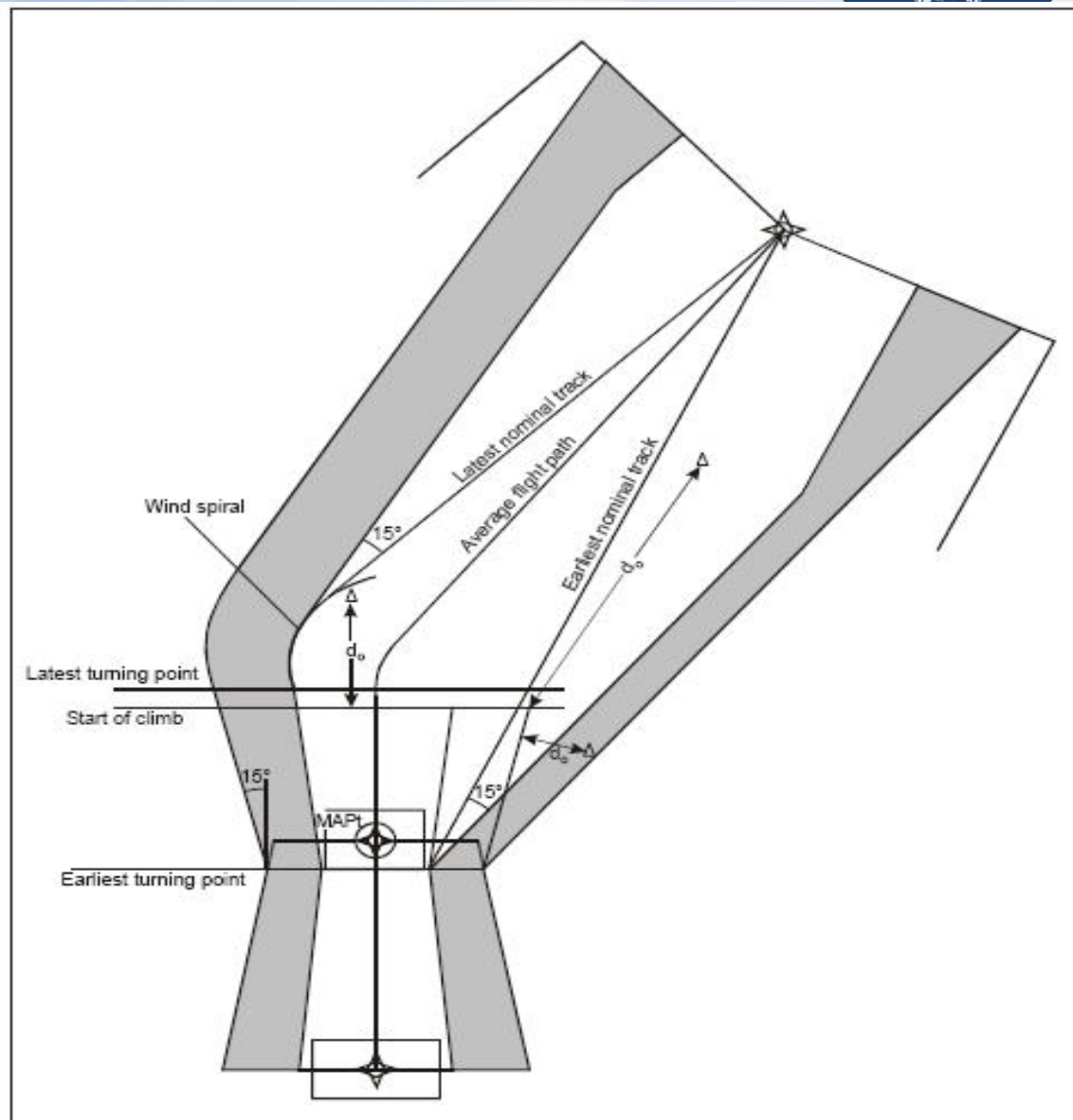


Figure III-2-2-11. Missed approach turn at the MAPt followed by a DF leg

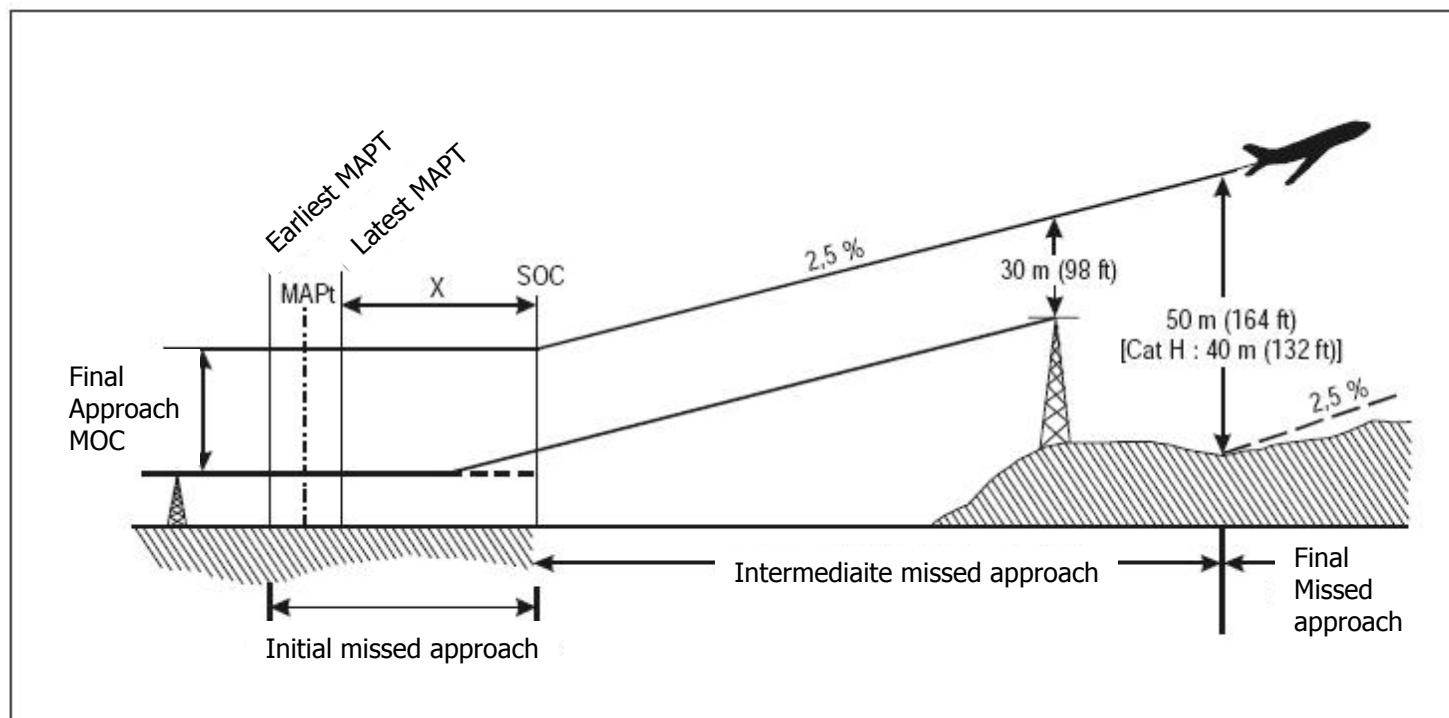


MISSED APPROACH

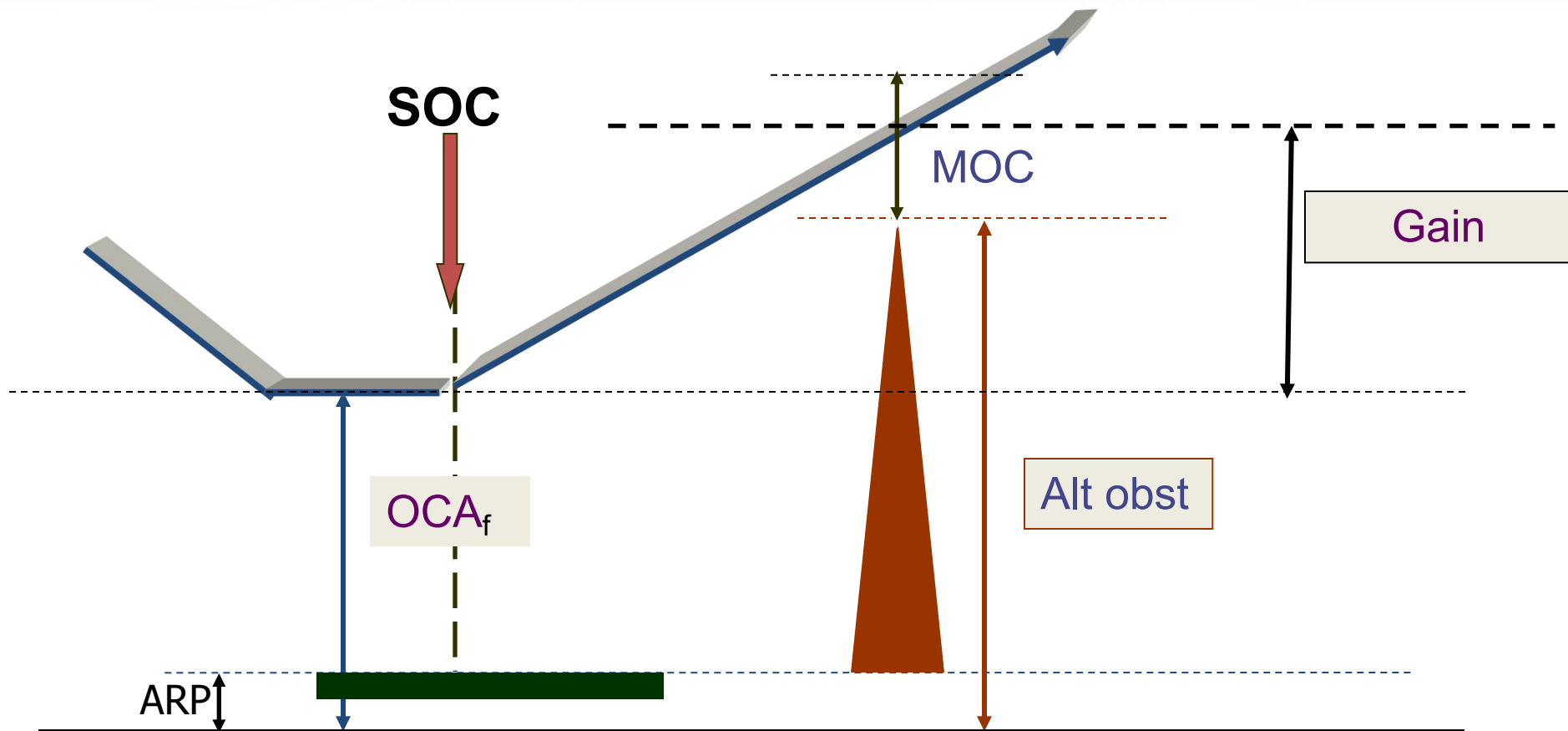
Obstacle Assessment review

Initial missed approach MOC

- MOC of final segment

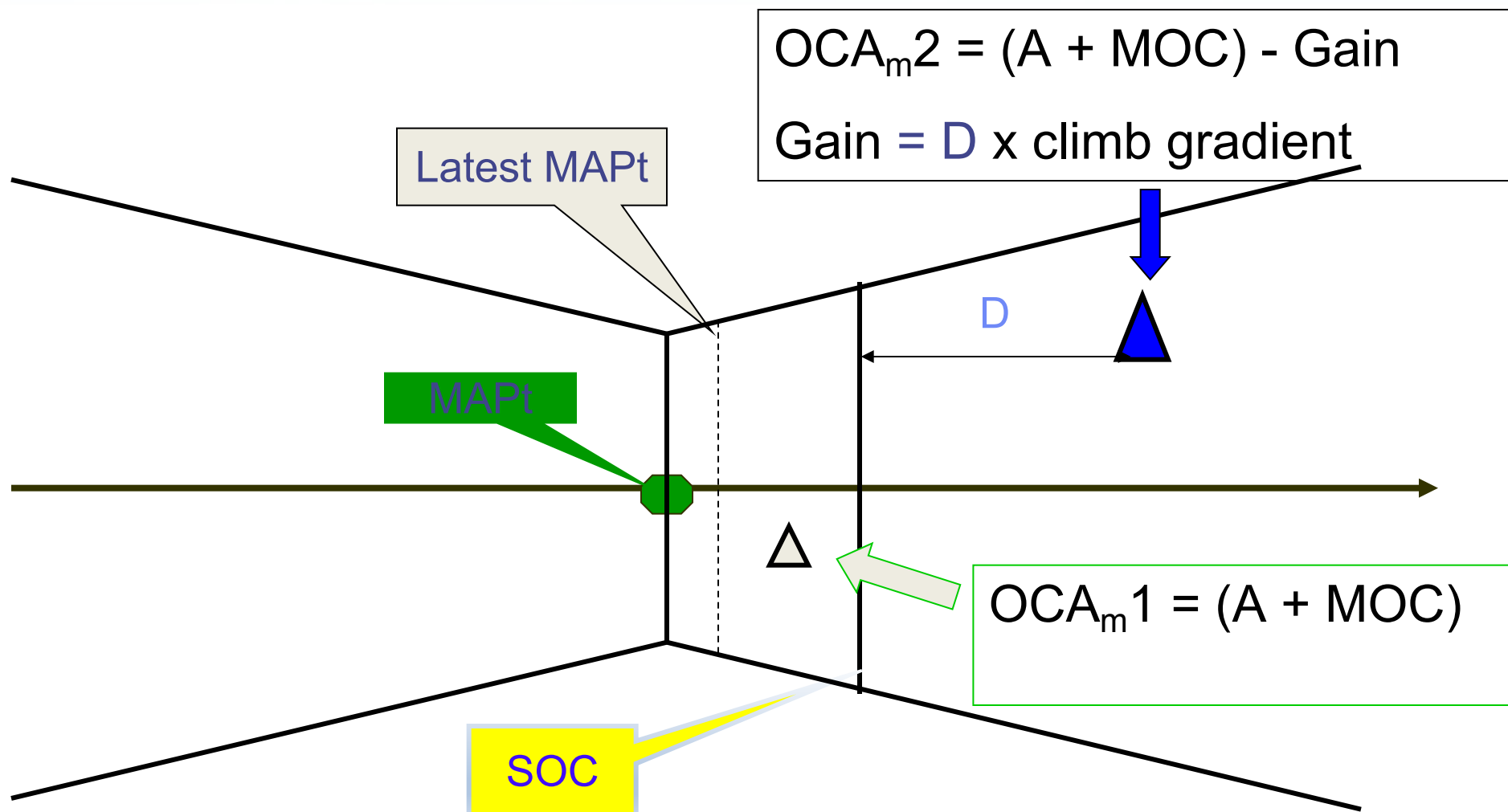


Intermediate missed approach



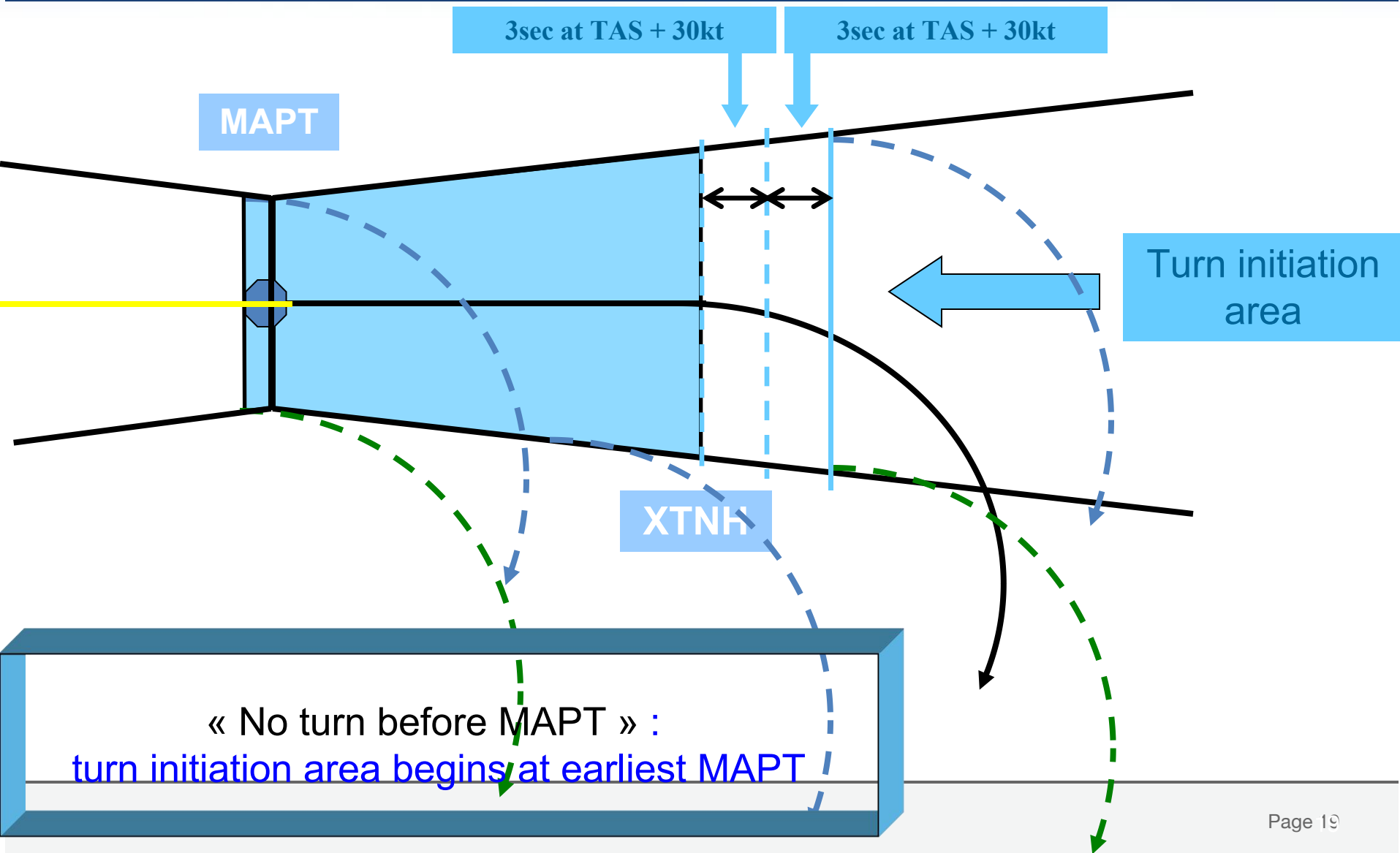
In this case, OCA_f is not high enough in case of missed approach
OCA_m will be higher than OCA_f

Obstacle clearance for initial and intermediate



Missed approach : Turn altitude

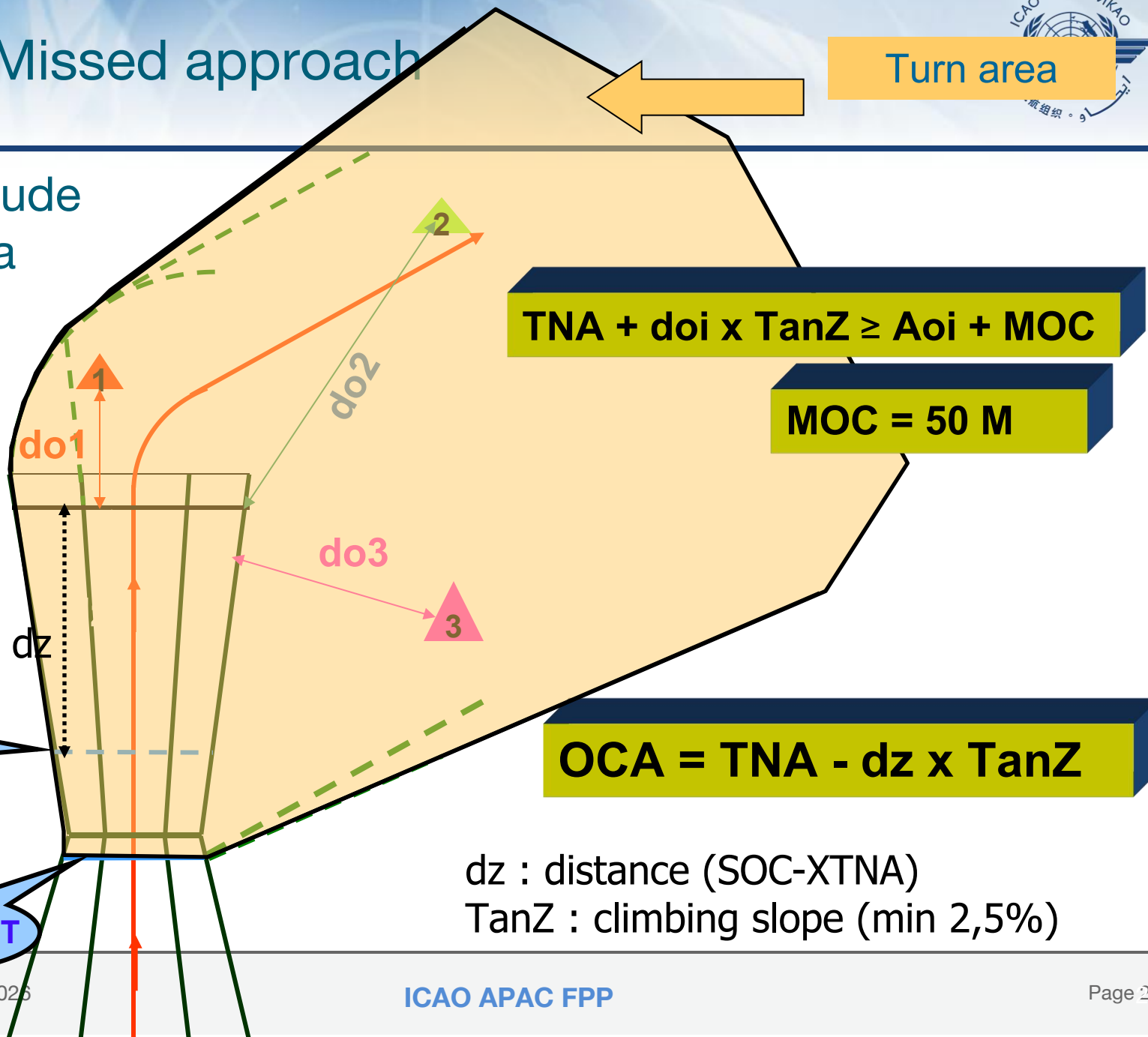
Turn initiation area



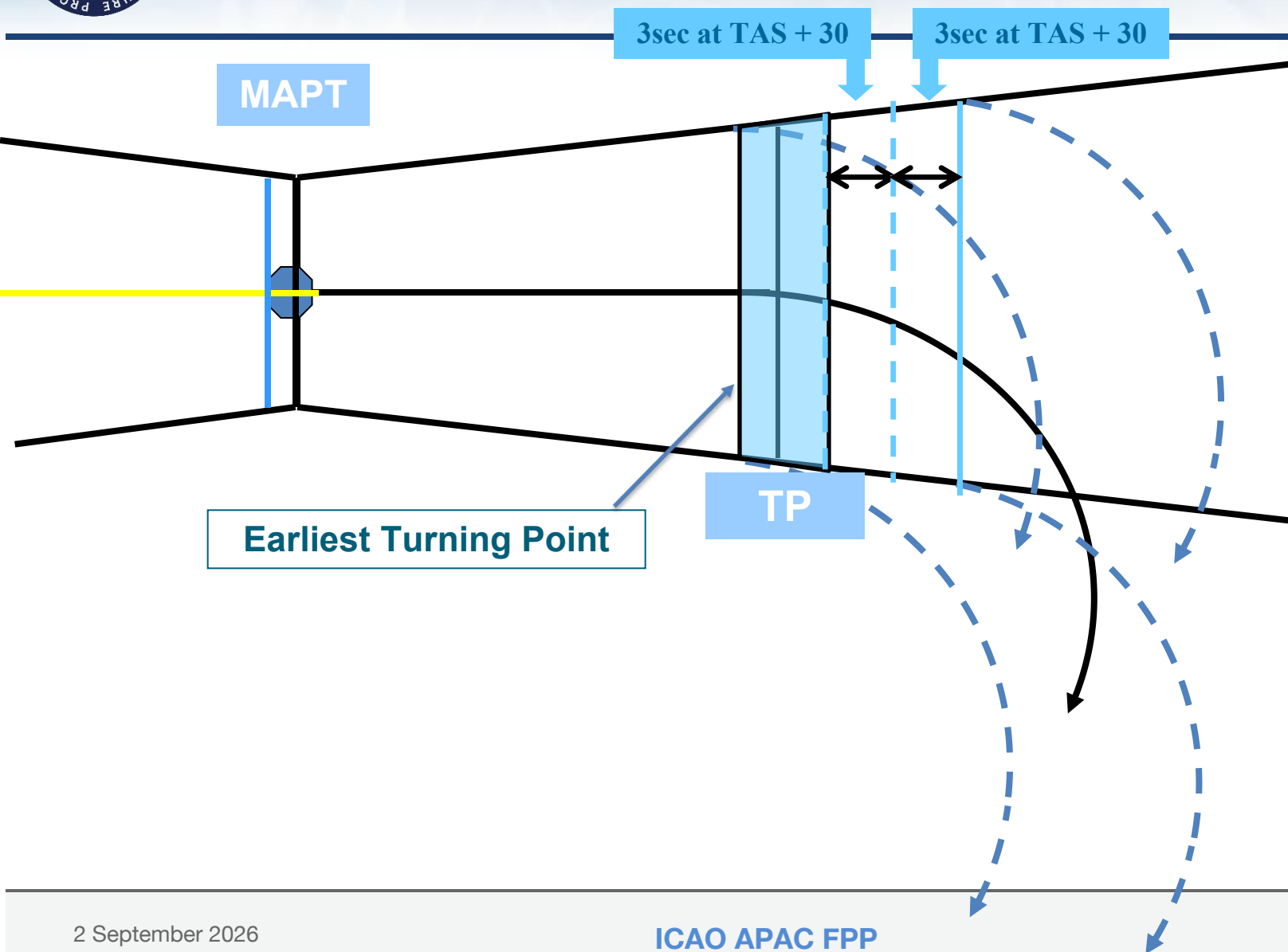
Missed approach

Turn area

Turn altitude
Turn area

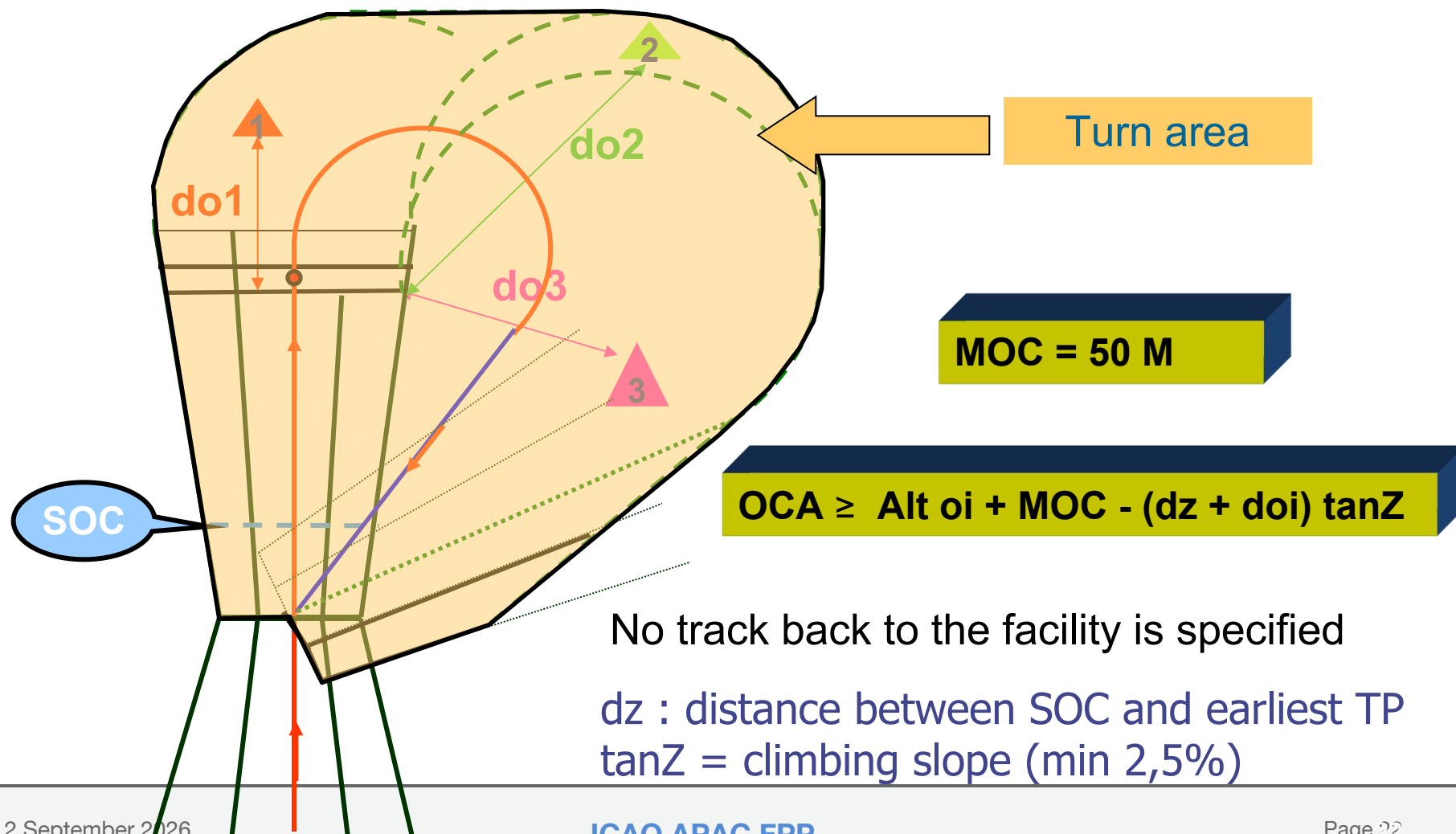


Missed approach : Turning Point



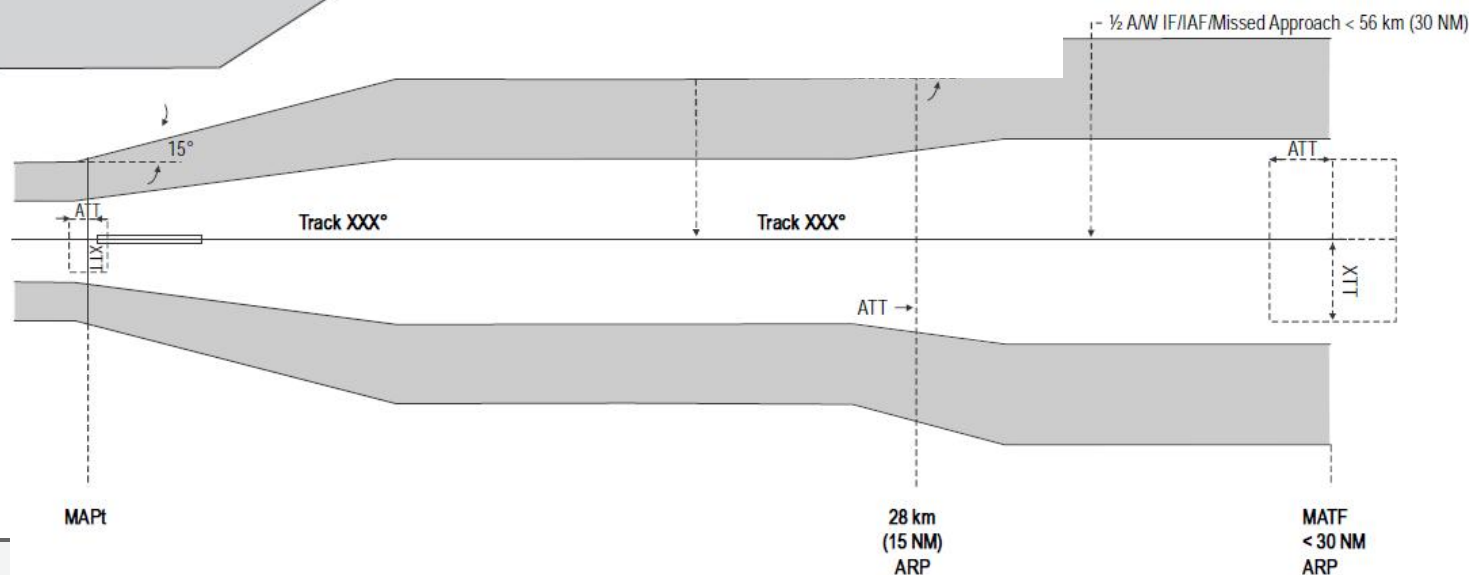
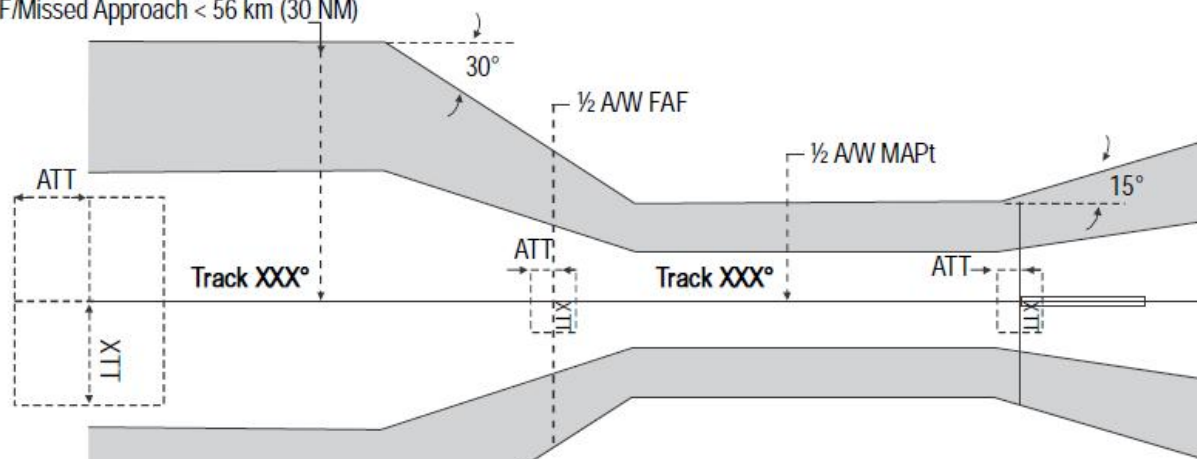
Missed approach : Turning Point

$$\text{Alt at earliest TP} + (\text{Dist Obst} / \text{earliest TP}) \tan Z \geq \text{Alt Obst} + \text{MOC}$$



Complete RNP APCH Protection Area

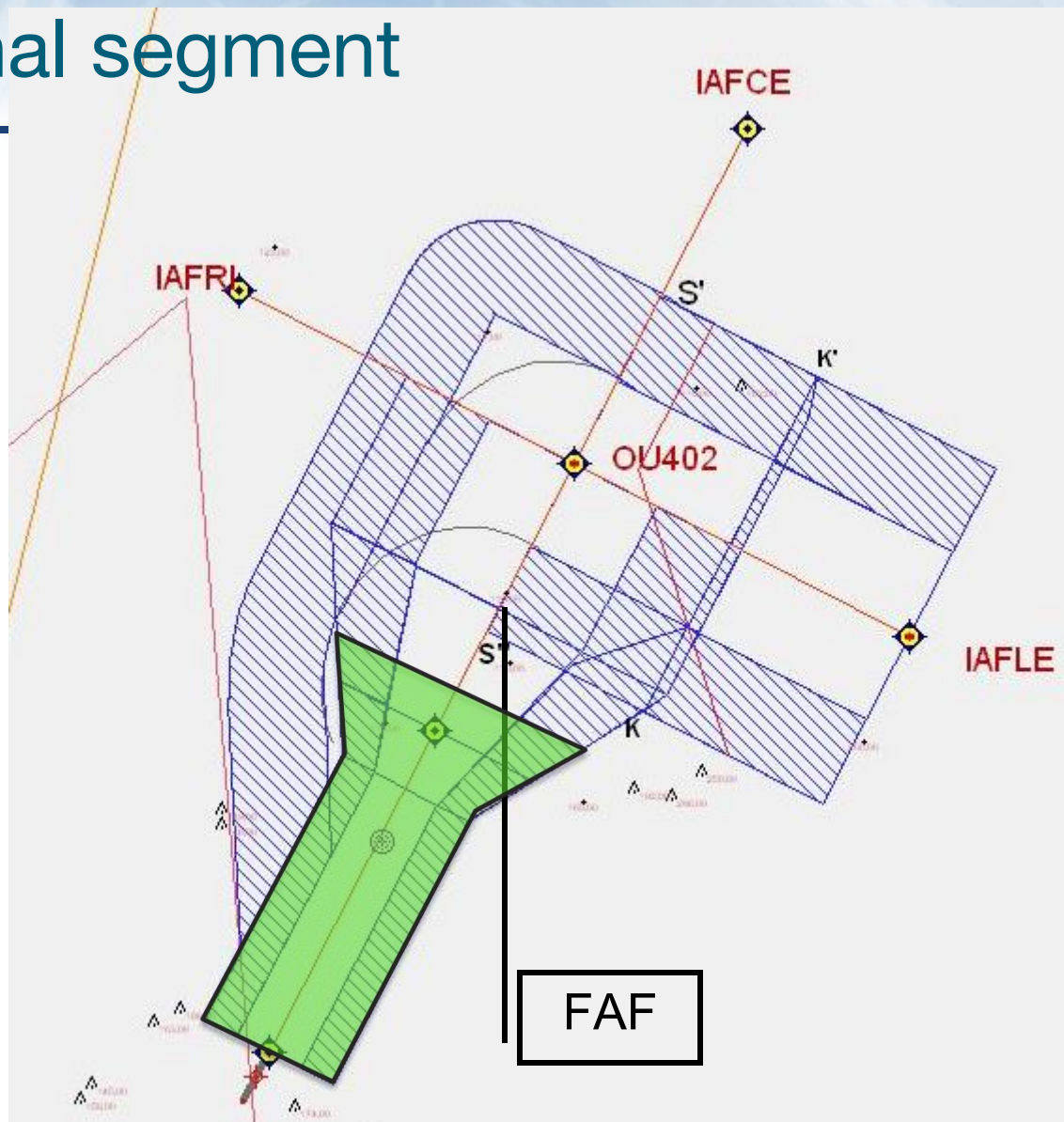
½ A/W IF/IAF/Missed Approach < 56 km (30 NM)



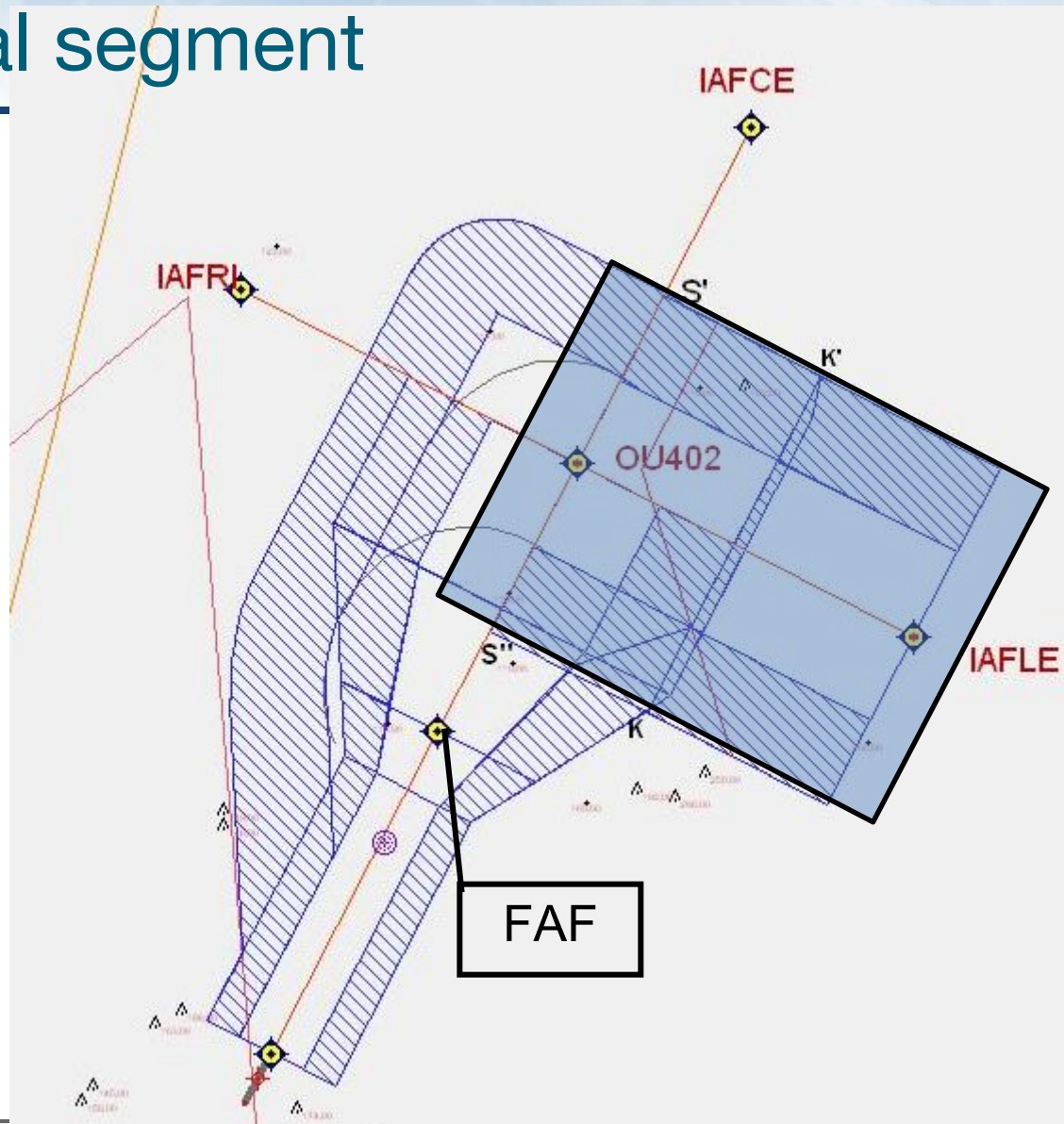
Identify intermediate and final area

- A pilot can initiate the descent as long as the A/C is abeam the WP for fly by (NN'N'' line) or at the WP for FO (-ATT)
- A pilot cannot descend on the final segment if he is not established on the final axis(within LNAV surfaces , OAS surfaces for APV, or X surfaces for ILS)
- Based on previous assumptions, it can be stated that :
 - The intermediate protection area earliest limit is starting at least at the most constraining between NNN' and KK' before IF
 - The turn expansion area for the turn at IF is part of the intermediate segment protection area and shall not be considered for final segment

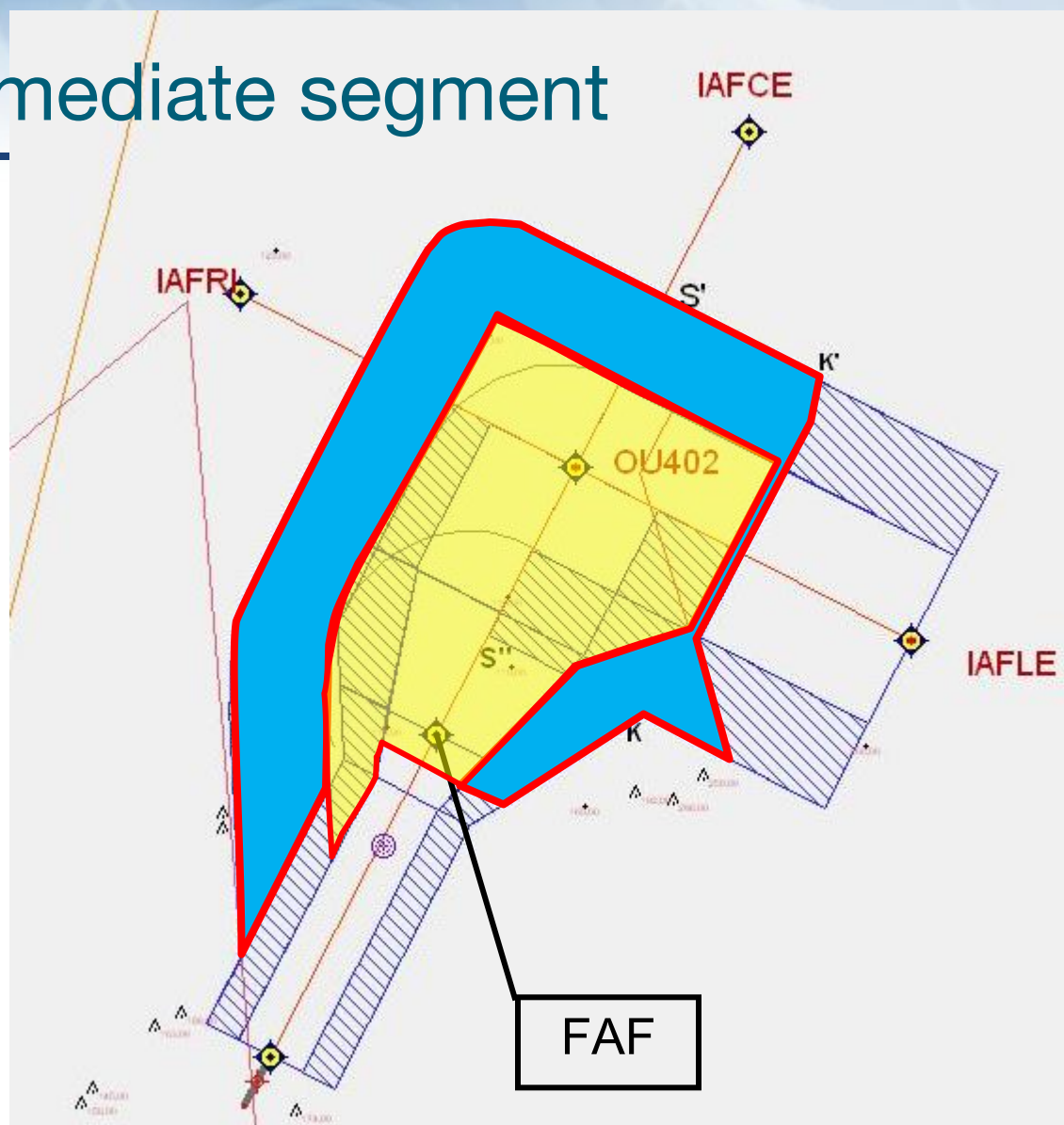
Final segment



Initial segment



Intermediate segment



Any questions?

