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PANS-OPS Flight Procedure Design Training for CAAs

23 August – 03 September 2021





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08– RNP APCH procedures

(Doc. 8168, vol. 2, Part I, Section 2 & 4, Part III, Section 3, Chap. 2 & 3)





- 1. General**
- 2. Initial intermediate and final approach segments protection**
- 3. Missed approach segments**
- 4. Obstacle assessment**
- 5. Limit of segments**



□ Course objectives:

- ☞ Which RNP value for each approach segment ?
- ☞ Understand which area widths are applicable;
- ☞ Identify where the merging methodology should be applied;
- ☞ Identify the possible MAPt position;
- ☞ How to design a missed approach turning altitude.



Initial intermediate and final approach

African Flight Procedure Programme (AFPP)

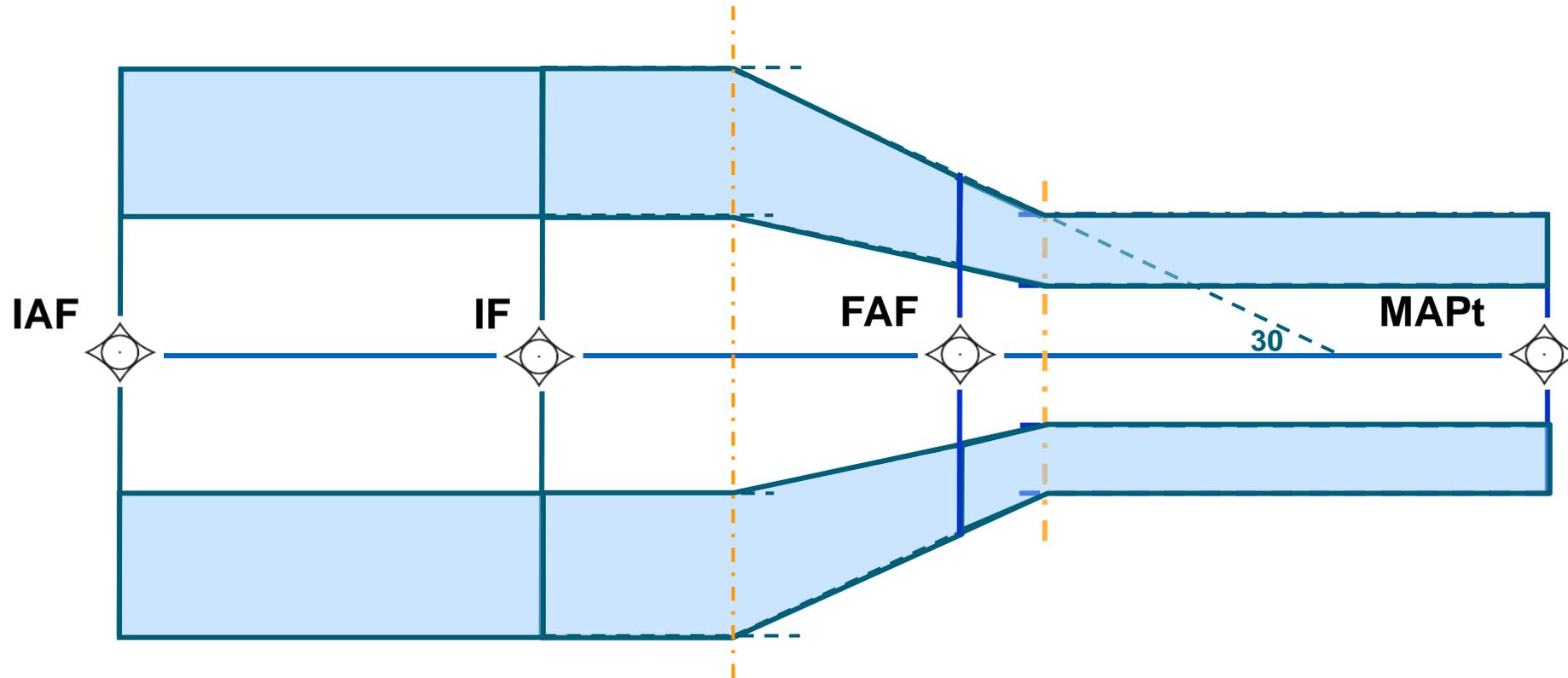
RNP APCH protection parameters (NM)

Navigation specifications		RNP	FTE	ATT	XTT	BV	^{1/2} AW
RNP APCH	≤ 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



Initial, Intermediate & Final approach protection

African Flight Procedure Programme (AFPP)





Missed approach segments

African Flight Procedure Programme (AFPP)

☐ Can be based on:

☞ Conventional Navaid or,

☞ RNAV:

- Contingency required.

☐ Turn at an altitude during missed approach is acceptable:

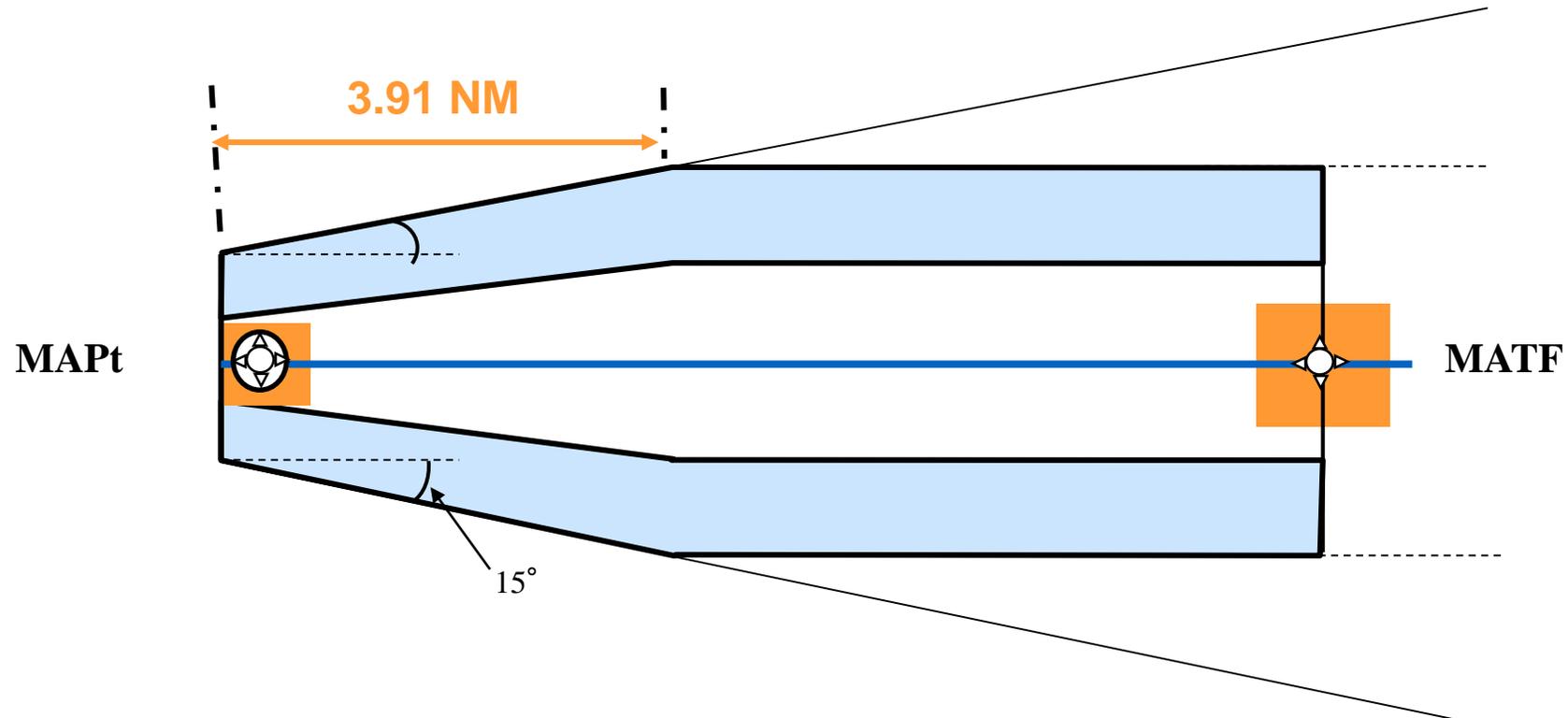
☞ Whereas CA, FA or VA are not mandate, the lateral guidance is provided and the altitude is managed manually by the pilot.

☐ MAPt location: Refer to general criteria:

☞ Optimum position:

- Threshold;
- Intersection between final path and RWY centerline (for offset final approach).

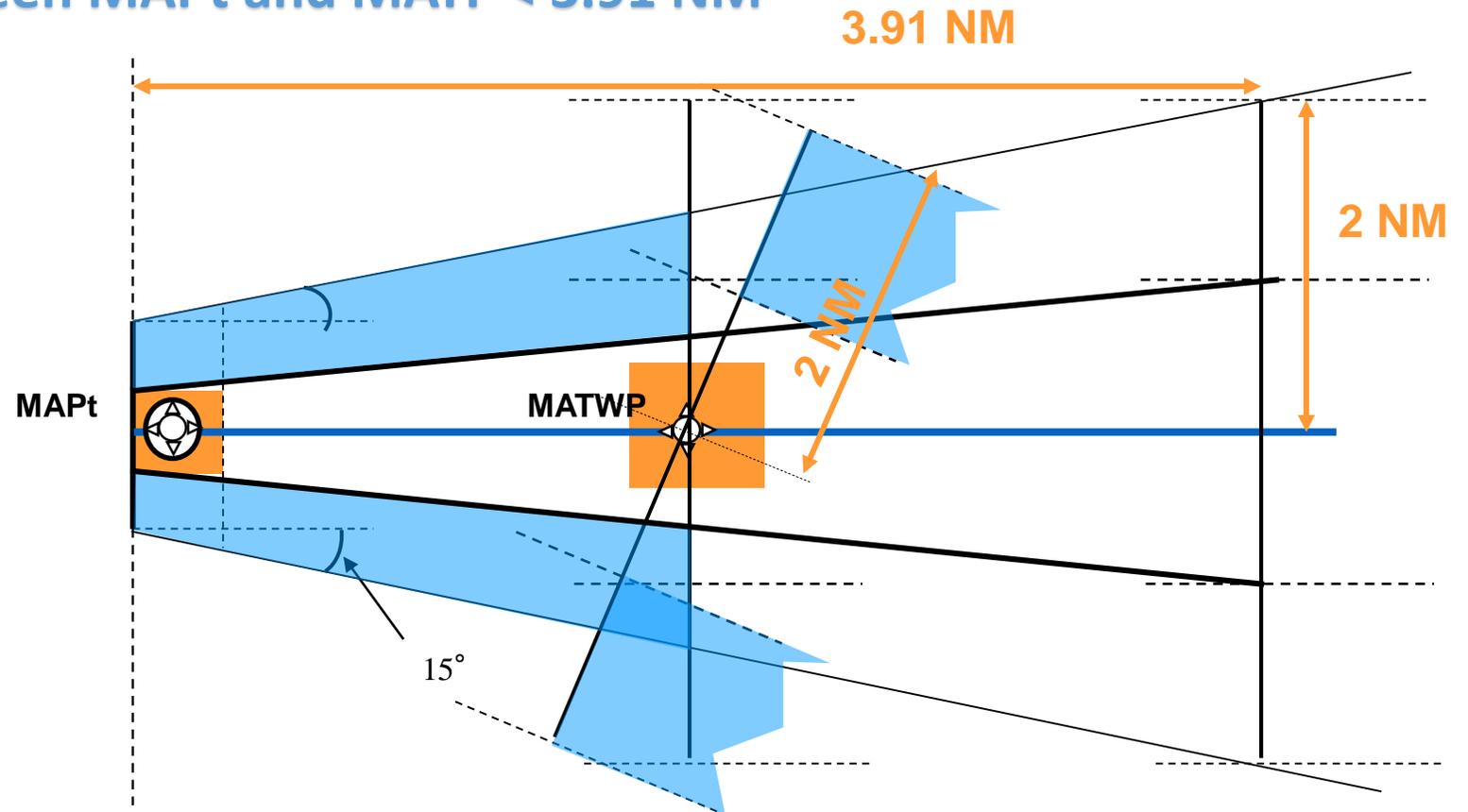
Case 1: Distance between MAPt and MATF ≥ 3.91 NM

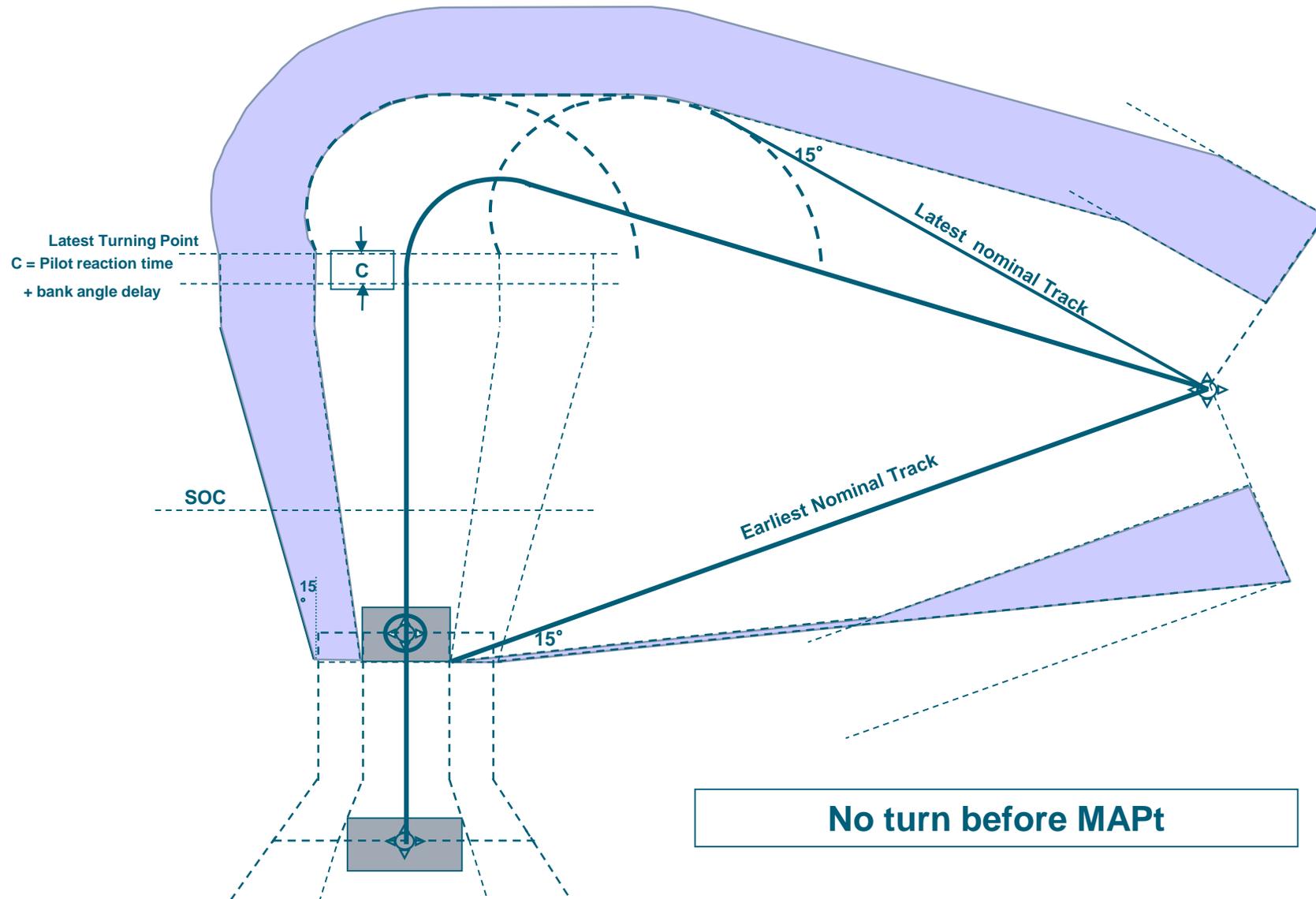


Missed approach segments

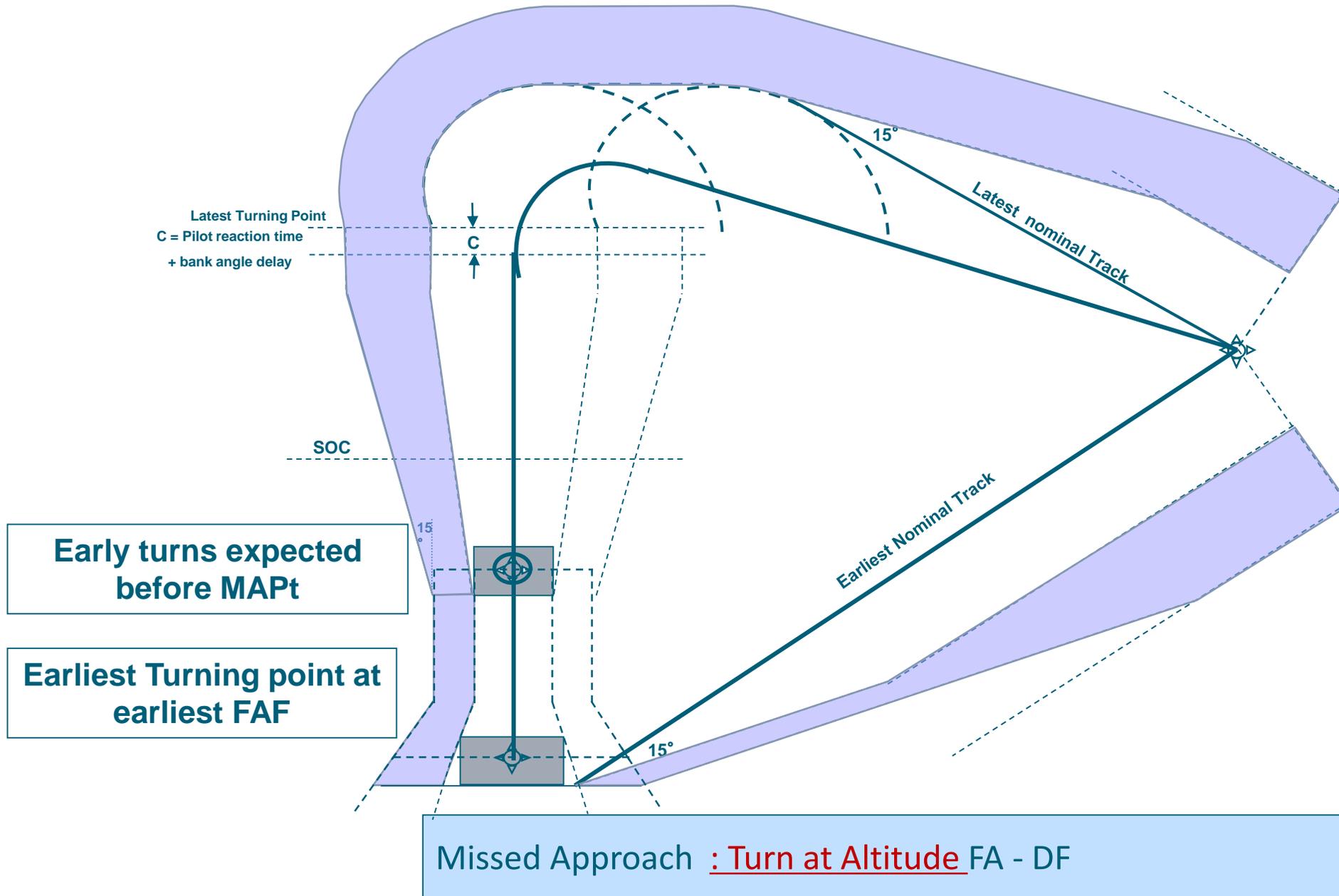
African Flight Procedure Programme (AFPP)

Case 2: Distance between MAPt and MATF < 3.91 NM





Missed approach : Turning altitude FA - DF



Turn at MAPt

Missed approach segments

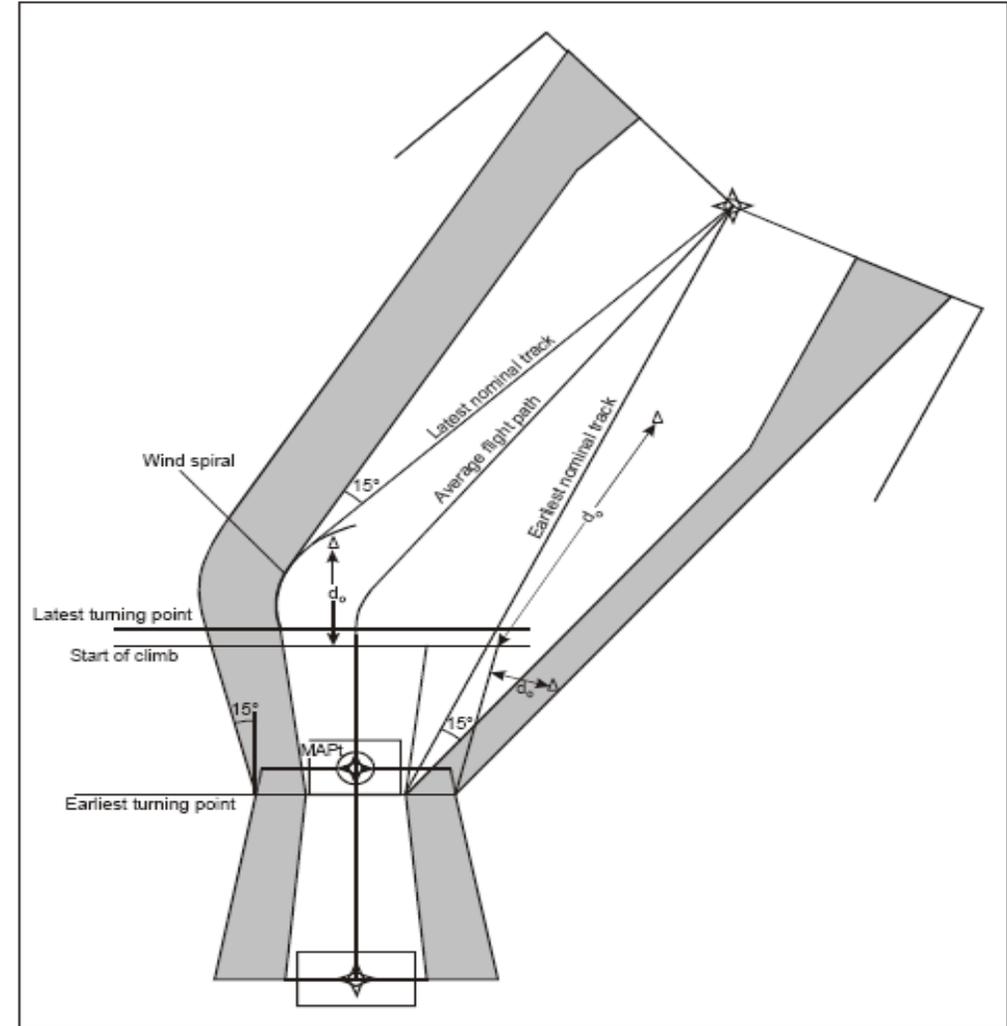
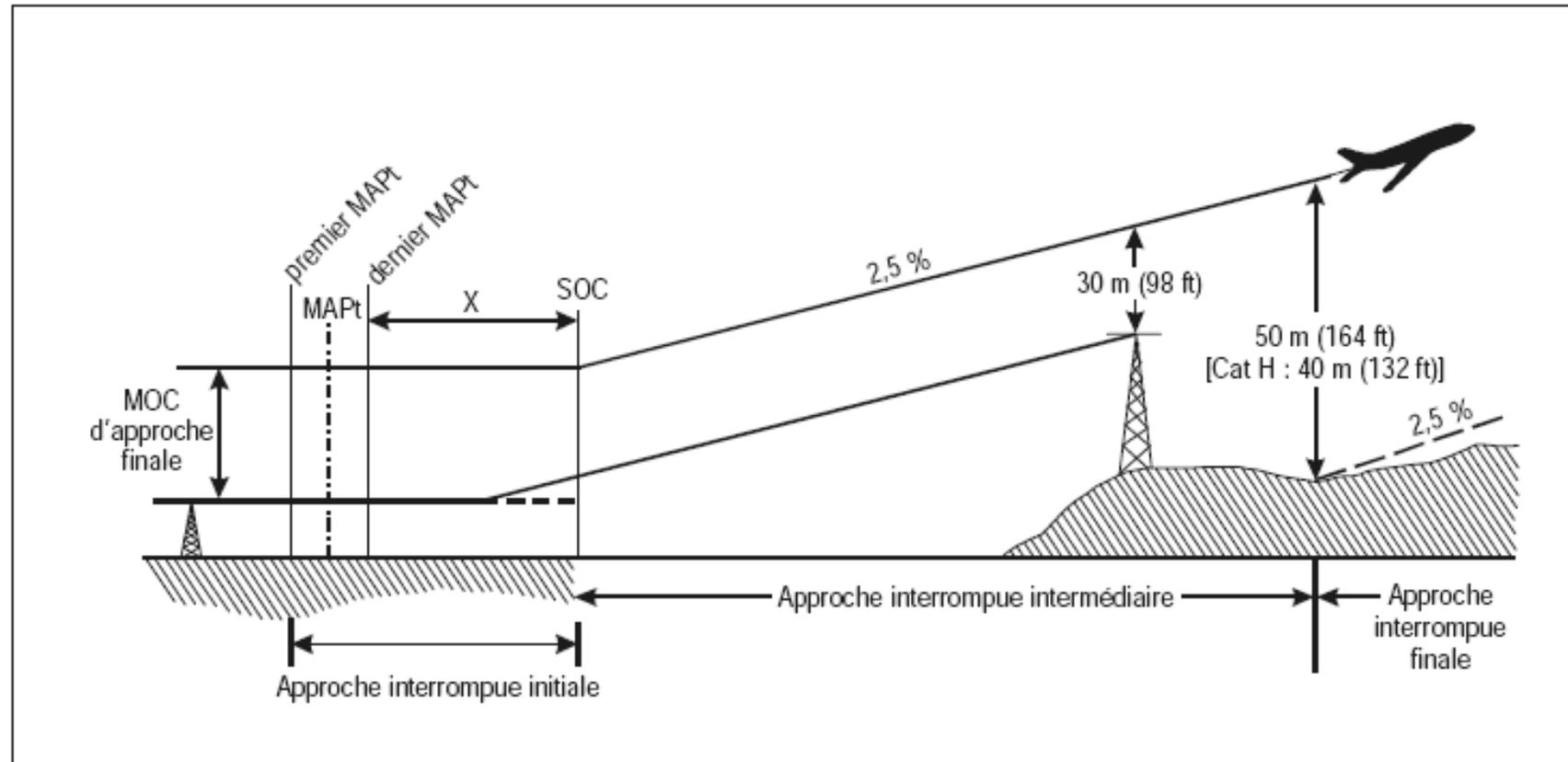
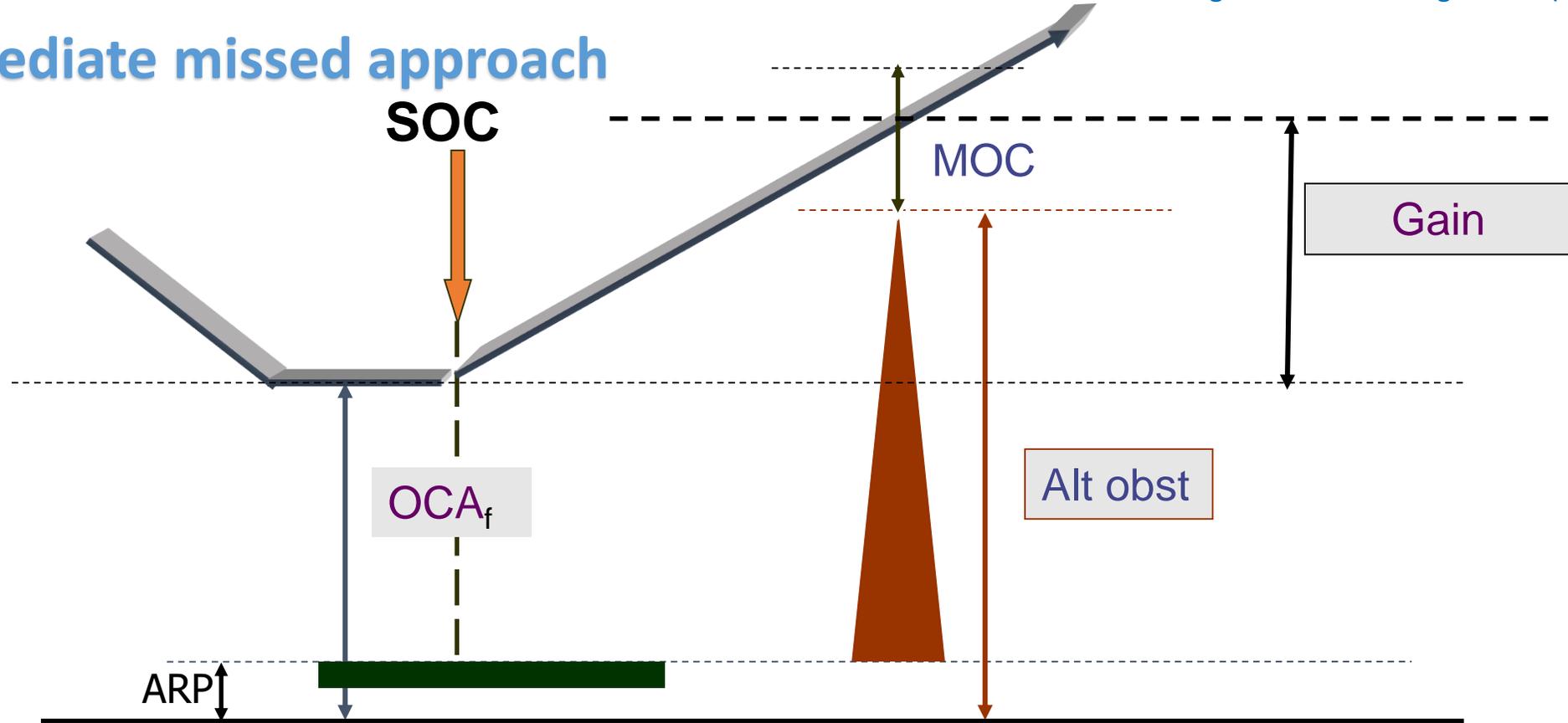


Figure III-2-2-11. Missed approach turn at the MAPt followed by a DF leg

Initial missed approach



Intermediate missed approach



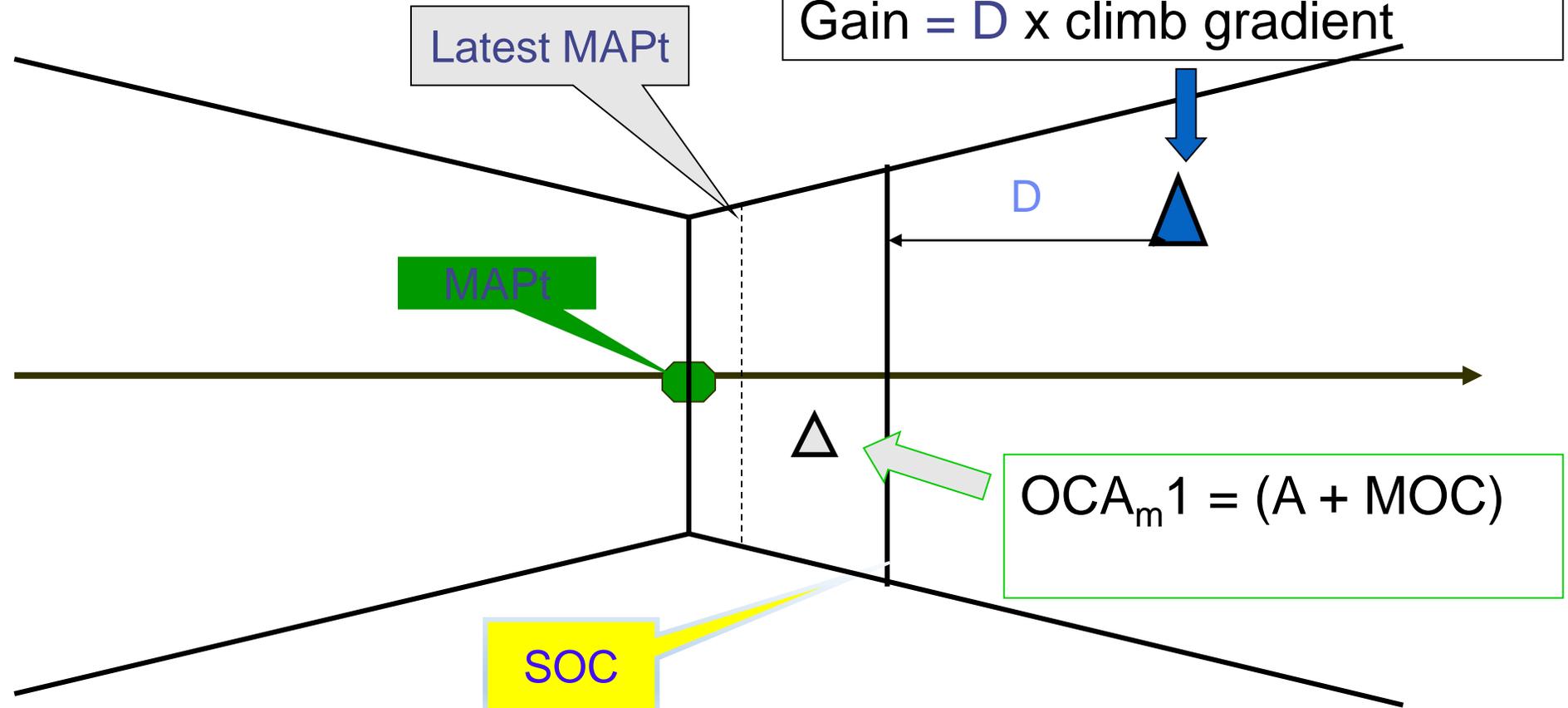
**In this case, OCA_f is not high enough in case of missed approach
OCA_m will be higher than OCA_f**



Obstacle assessment

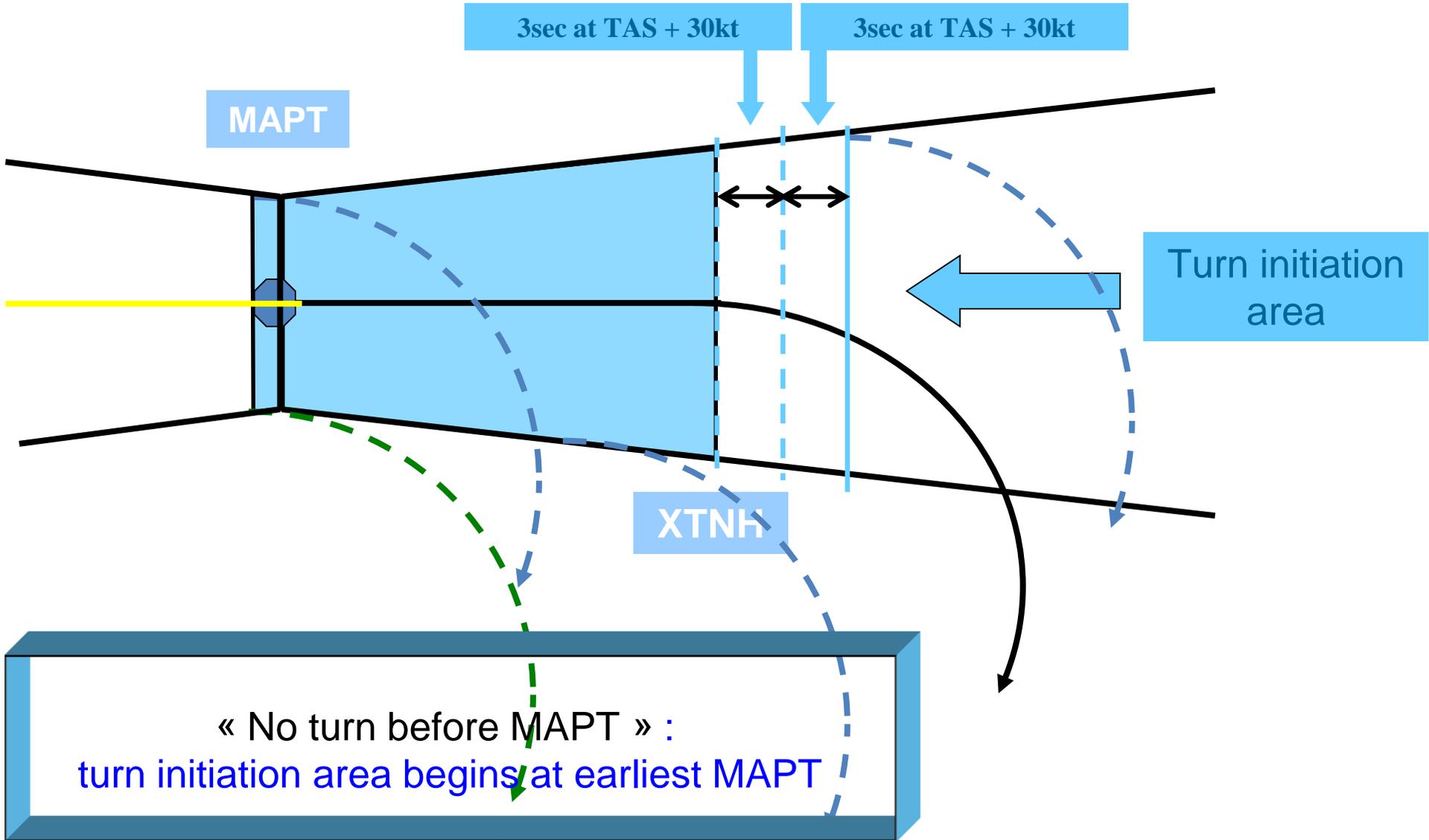
African Flight Procedure Programme (AFPP)

Obstacle clearance for initial & intermediate



Missed approach : Turn altitude

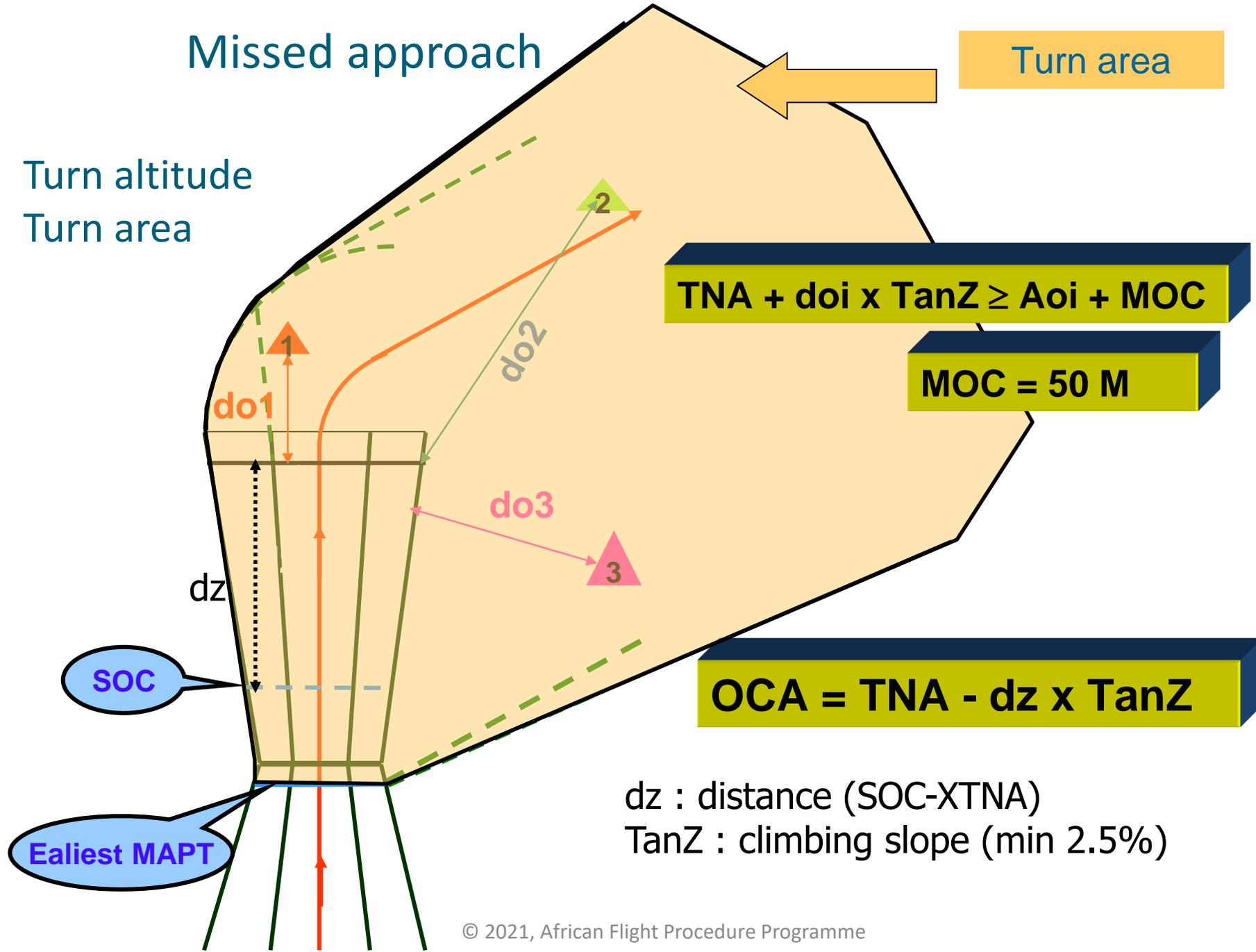
Turn initiation area



Missed approach

Turn area

Turn altitude
Turn area

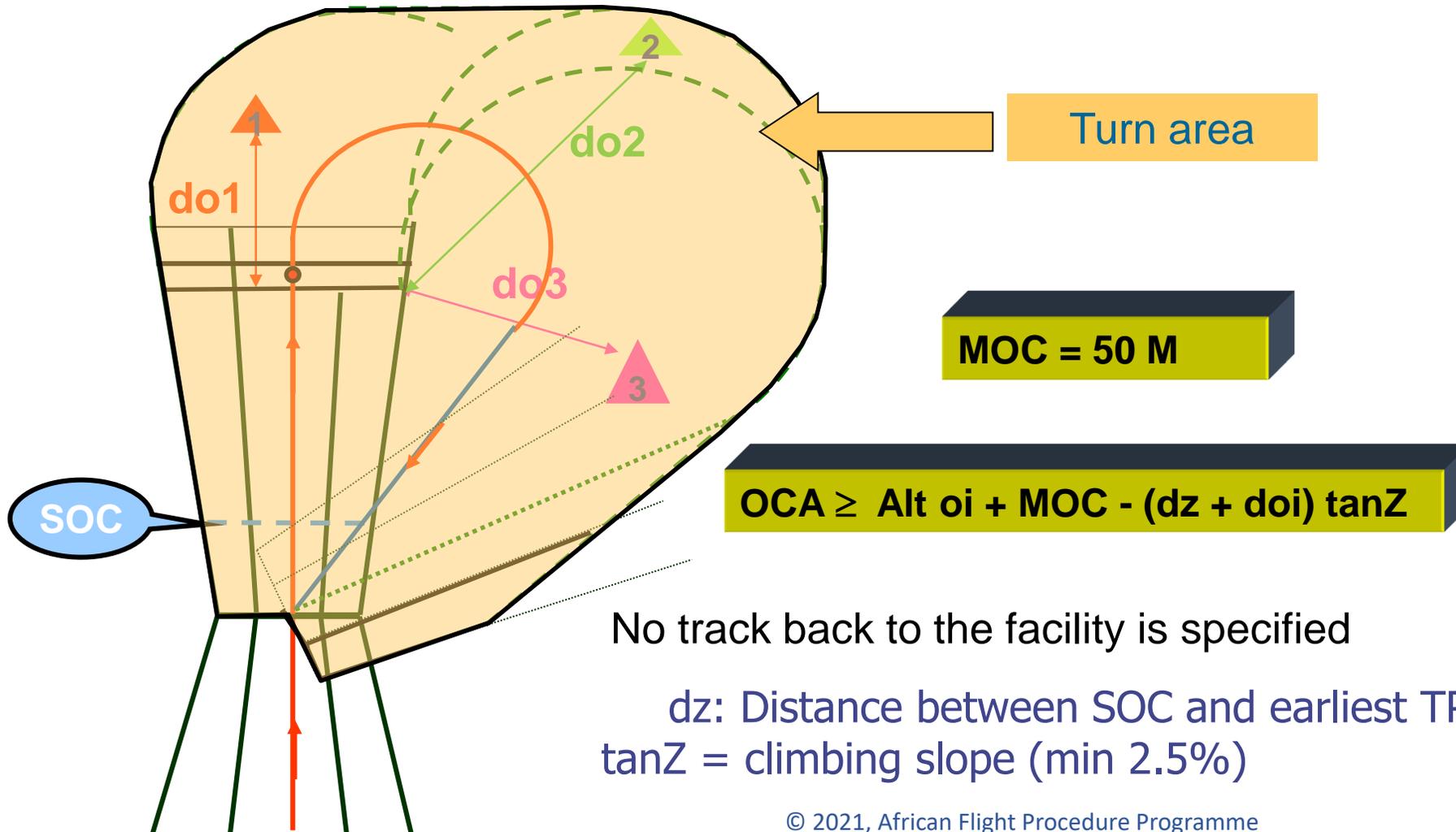


dz : distance (SOC-XTNA)
 $TanZ$: climbing slope (min 2.5%)

Missed approach turn at a TP

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

Flight Procedure Programme (AFPP)

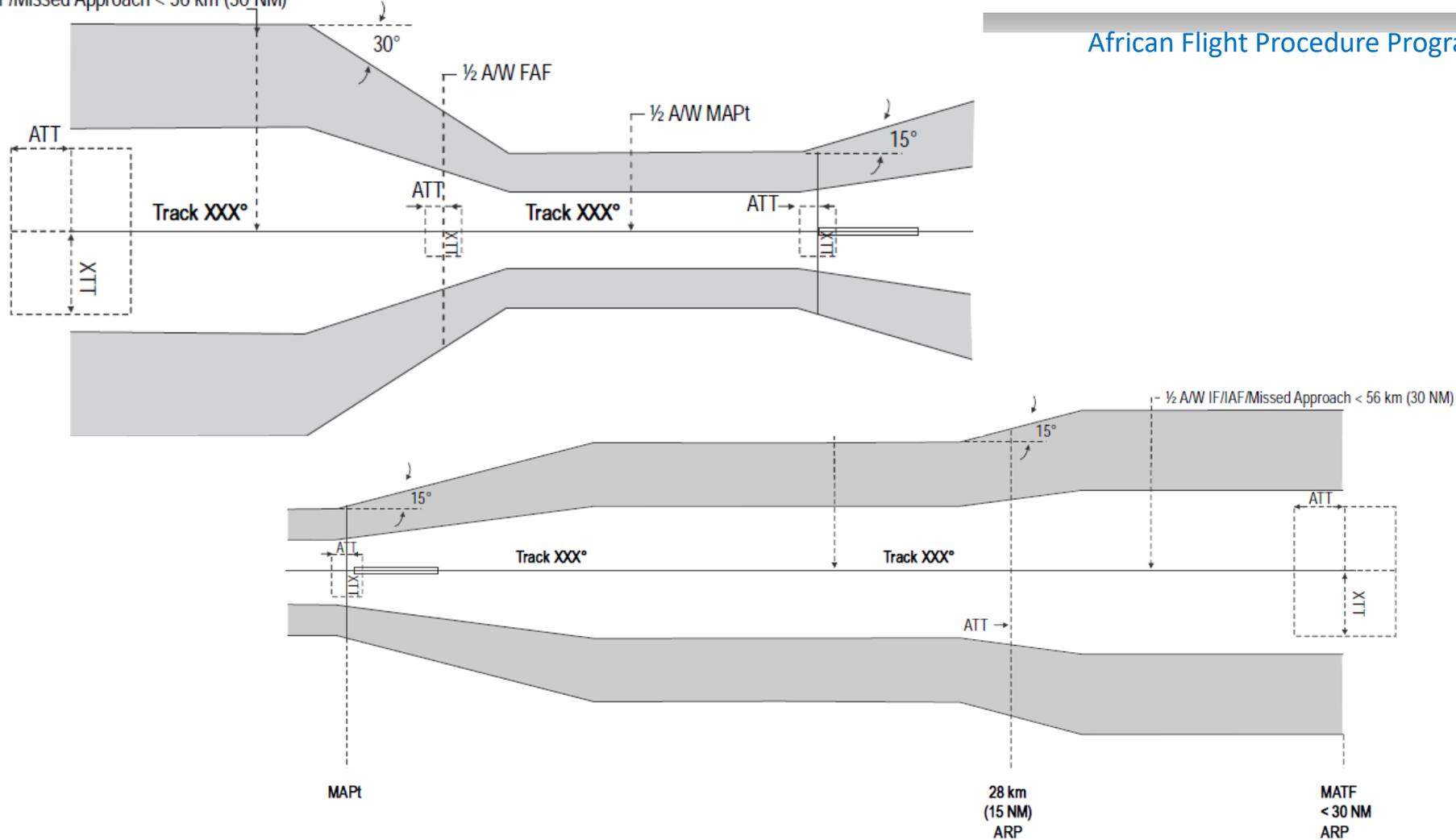




Full RNP APCH Protection Area

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





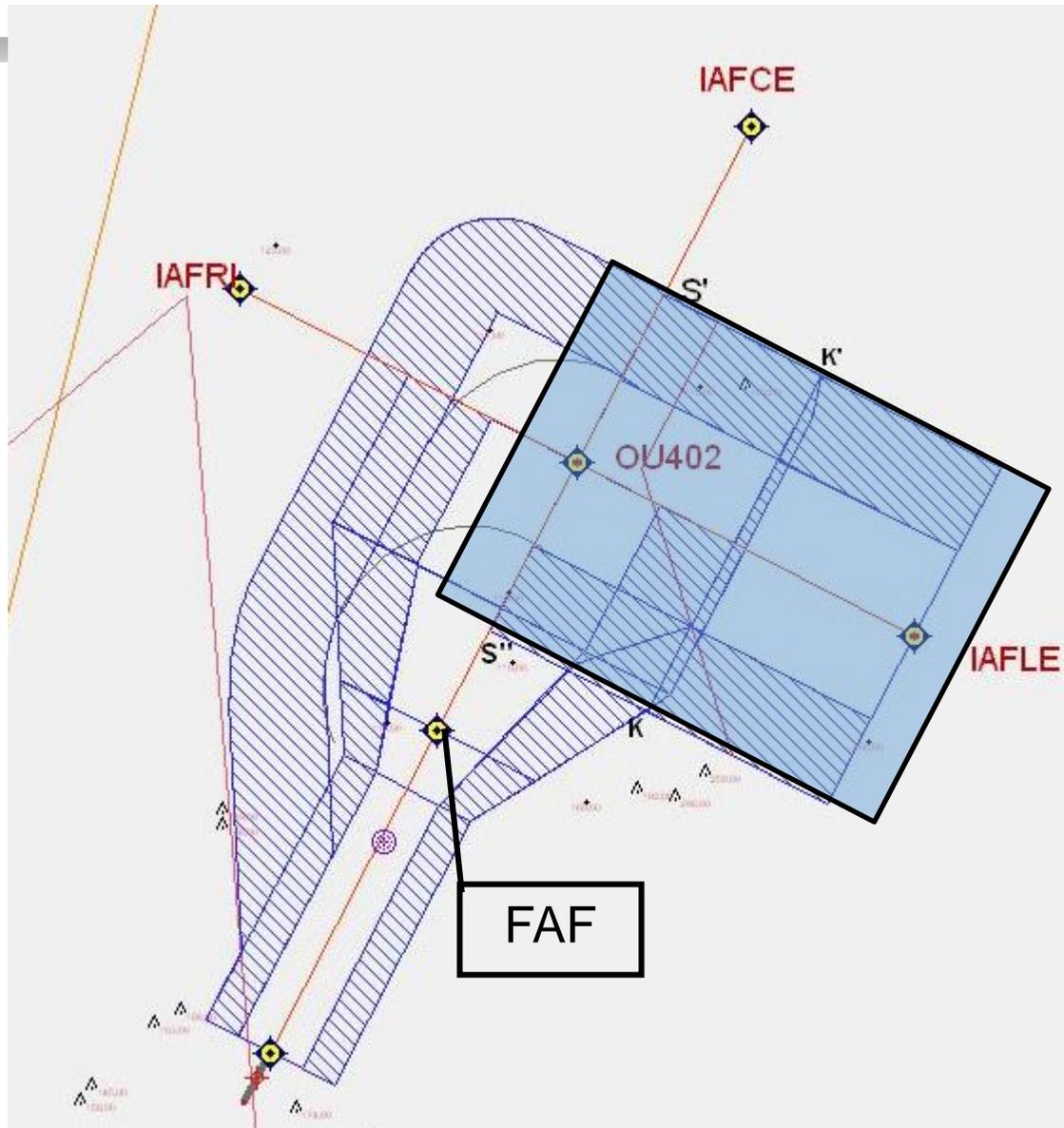
Limit of segments

African Flight Procedure Programme (AFPP)

- ❑ 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.

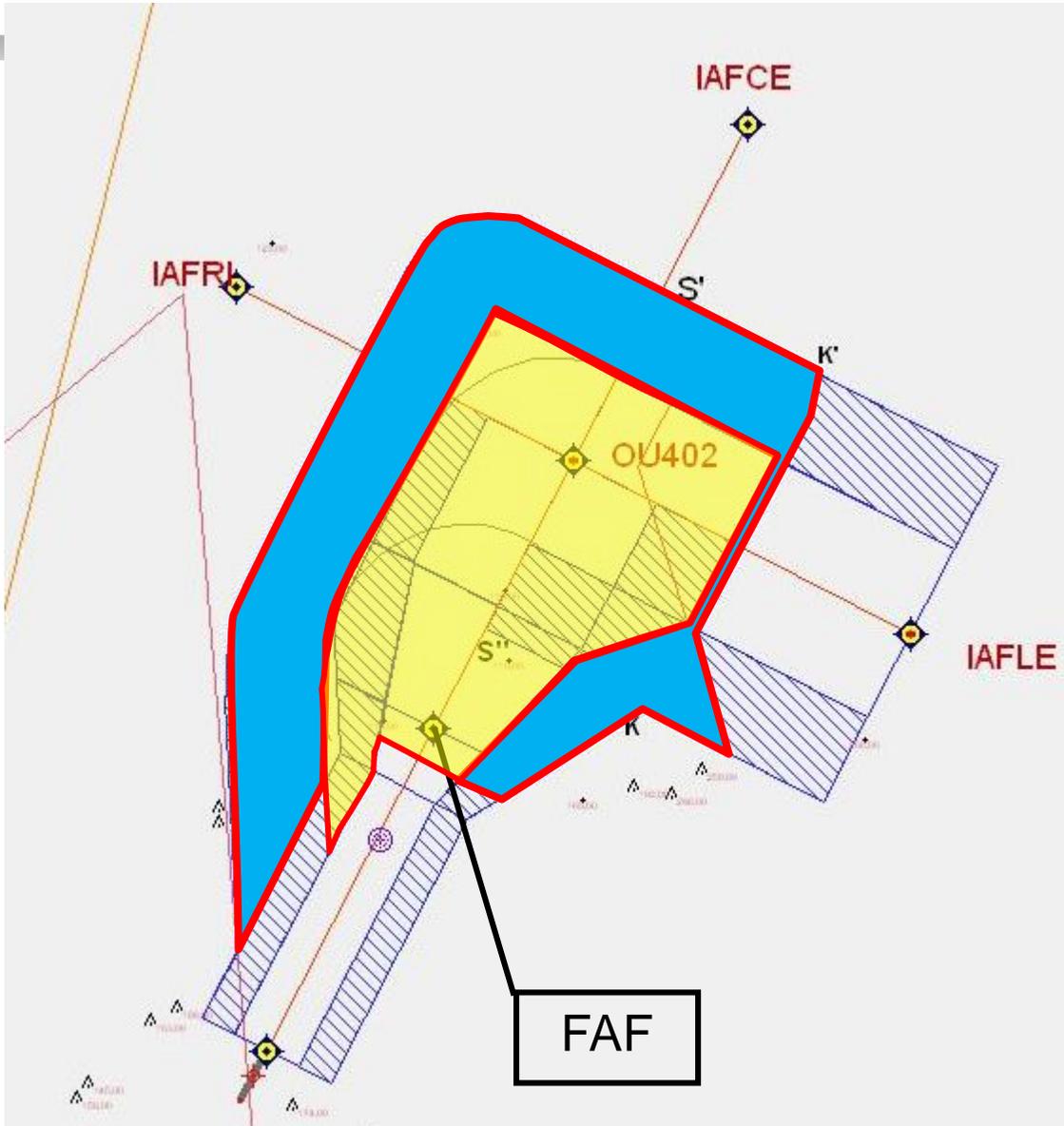
Initial approach segment

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Intermediate approach segment

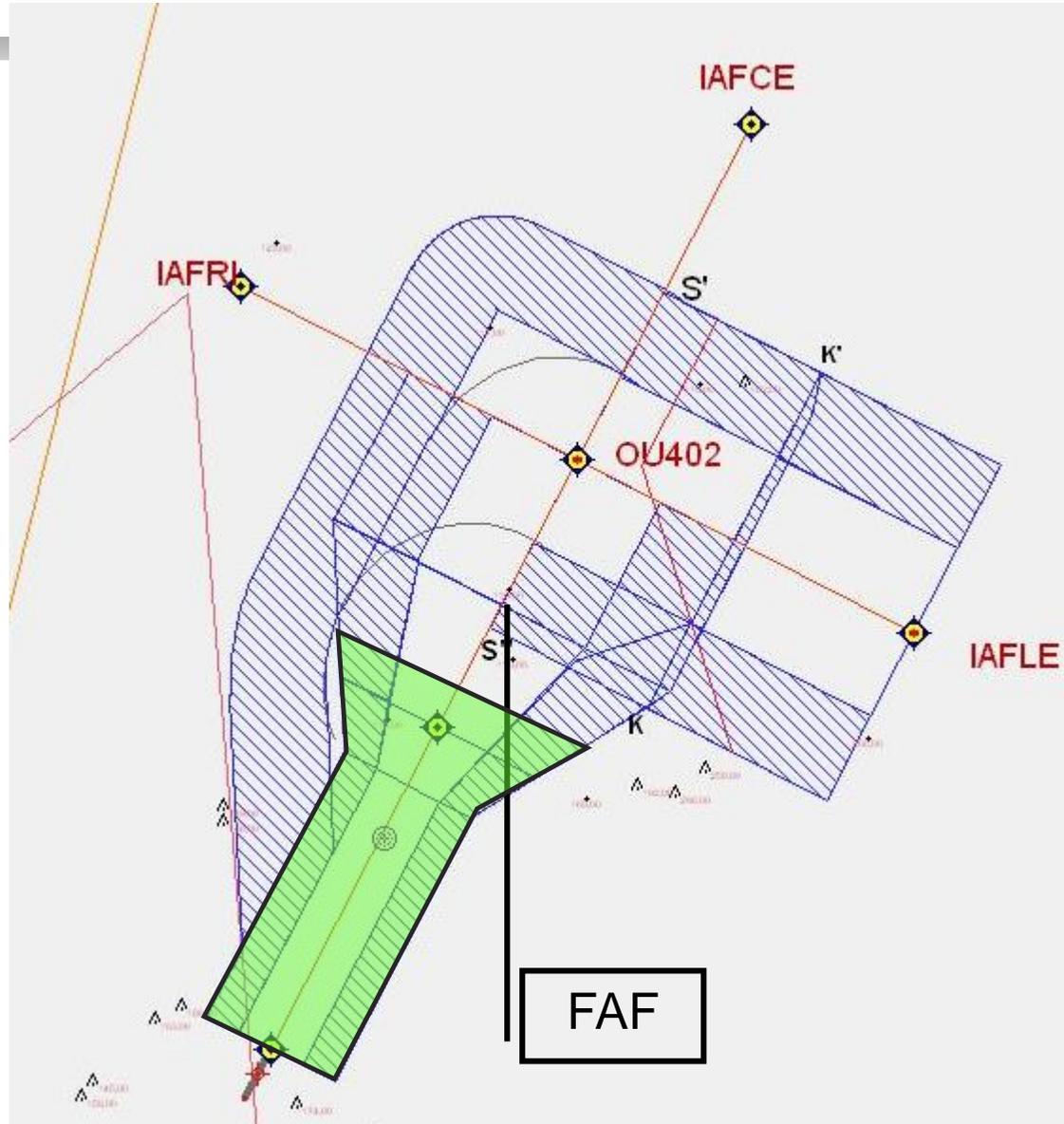
African Flight Procedure Programme (AFPP)





Final segment

African Flight Procedure Programme (AFPP)



North American
Central American
and Caribbean
(NACC) Office
Mexico City

South American
(SAM) Office
Lima

ICAO
Headquarters
Montreal

Western and
Central African
(WACAF) Office
Dakar

European and
North Atlantic
(EUR/NAT) Office
Paris

Middle East
(MID) Office
Cairo

Eastern and
Southern African
(ESAF) Office
Nairobi

Asia and Pacific
(APAC) Office
Bangkok

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