# Tentative Agenda

| | 9:00-10:30 (90mins) | 10:45-12:00 (90mins) | Lunch | 13:20-14:50 (90mins) | 15:00-16:30 (90mins) |
|---|---|---|---|---|---|
| Day1 Monday | Registration & Introduction | Review of Pre-course Assignment | | General Overview -Aircraft Classification -MOC | Speed Conversion* & Turn Calculation* |
| Day2 Tuesday | Wind Effect & Turn Parameters | Wind Effect* & Turn Parameters* | | Fix Tolerance | Fix Tolerance |
| Day3 Wednesday | NPA -General Criteria Initial Segment | NPA Initial Segment* | | NPA Intermediate Segment | NPA Intermediate Segment* |
| Day4 Thursday | NPA Final Segment | NPA Final Segment* OCA/H* | | NPA Final Segment* OCA/H* NPA VSS | NPA Final Segment* OCA/H* NPA VSS |
| Day5 Friday | Missed Approach -Initial Phase | Missed Approach -Intermediate Phase -Turning MAP | | Missed Approach -Intermediate Phase -Turning MAP | Missed Approach -Intermediate Phase* -Turning MAP |

**Notes:**

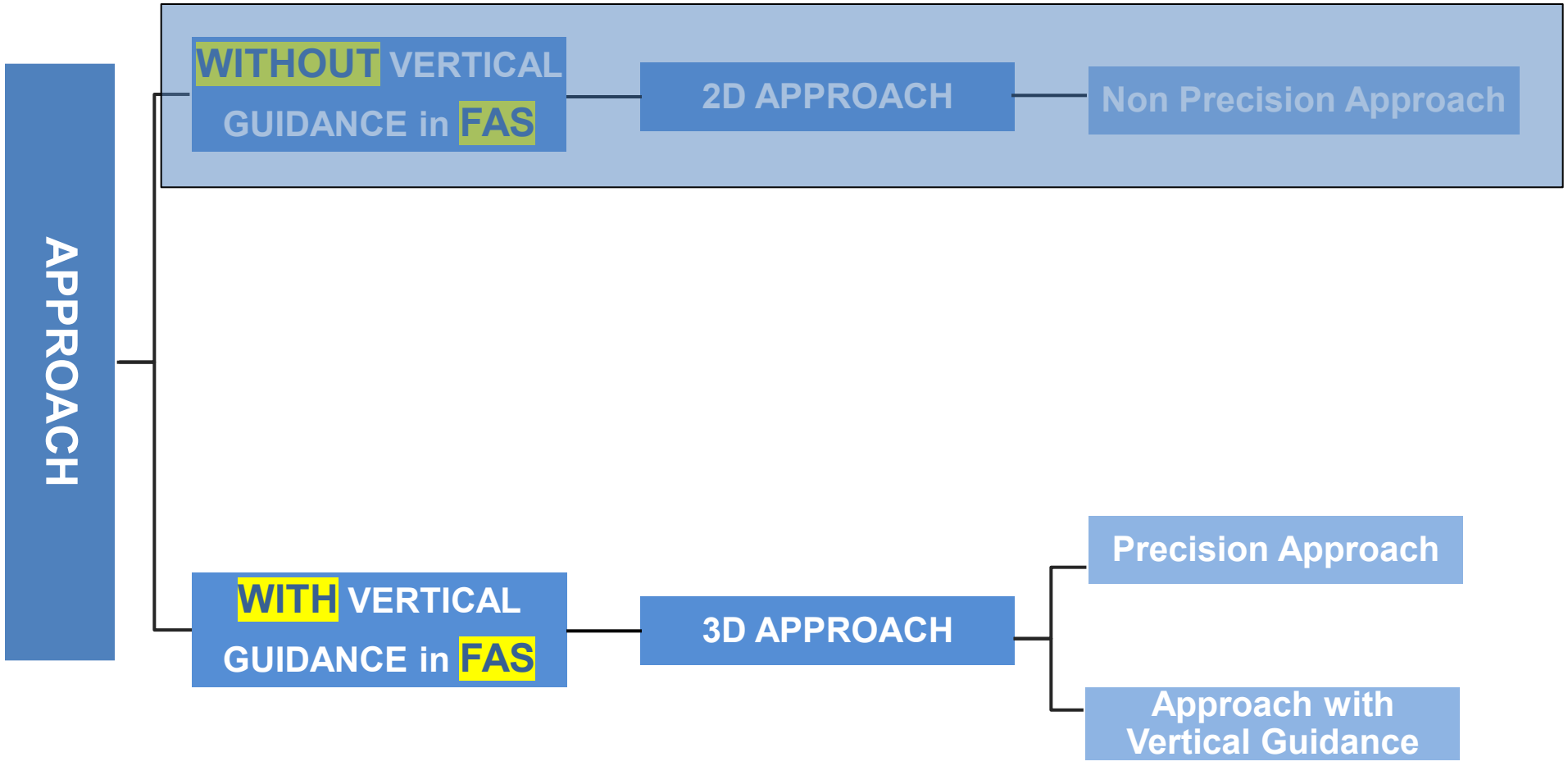
1. All scheduling is in Beijing time(UTC+8).
2. Topics with * will be followed by a short practical exercise.
3. Each presentation is followed by a 10-minute Q&A session.

# Pans-Ops
# Procedure Design Initial Course

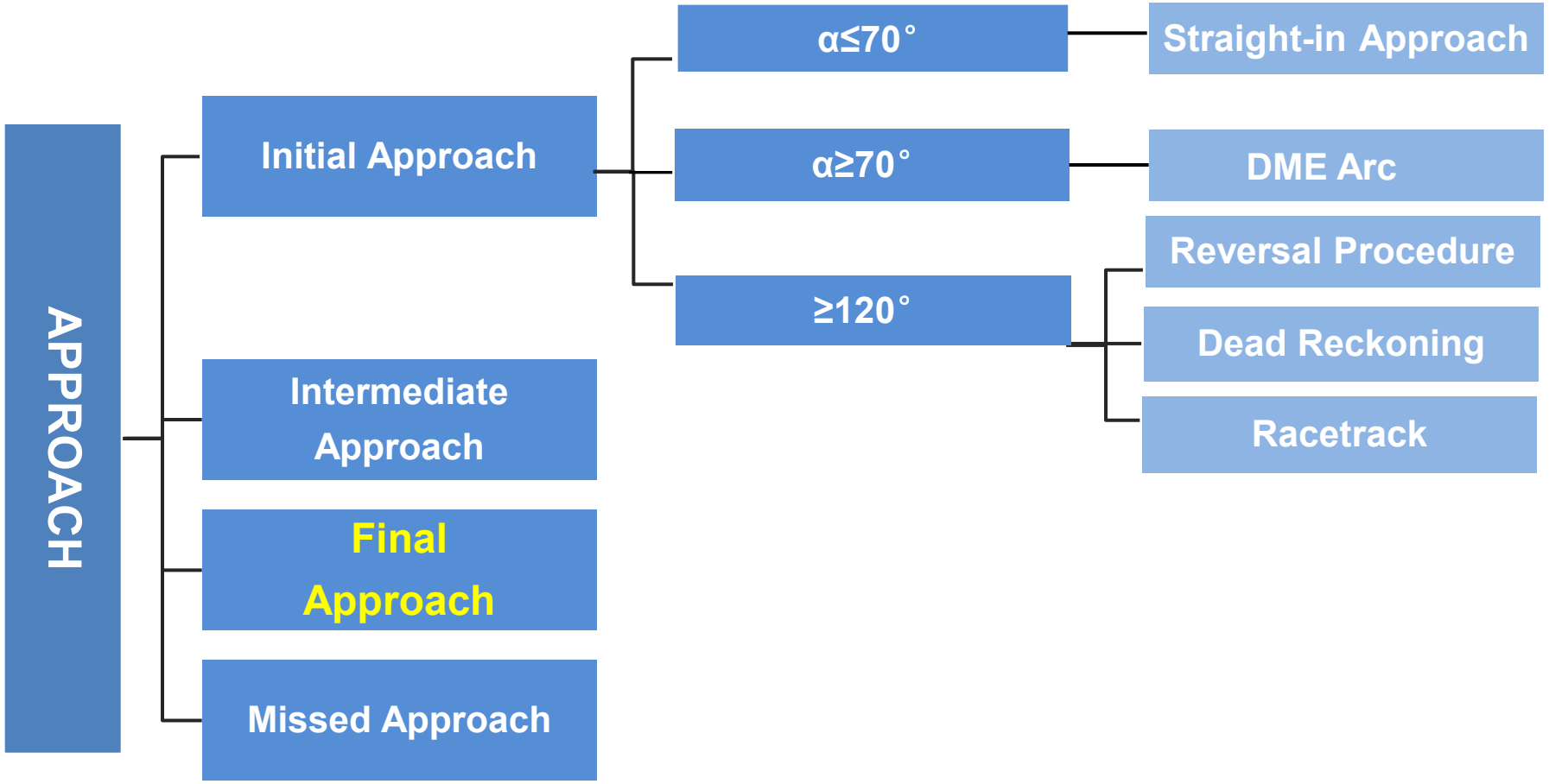
## ICAO APAC FPP Office – Beijing, China

(15 June ~ 10 July 2026)

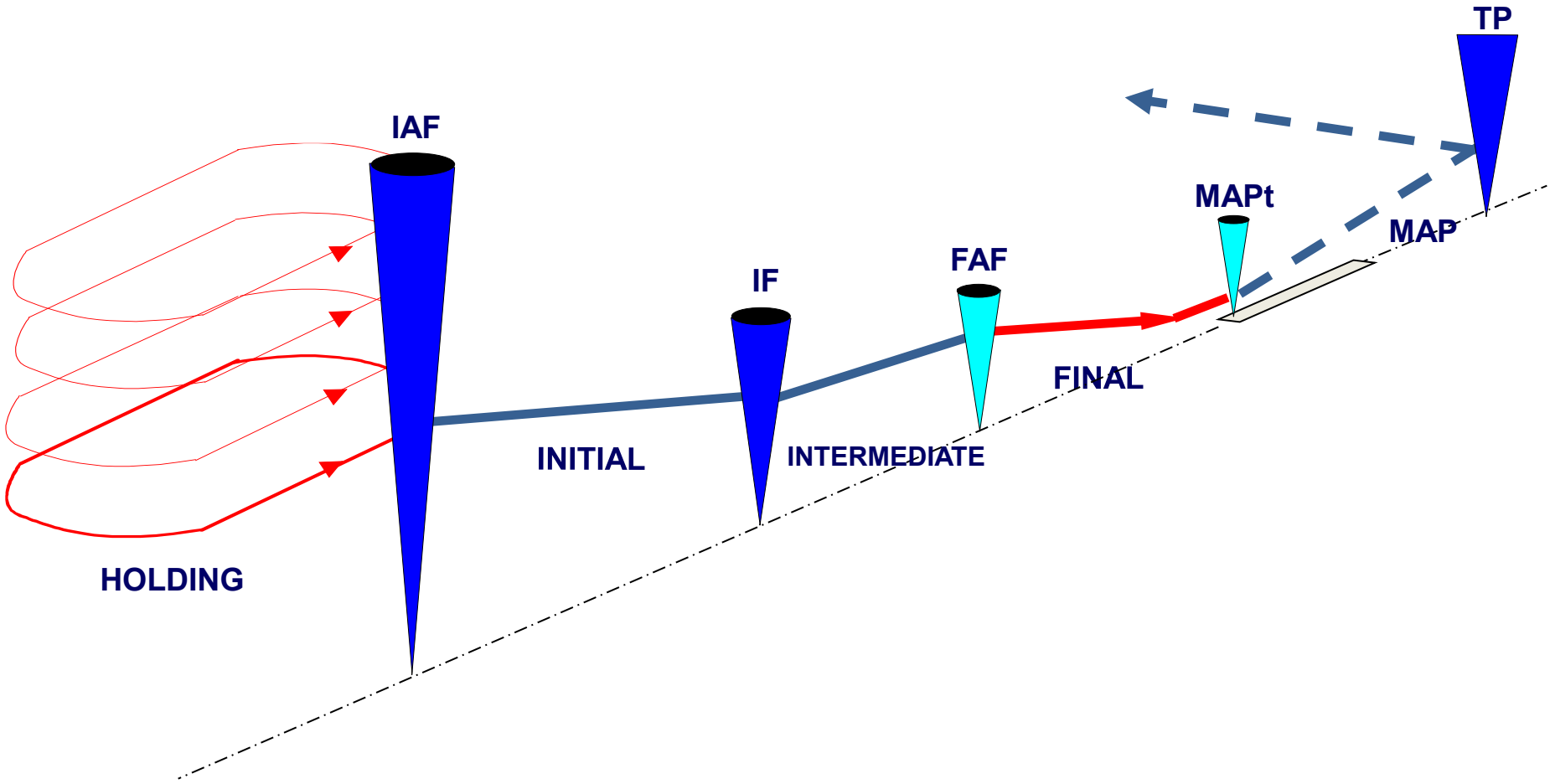
# Approach Types



# Approach Segment Types



# Segments of Instrument Approach

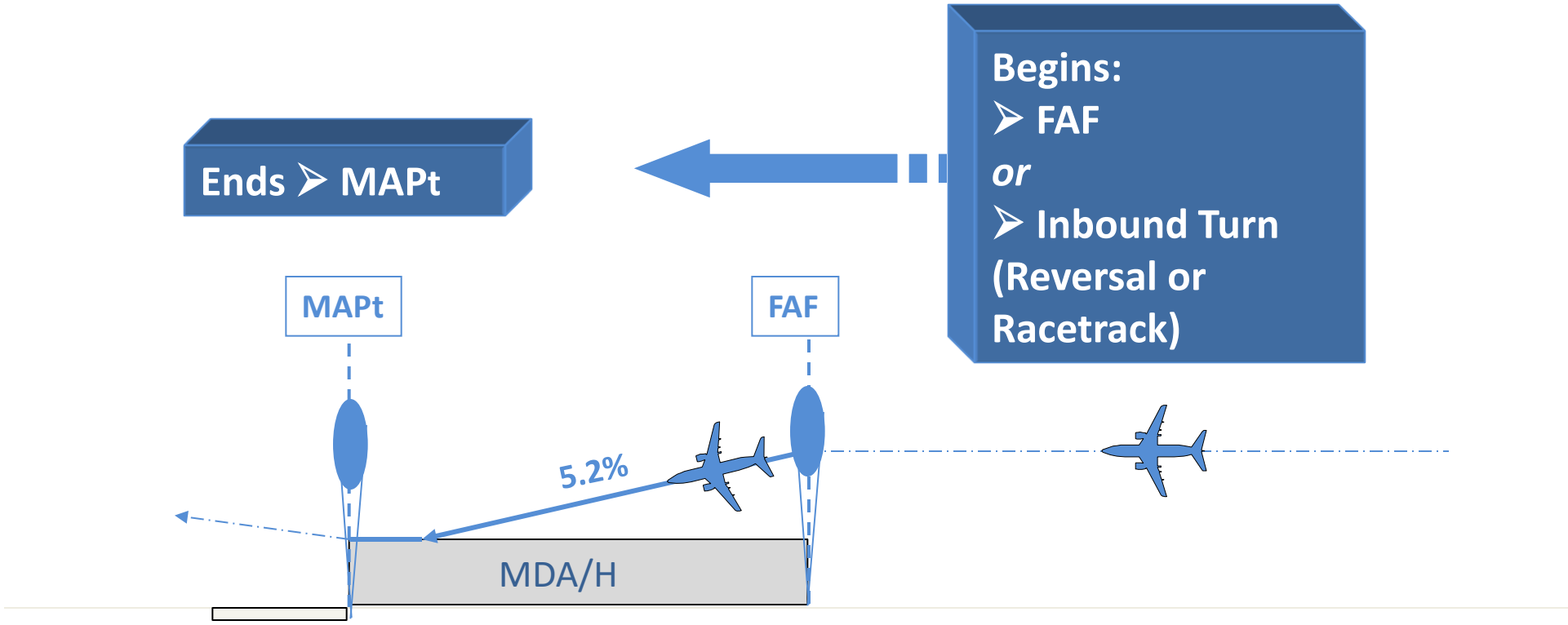


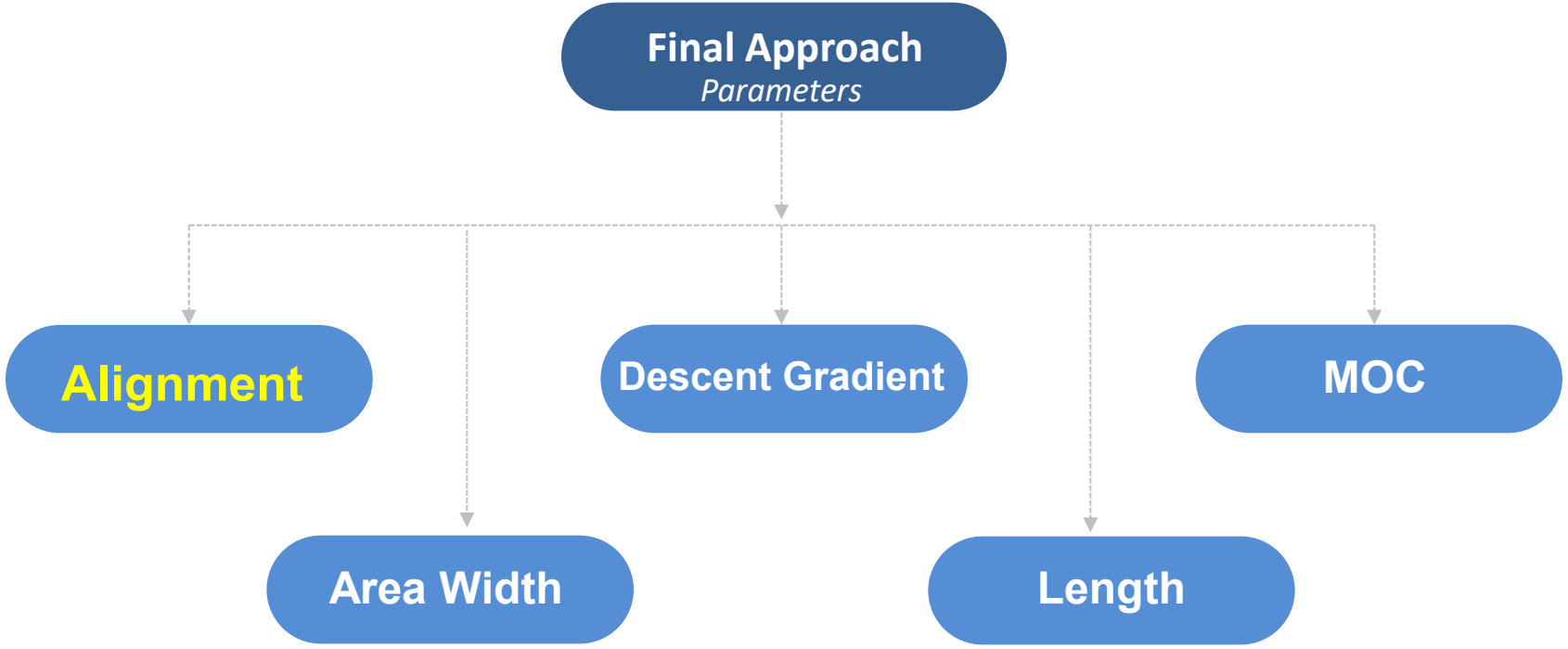
# Final Approach Segment Purpose

- The instrument part of final approach begins at FAF and ends at MAPt;
- It either terminates as: Landing or MAP;
- Track guidance shall be provided;

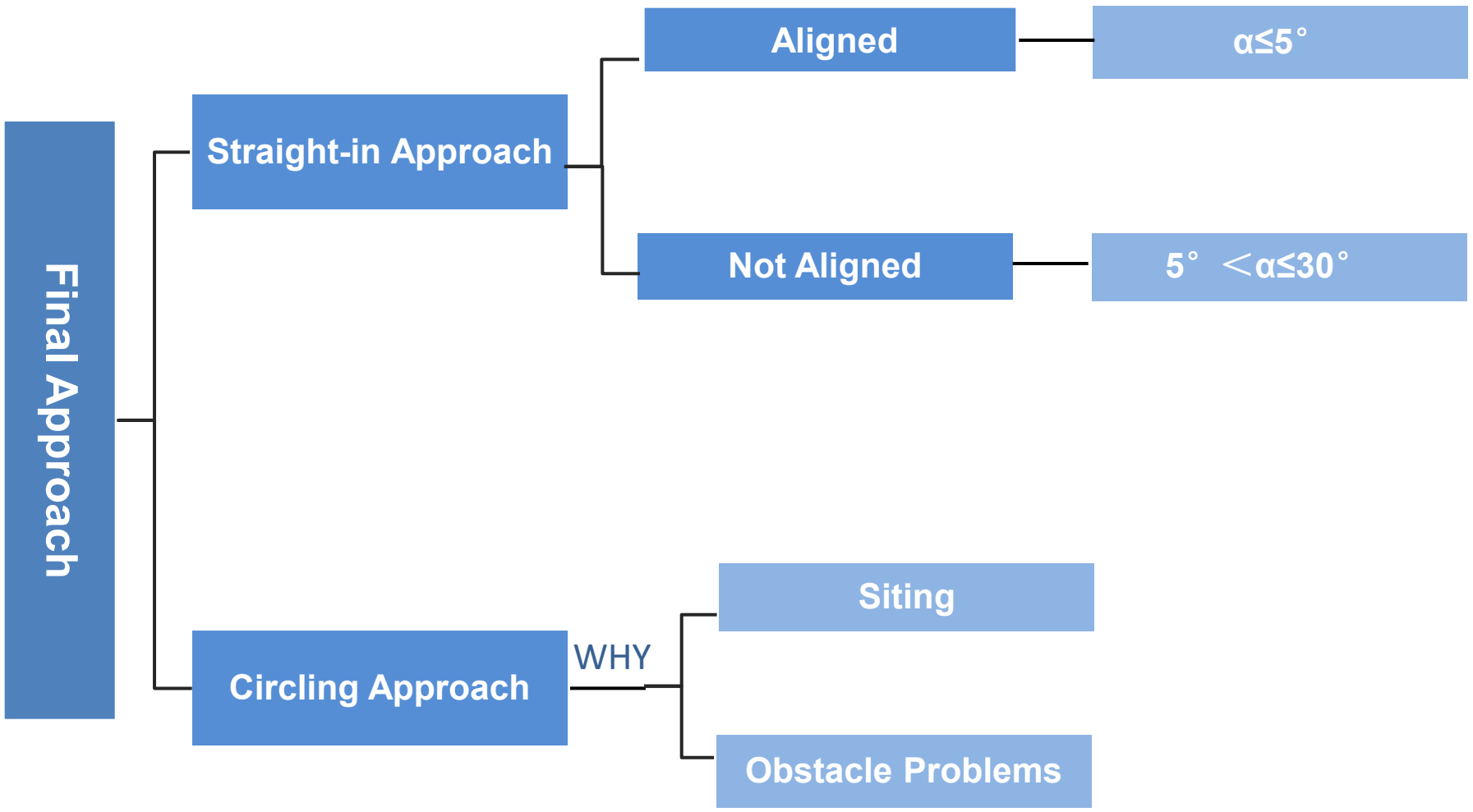
# Segment Purpose

## Last radio-guided segment before landing

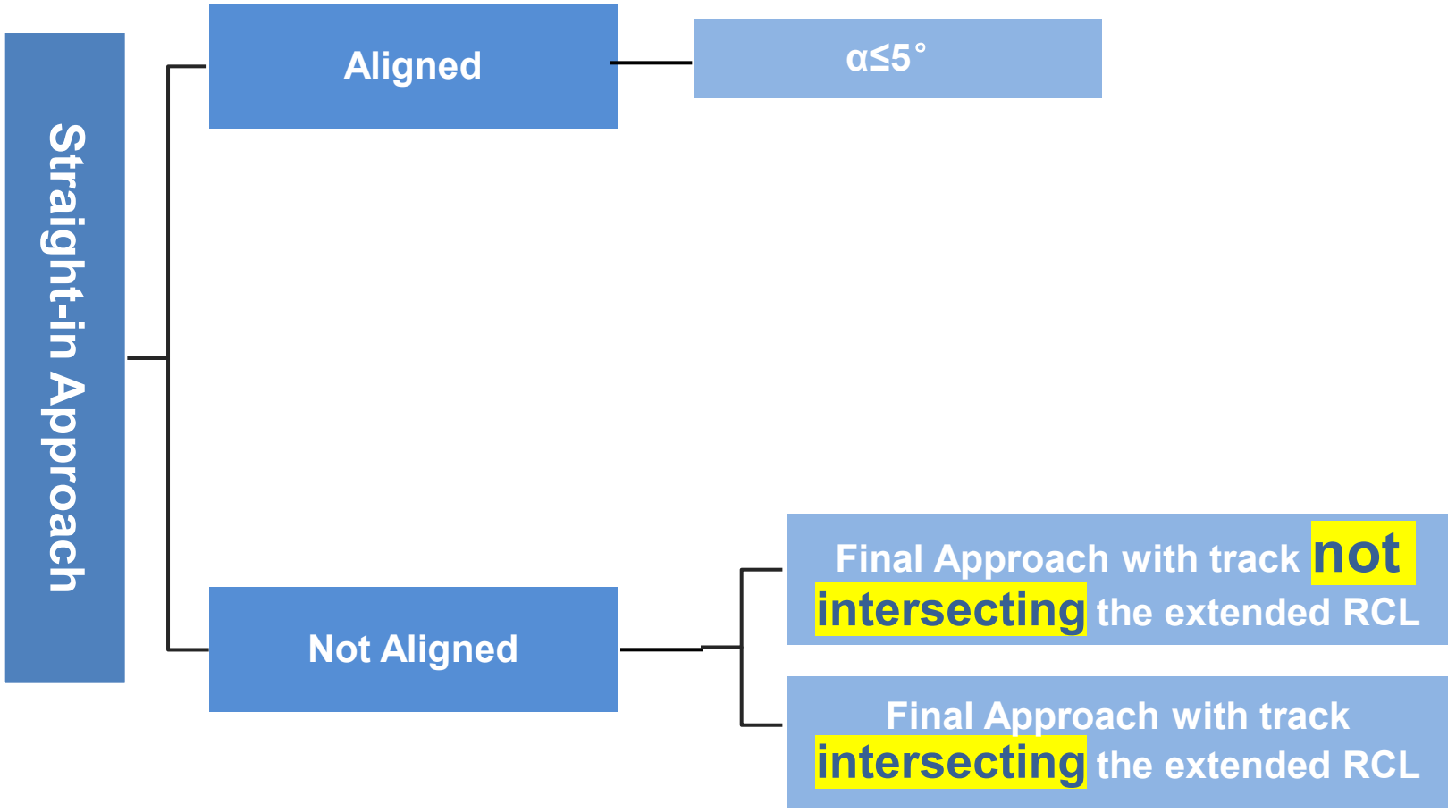



Final Approach
Parameters
Alignment
Descent Gradient
MOC
Area Width
Length

# Alignment


Final Approach
Straight-in Approach
Aligned
α≤5°
Not Aligned
5° ＜α≤30°
Circling Approach
WHY
Siting
Obstacle Problems

# Alignment


Straight-in Approach
Aligned
α≤5°
Not Aligned
Final Approach with track not intersecting the extended RCL
Final Approach with track intersecting the extended RCL

# Alignment

- Final approach may be made:
  - to a runway for a straight-in landing;
  - to an aerodrome for a circling approach;

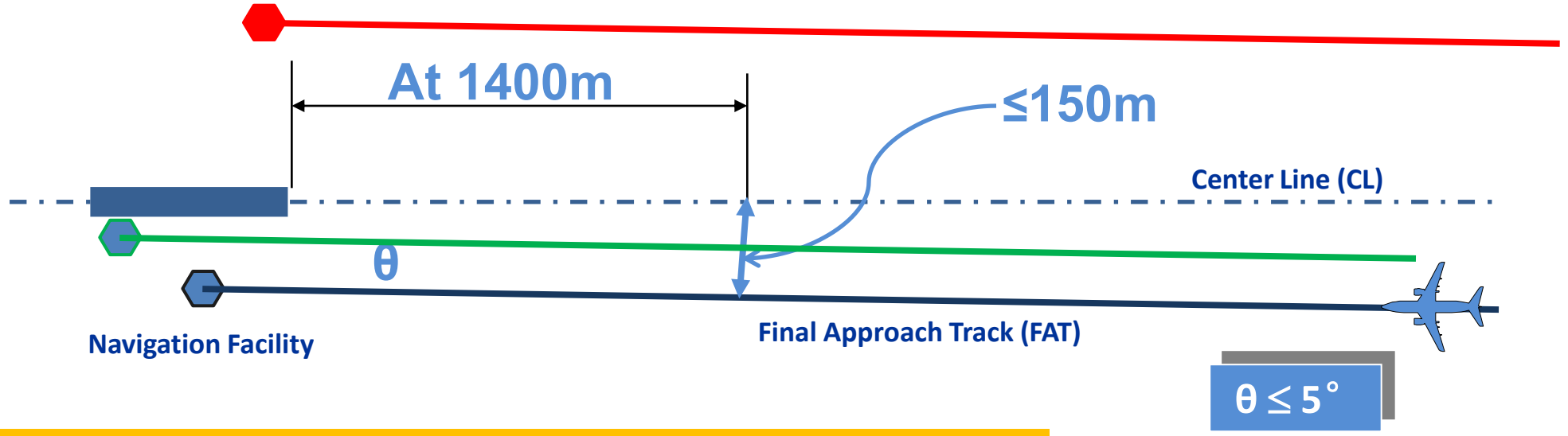
It should be aligned with the runway whenever possible!

# Alignment (updated)

- An offset final approach increases the complexity of pilot operation.
- An offset final approach track shall not be established as a noise abatement.

# Alignment

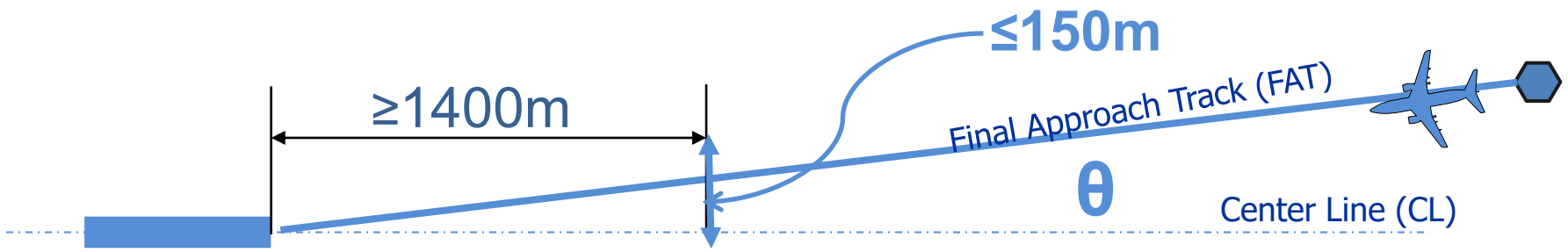
## ➢Straight-in-Approach (aligned)




The final approach track shall pass a point 1 400 m before the runway threshold within a maximum of 150 m laterally.

# Alignment θ< 5°

## ➢Straight-in-Approach (aligned)

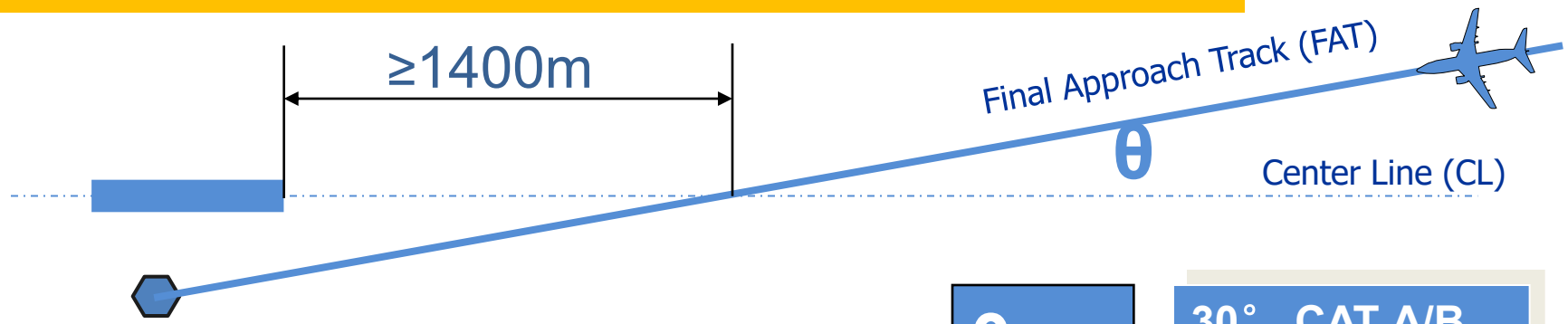



The final approach track shall pass a point 1 400 m before the runway threshold within a maximum of 150 m laterally.

# Alignment θ > 5°

## ➢Straight-in-Approach (not aligned)

the distance between the runway threshold and the point at which the final approach track intersects the runway centre line shall not be less than 1 400 m




$\theta_{max}$

30° CAT A/B

15° CAT C/D/E

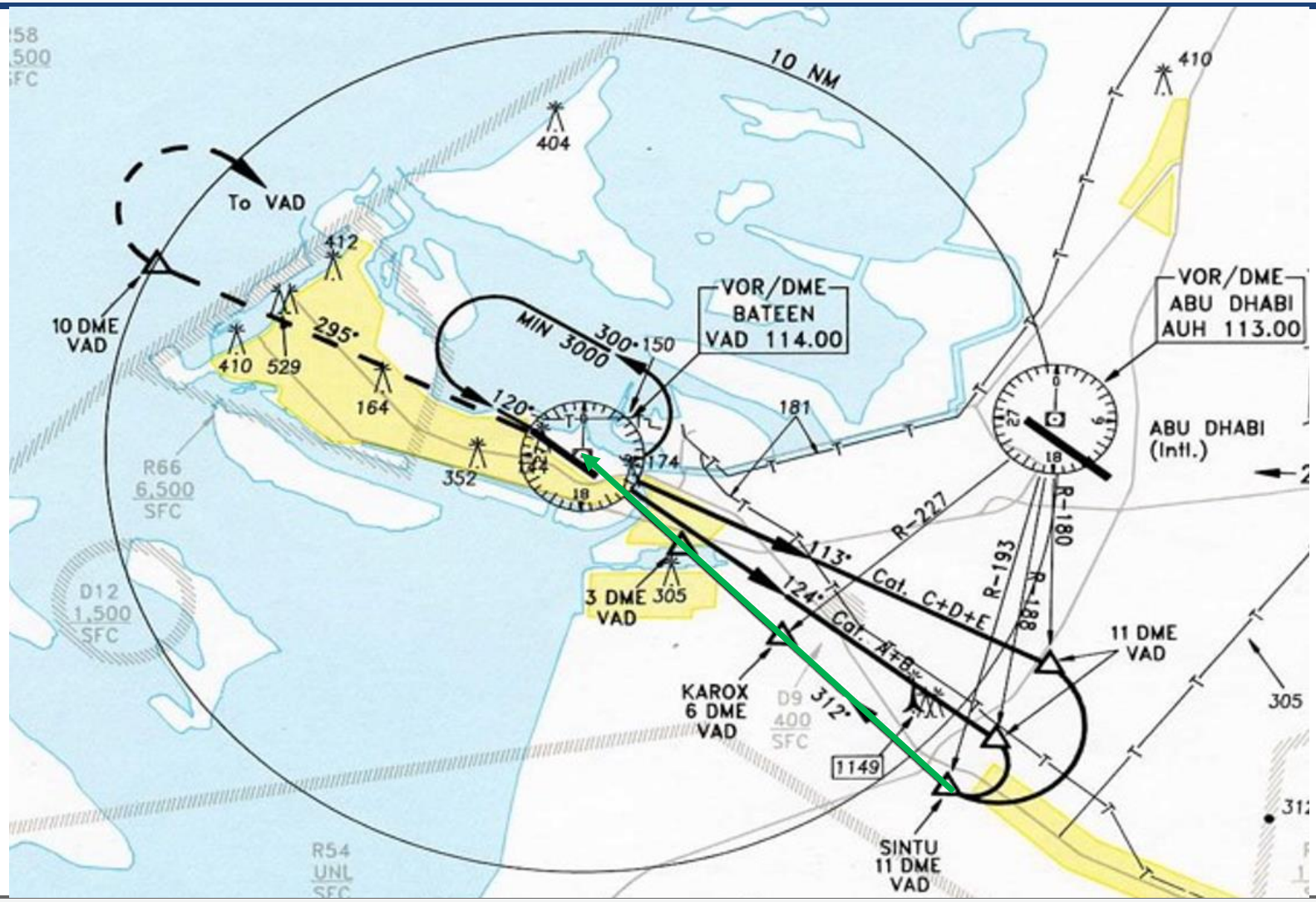
**if θ > 5° ⇒ Lower Limit on OCH (Table I-4-5-3)**

# ALIGNMENT

- In case of intersecting, for Non-aligned Straight-in-Approach (Angle $\alpha$>5°)
- Table I-4-5-3
- Maximum turn at FAF 30°
- If criteria cannot be met, then circling approach;

| Aircraft Category | Lower Limit on OCH(m/ft) | |
|---|---|---|
| | 5° <θ<=15° | 15° <θ< 30° |
| CAT A | 105/340 | 115/380 |
| CAT B | 115/380 | 125/410 |
| CAT C | 125/410 | |
| CAT D | 130/430 | |
| CAT E | 145/480 | |

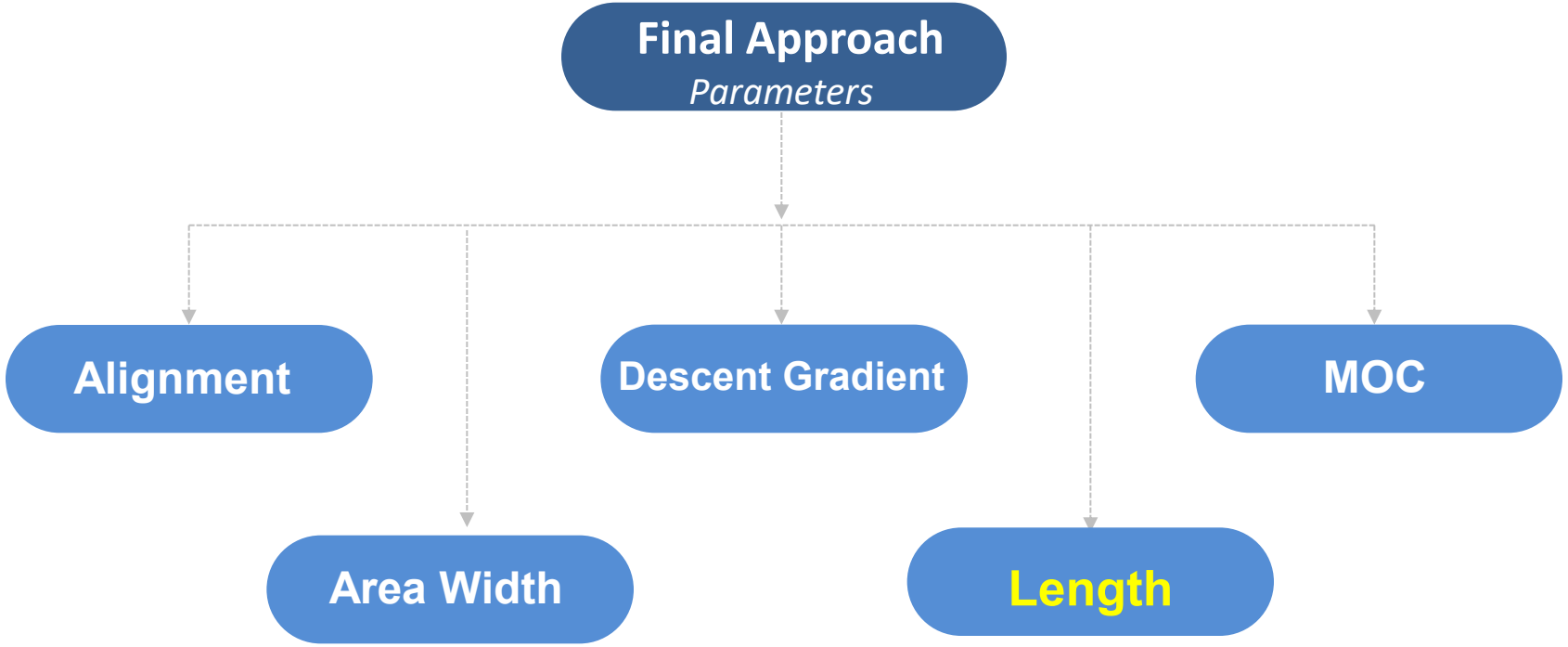
# Example


10 NM
To VAD
10 DME
VAD
404
412
410
529
295°
164
352
120°
MIN 3000
300-150
VOR/DME
BATEEN
VAD 114.00
181
174
R66
6,500
SFC
D12
1,500
SFC
3 DME 305
VAD
410
VOR/DME
ABU DHABI
AUH 113.00
ABU DHABI
(Intl.)
R-227
R-180
R-193
R-188
113°
124°
Cat. C+D+E
Cat. A+B
11 DME
VAD
KAROX
6 DME
VAD
D9
400
SFC
312°
1149
305
SINTU
11 DME
VAD
R54
UNL
SFC

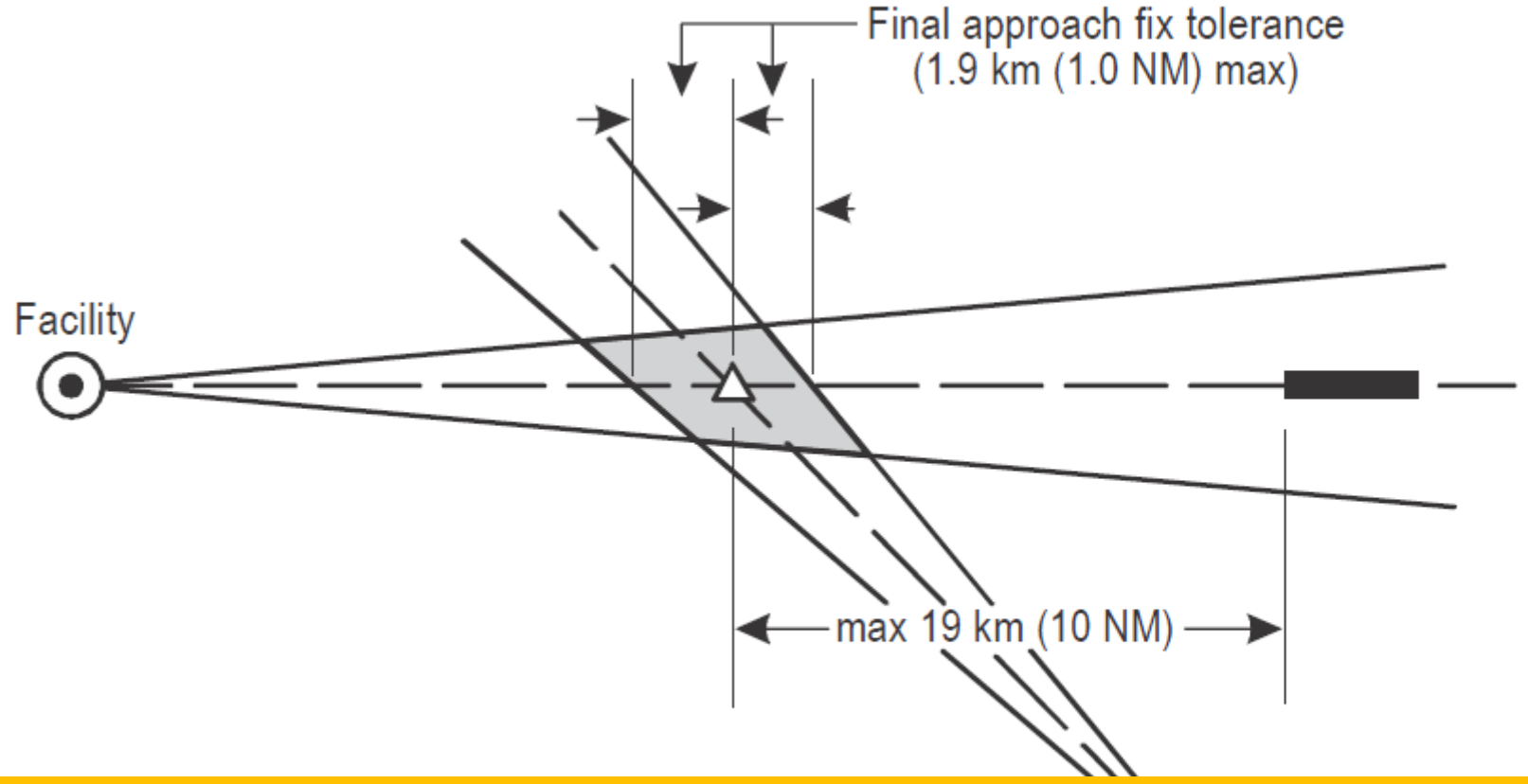
# Alignment

- Obstacle clearance altitude/ height (**OCA/H**) above the **elevation** of the relevant runway **threshold** or the **aerodrome elevation** as applicable, used in establishing compliance with appropriate obstacle clearance criteria.

| OCA(H) | | | | |
|---|---|---|---|---|
| Cat of ACFT | Cat A | Cat B | Cat C | Cat D |
| Straight-in | 630 (450) | | | |
| Circling | 760 (580) | 1090 (910) | 1190 (1010) | 1430 (1250) |


Final Approach
Parameters
Alignment
Descent Gradient
MOC
Area Width
Length

# LENGTH




For use as a FAF, the fix shall be located not farther than 19 km (10 NM) from the landing surface.

The fix tolerance atthe FAF crossing level should not exceed ± 1.9 km (1.0 NM).

# LENGTH

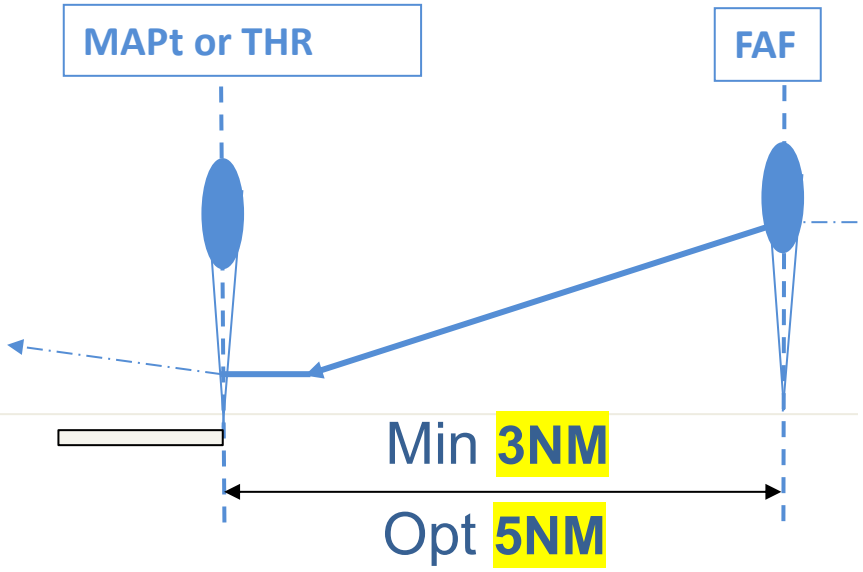
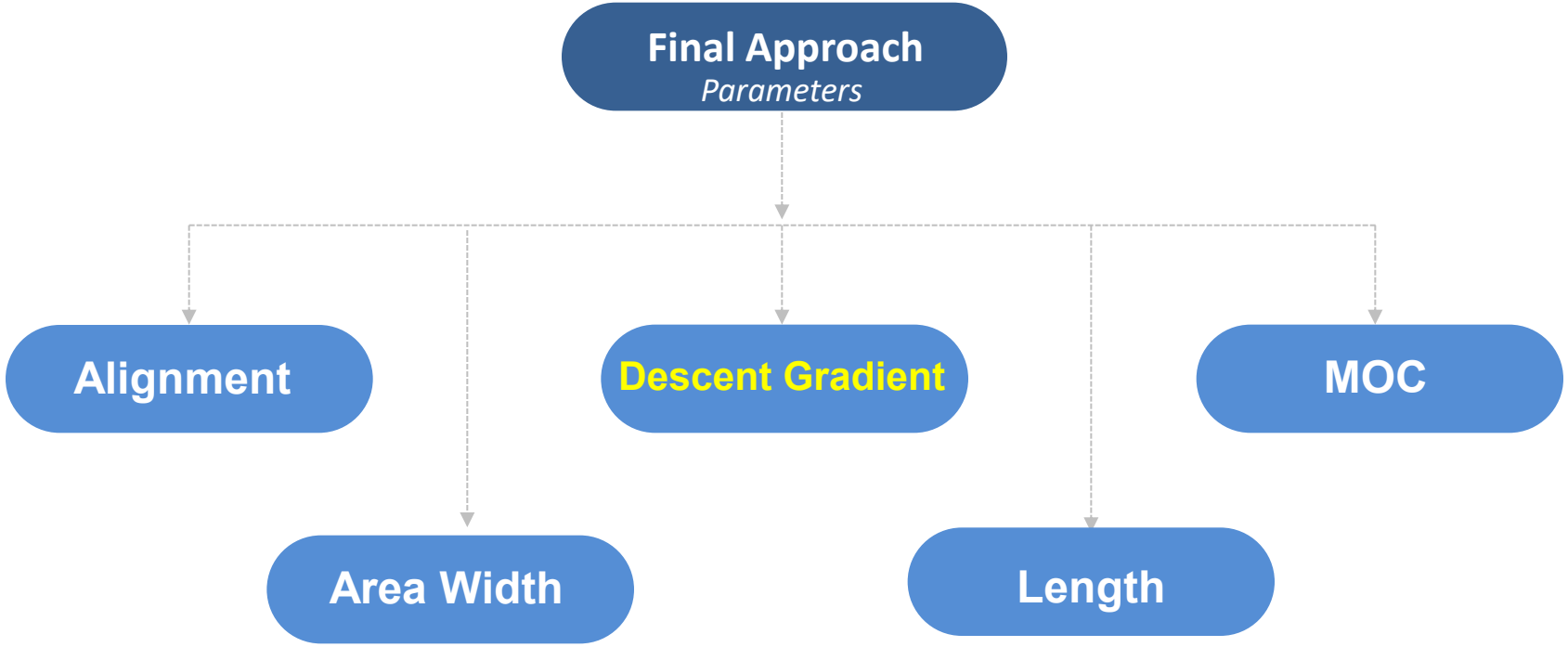



**Table I-4-5-1. Minimum length of final approach segment**

| | Magnitude of turn over FAF | | | |
|---|---|---|---|---|
| Aircraft category | 10° or less | 20° | 30° | 60° |
| D and $D_L$ | 5.6 km (3.0 NM) | 5.6 km (3.0 NM) | 6.5 km (3.5 NM) | |
| E | 5.6 km (3.0 NM) | 6.5 km (3.5 NM) | 7.4 km (4.0 NM) | |
| H | 1.9 km (1.0 NM) | 2.8 km (1.5 NM) | 3.7 km (2.0 NM) | 5.6 km (3.0 NM) |
| The values in this table may be interpolated. If turns of more than 30° (Cat H, 60°) are required, or if the minimum lengths specified in the table are not available for the procedure, straight-in minimums are not authorized and only the circling OCA/H should be published. | | | | |

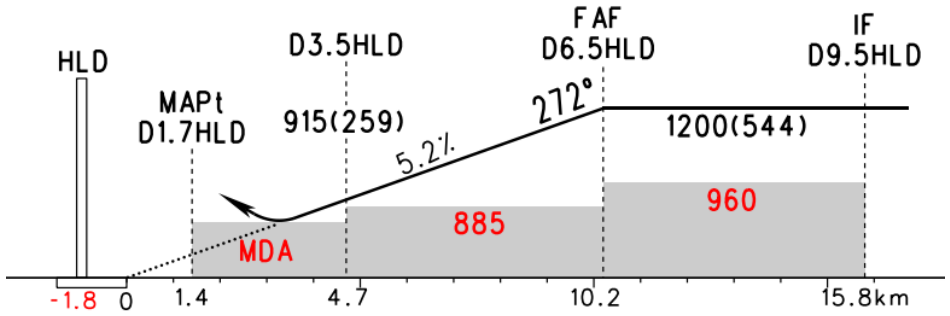
The maximum length for VOR/NDB should not normally be greater than 19 km (10 NM).


Final Approach
Parameters
Alignment
Descent Gradient
MOC
Area Width
Length

# Descent Gradient

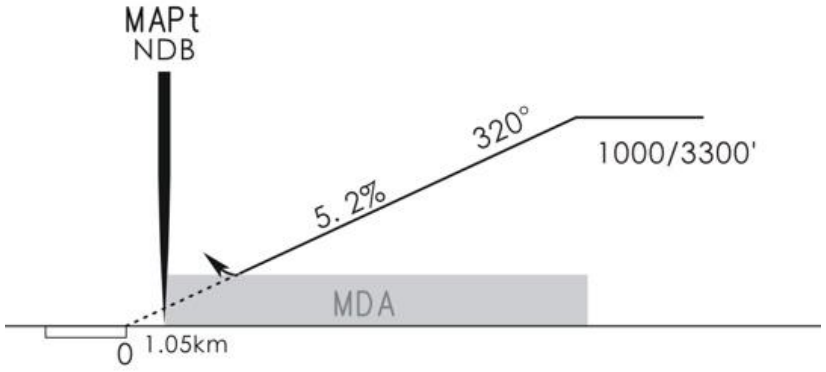
- **Final with FAF:**
  - **Mini/Opt: 5.2% (≈3° )**
  - **Maximum: 6.5% for CAT A/B**

    **6.1% for CAT C/D/E**

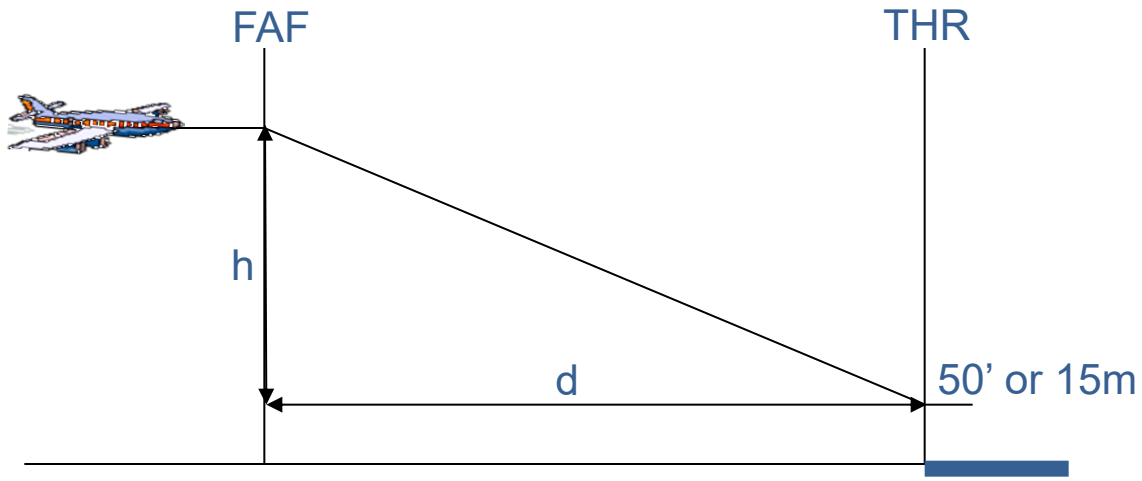



- **Final without FAF (Table I-4-5-2):**

| Rate of Descent | | |
|---|---|---|
| **Aircraft CAT** | **Maximum (ft / min)** | **Minimum (ft/min)** |
| **CAT A/B** | **655** | **394** |
| **CAT C/D/E** | **1000** | **590** |
| **CAT H** | **755** | **N/A** |



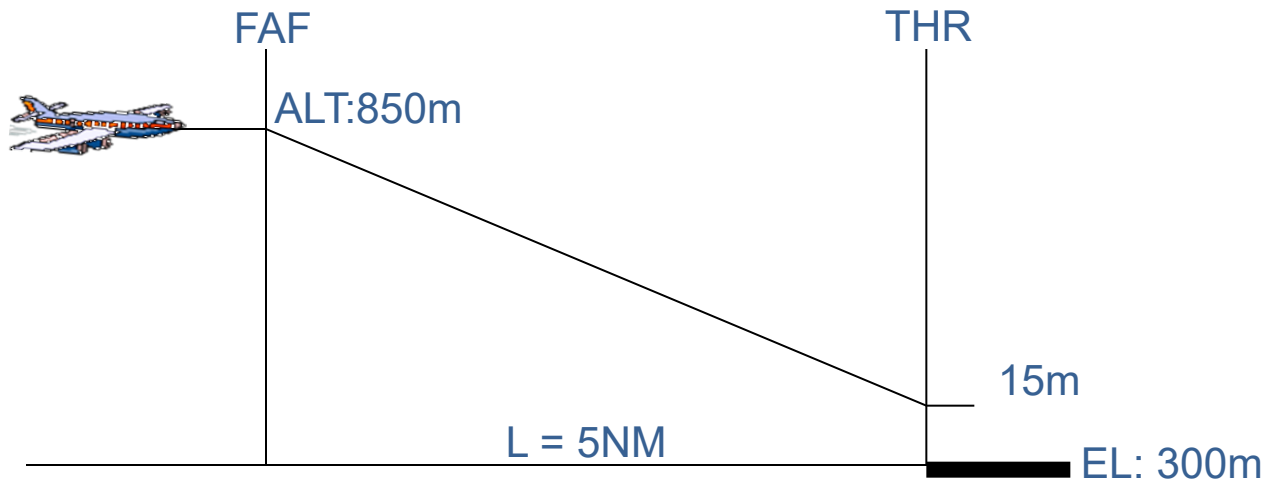
# Descent Gradient




- Descent Gradient(g) = $\frac{h}{d}$

# Descent Gradient - Exercise

➢ Descent Gradient = $\frac{\text{FAF Alt} - \text{THR EL} - 15\text{m}}{\text{L} * 1852}$




∴ Descent Gradient = =

# Descent Gradient - Exercise

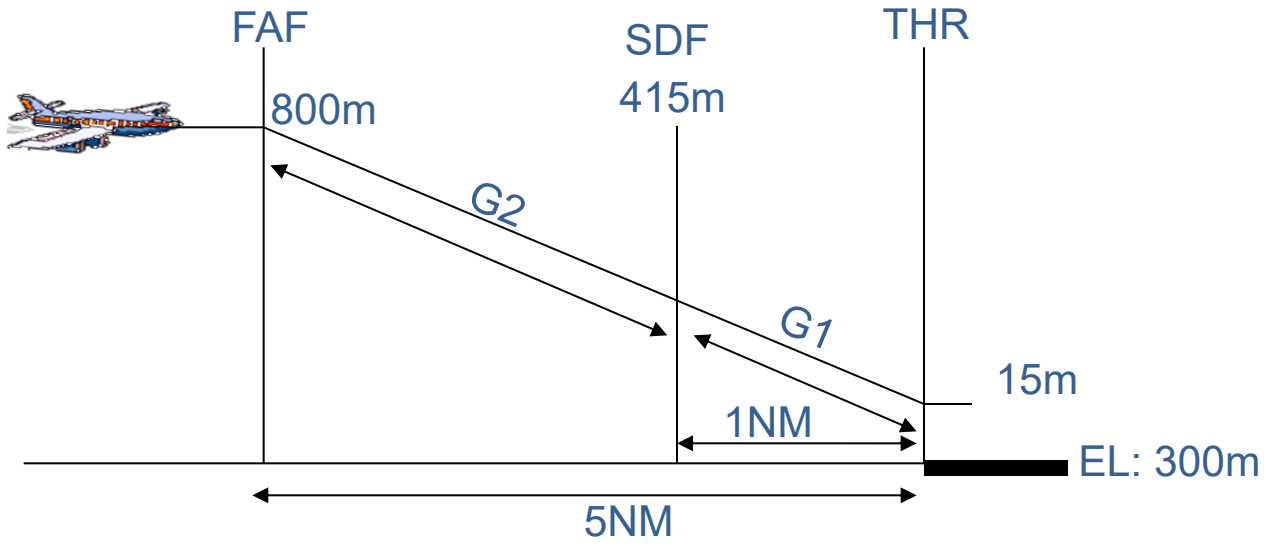
1. Lower FAF Alt:

   FAF Alt =

2. If Intermediate altitude cannot be lowered due to obstacles, then move the FAF so as to increase the distance of FAF-THR:

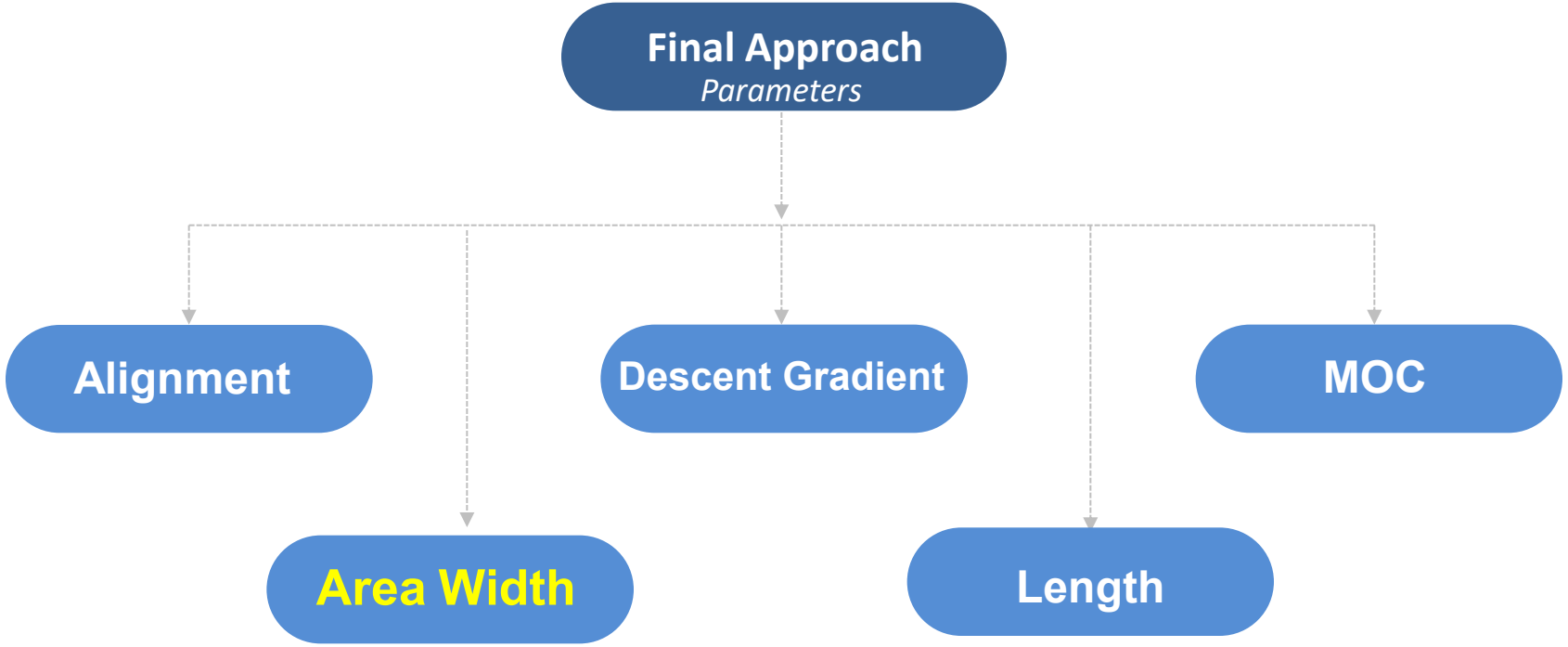
**Aim: Make the Descent Gradient close to 5.2%**

# Descent Gradient - Exercise




∴ Descent Gradient 1 = =

∴ Descent Gradient 2 = =


Final Approach
Parameters
Alignment
Descent Gradient
MOC
Area Width
Length

# Area Width

- Depends on:

1.Facility (VOR or NDB)

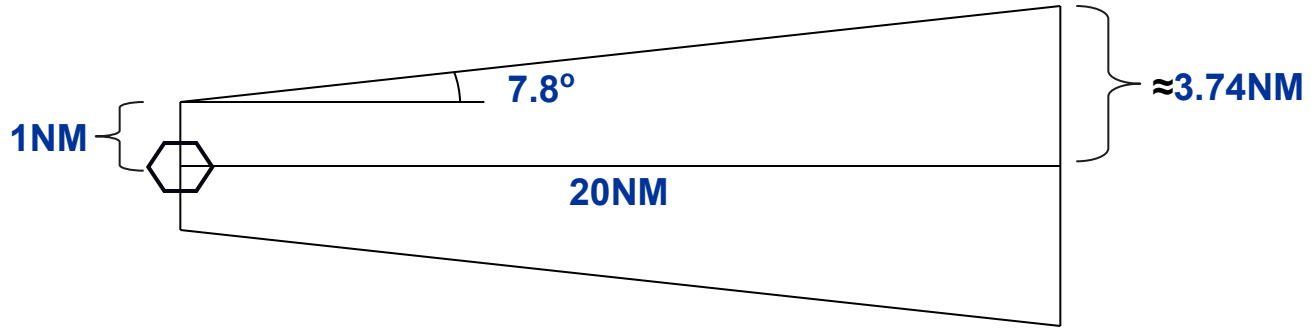
2.Layout

- The final approach may be made either ‘from’ or ‘to’ the facility
- VOR: The Final Segment (i.e. from FAF to MAPt) must be contained within 20NM of the facility
- NDB: The Final Segment (i.e. from FAF to MAPt) must be contained within 15NM of the facility

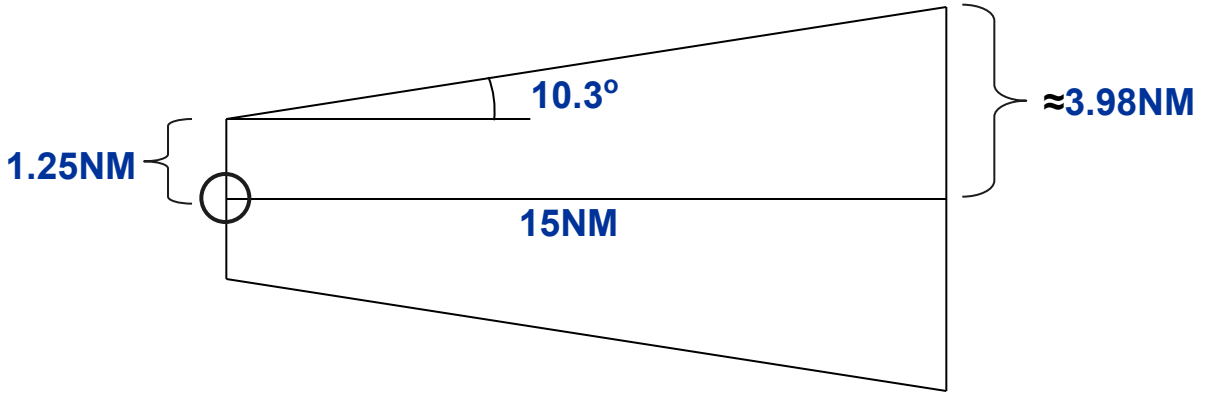
# Area Width

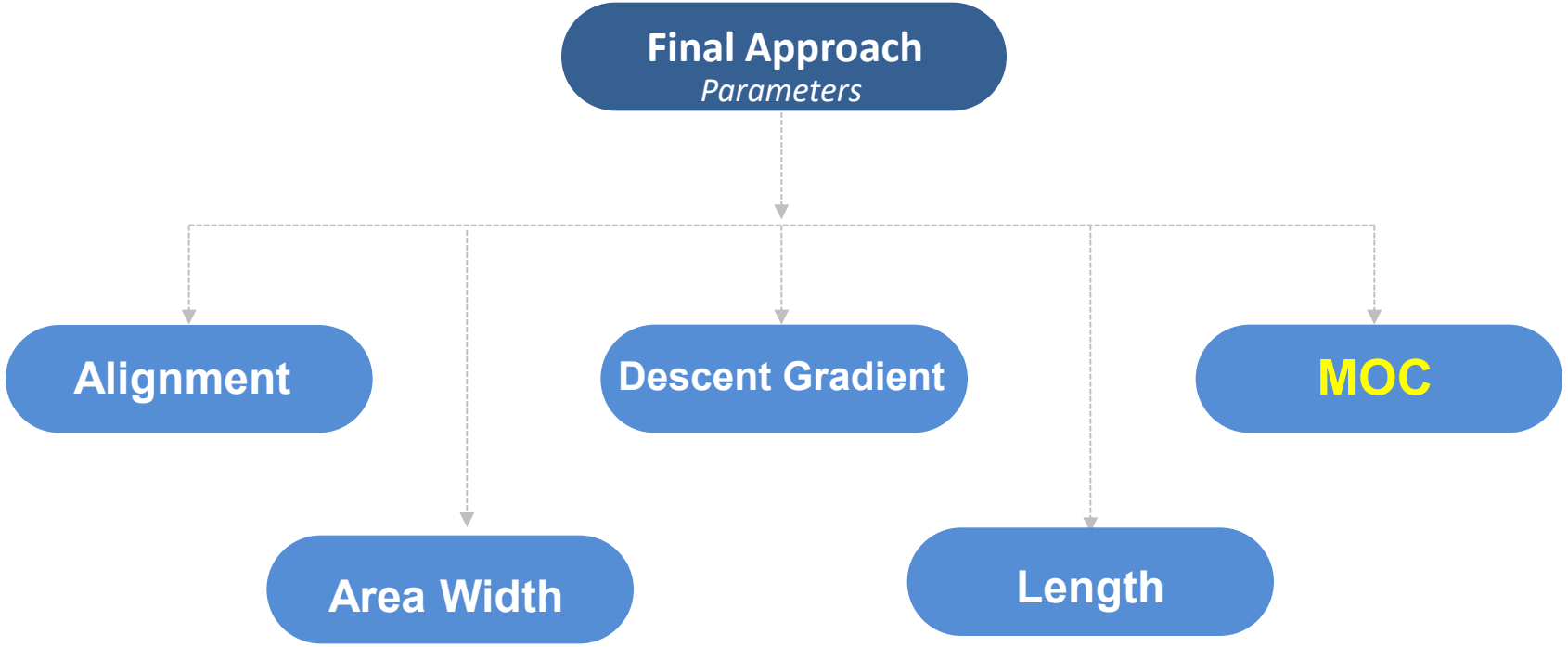
**For VOR:** **w/2 = 1NM + D*Tan7.8°**

(**D:** Distance for the facility)




**For NDB:** **w/2 = 1.25NM + D*Tan10.3°**

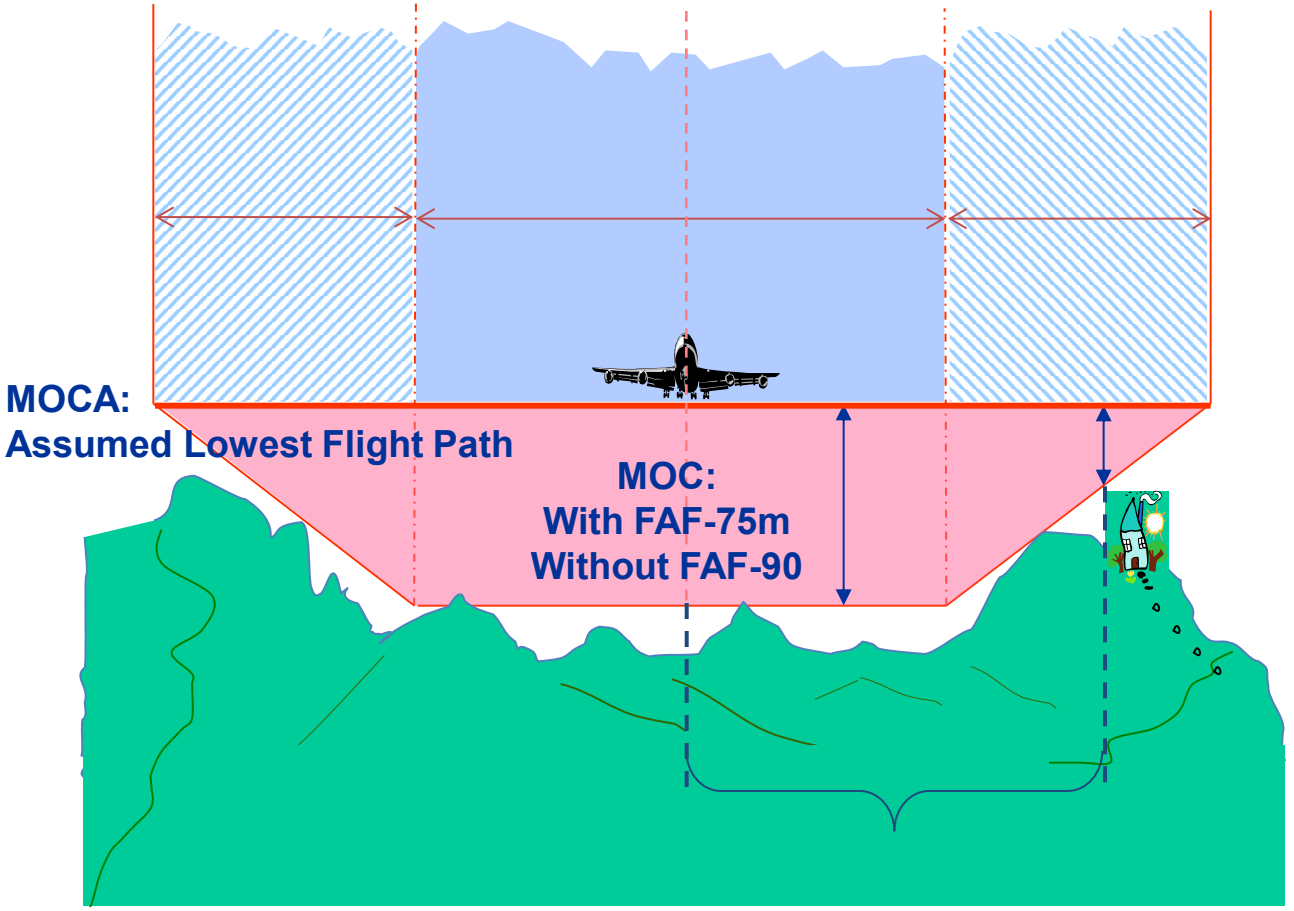



Final Approach
Parameters
Alignment
Descent Gradient
MOC
Area Width
Length

# MOC

- For Aligned Straight-in Approach (angle between FAT & CL ≤ 5°)
  - With FAF: 75m/246ft
  - Without FAF: 90m/295ft
- Obstacle Clearance Altitude/Height (OCA/H): The lowest altitude/height that provides the minimum obstacle protection and a missed approach must be initiated.
- OCA: Reference to MSL
- OCH: Reference to AD EL
  - or THR EL if more than 2m or 7 ft below
- OCA/H: Round up to next 10' or 5m

# MOC

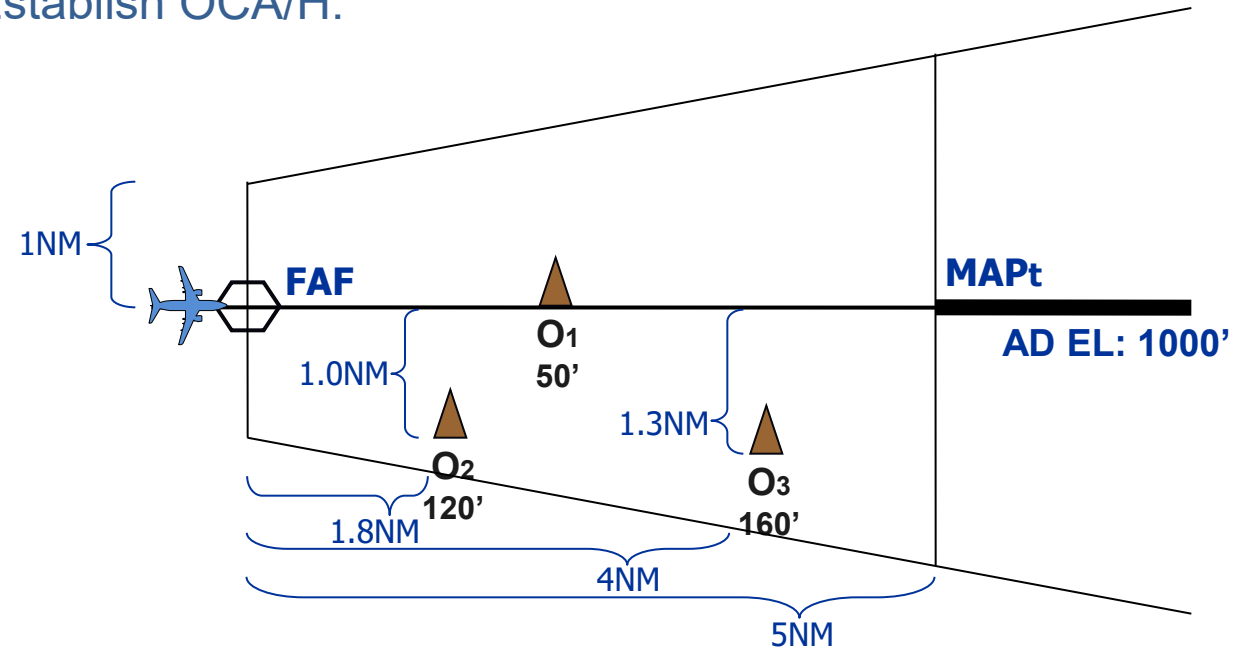

MOCA:
Assumed Lowest Flight Path
MOC:
With FAF-75m
Without FAF-90

# MDA/H

- Minimum Descent Altitude/Height (MDA/H): A specified altitude/height in a non-precision approach or circling approach below which descent must not be made without the required visual reference.
- It is established operationally
- With the addition of operators' margin, it must be higher than the OCA/H

# MOC – EXERCISE 1

- Establish OCA/H:




Critical Obstacle?

# MOC – EXERCISE 2

- Continue with previous question, with the OCA/H of 1300’/300’, what is the height of an additional mast if it is being built on top of $O_2$?

- Continue with previous question, calculate the OCA/H if the VOR is replaced by a NDB:

$O_1$:

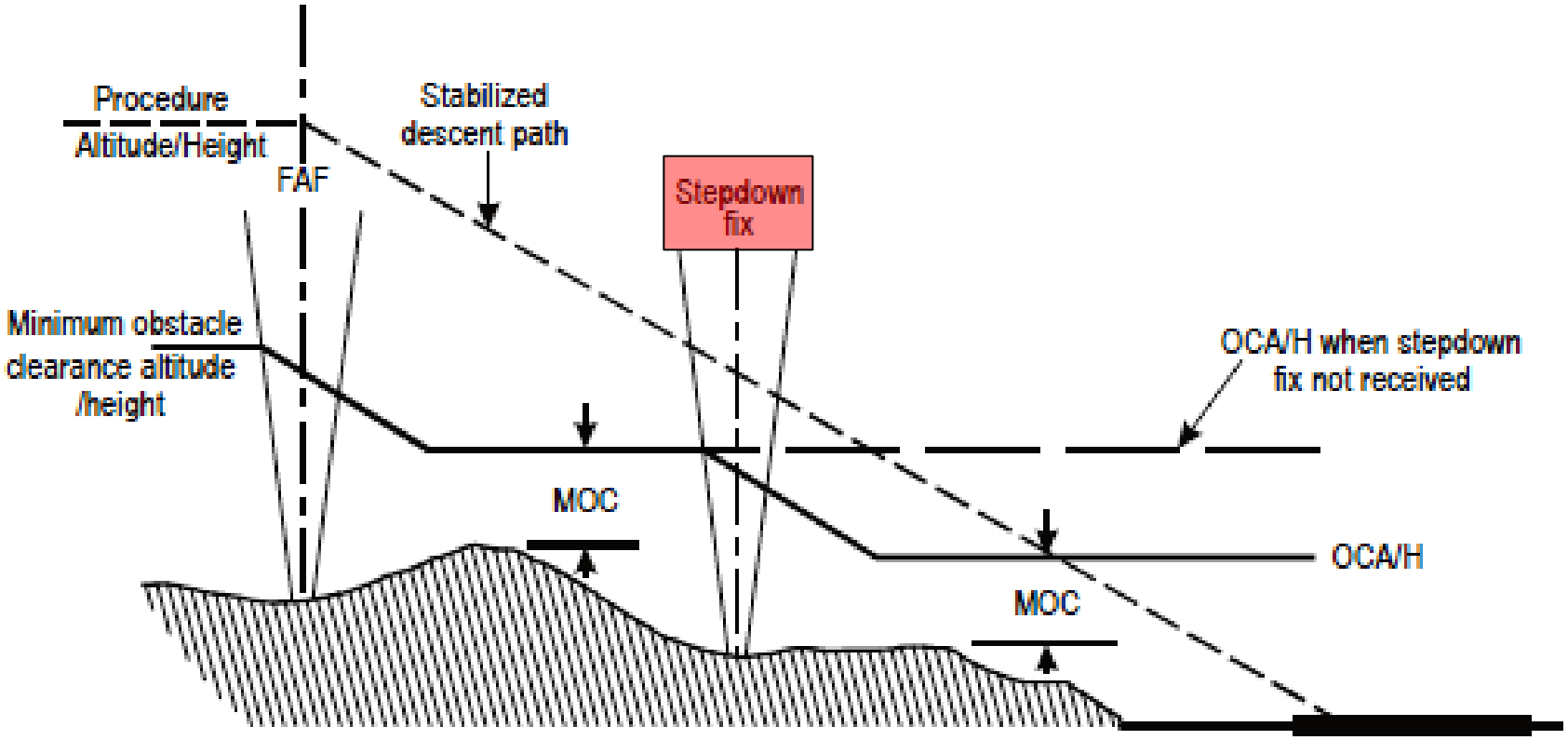
$O_2$:

$O_3$:

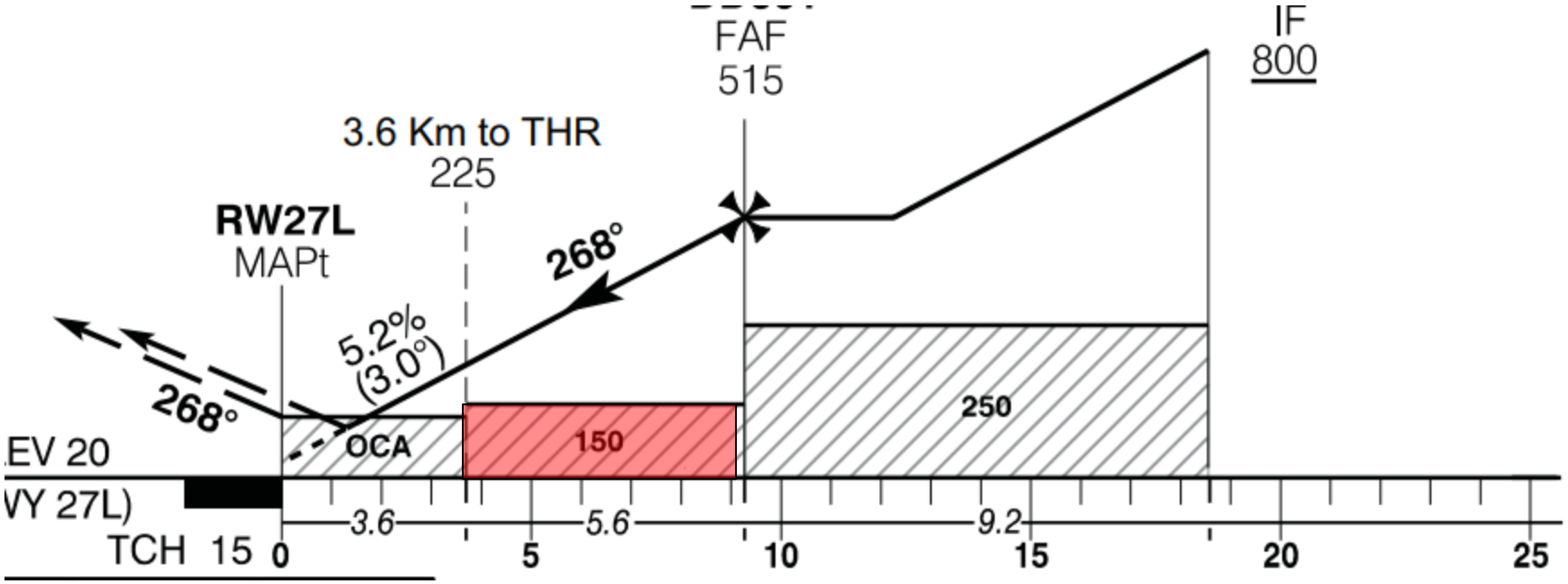
# What's more?

- Stepdown Fix – It permits additional descent within a segment by identifying a point at which a controlling obstacle has been safely overflown
  - Used to overfly obstacles
  - Only use it when necessary since it may interfere with stabilized approach
  - If used in the Final Segment, normally one SDF should be established
  - Two could be possible if given by DME distance
- Two descent gradients
- Two OCA/H values (with and without SDF)

# Stepdown Fix



# Stepdown Fix



# Summary

- Final approach(alignment, descent gradient, length, MOC, area width);
- OCA/OCH
- Stepdown fix

# Q&A


# Let's Focus/Propose/Plan Together