Tentative Agenda

	9:00-10:30 (90mins)	10:45-12:00 (90mins)	Lunch	13:20-14:50 (90mins)	15:00-16:30 (90mins)
15 June 2026 Monday	Registration & Introduction	Review of Pre-course Assignment		General Overview -Aircraft Classification -MOC	Speed Conversion* & Turn Calculation*
16 June 2026 Tuesday	Wind Effect & Turn Parameters	Wind Effect* & Turn Parameters*		Fix Tolerance	Fix Tolerance
17 June 2026 Wednesday	NPA -General Criteria Initial Segment	NPA Initial Segment*		NPA Intermediate Segment	NPA Intermediate Segment*
18 June 2026 Thursday	NPA Final Segment	NPA Final Segment* OCA/H*		NPA Final Segment* OCA/H* NPA VSS	NPA Final Segment* OCA/H* NPA VSS
19 June 2026 Friday	Missed Approach -Initial Phase	Missed Approach -Intermediate Phase -Turning MAP		Missed Approach -Intermediate Phase -Turning MAP	Missed Approach -Intermediate Phase* -Turning MAP

Notes:

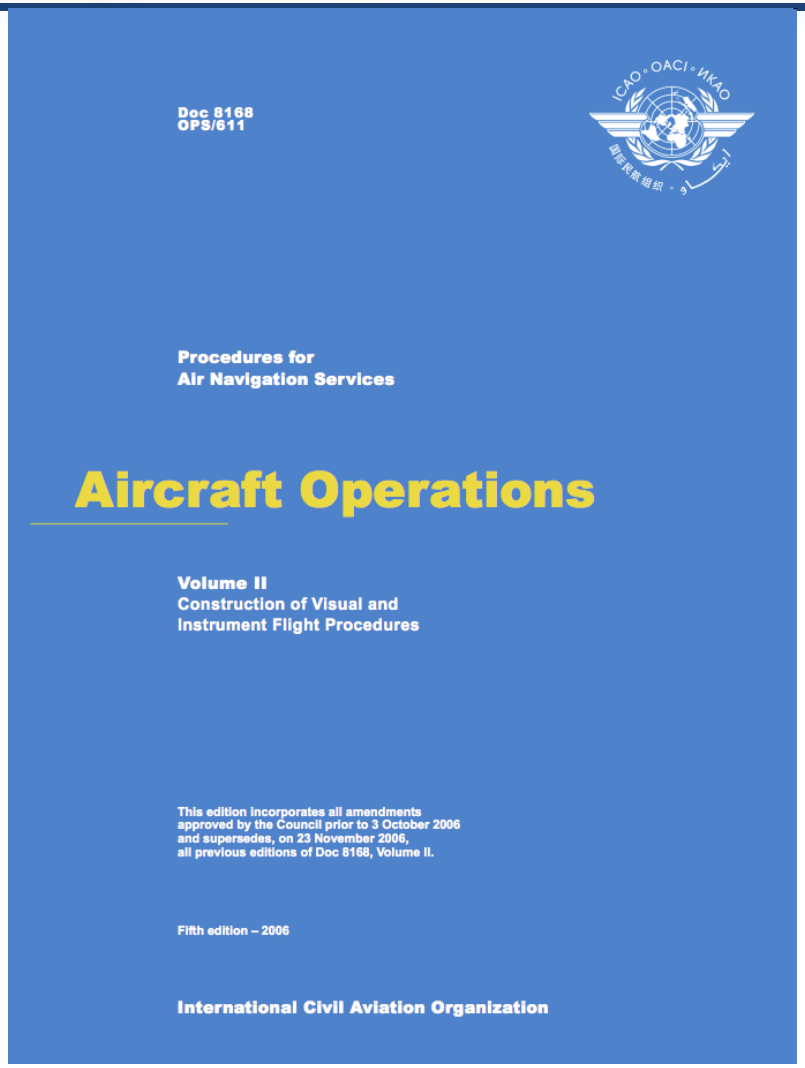
1. All scheduling is in Beijing time(UTC+8).
2. Topics with * will be followed by a short practical exercise.
3. Each presentation is followed by a 10-minute Q&A session.

GENERAL OVERVIEW

APAC FPP, ICAO

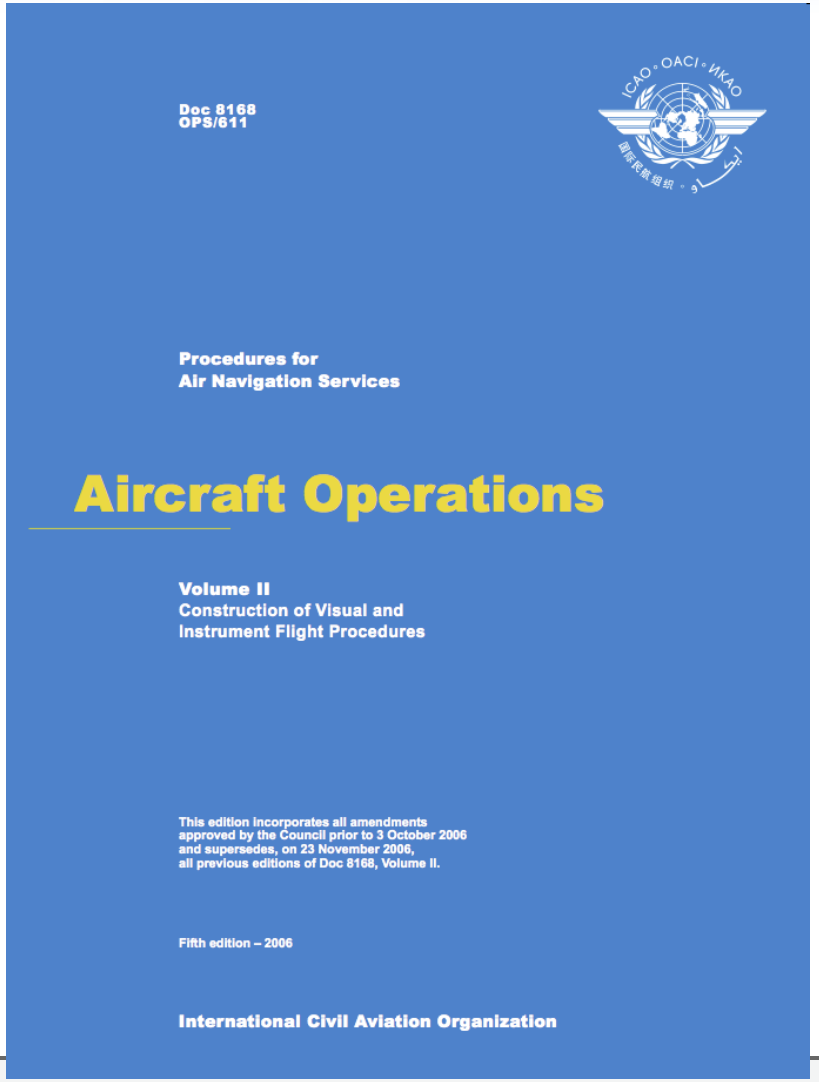
OBJECTIVE OF THE COURSE

The trainees should be able to understand the construction of Instrument Flight Procedures based on conventional criteria contained in ICAO Pans-Ops Doc 8168



OBJECTIVE OF THE COURSE

- The trainees shall be able to design:
  - Standard Terminal Arrival Route (STAR)
  - Non-precision Approach Procedure (NPA)
  - Precision Approach Procedure (PA) based on ILS criteria
  - Standard Instrument Departure Procedure (SID)



KNOWLEDGE REQUIRED

- Mathematics
  - Algebra
  - Geometry
  - Trigonometry
  - Statistics
- Aviation
  - ATM
  - Navigation
  - Aircraft Performance
  - AIS & Charts
  - Aerodromes
  - Geodesy

CONTENTS

- Instrument Flight Procedures
- Regulations & Structure of PANS-OPS
- Categories of Aircraft
- Obstacle Clearance
- Practical Considerations

INSTRUMENT FLIGHT PROCEDURES - PHILOSPHY

- **IFP：**
  - **A process, using navigation, through which an aircraft transits from the en-route phrase of flight to a position, and in a state, from which a normal landing can be initiated (i.e. see the Runway)**
  - **Series of predetermined maneuvers by reference to flight instruments**
  - **Maneuvers based on navigation method for aircraft proceeding according to Instrument Flight Rules**
  - **Obstacle Clearance - the primary safety consideration**
  - **Airspace, Environment, Economy & ATS etc.**

FACTORS GOVERNING THE PROCEDURE DESIGN

- **Terrain & Obstacles** surrounding the aerodrome
- Aircraft to be accommodated (category)
- Aircraft & Pilot ability
- Airspace Management

- These factors in turn influence the type and siting of the navigational aids
- Airspace restrictions may also affect the siting of navigation aids

INSTRUMENT FLIGHT PROCEDURES - OBJECTIVES

- **Safety** of aircraft operation
- Regularity of aircraft operation
- Efficiency of aircraft operation
- Air Traffic Services

INSTRUMENT FLIGHT PROCEDURES - OBJECTIVES

- **Procedure designed must be:**
  - **Safe**
  - **Simple**
  - **Short (vs CDO)**
  - **Clear (unambiguous)**

TYPES OF PROCEDURES

- En-route Procedures
- Terminal Procedures
  - Arrival Procedures
  - Departure Procedures
- Approach Procedures

- ✓ Conventional
- ✓ Area Navigation

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REGULATIONS

- ICAO Regulation

  DOC 8168 - OPS/611 Volume II

  Procedures for Air Navigation Services – Aircraft Operations

  (Construction of Visual and Instrument Flight Procedures)

- National regulation
  - US Criteria (TERPS)
  - France
  - Differences from ICAO criteria should be published

HISTORICAL BACKGROUND

- 1951: First regulation by ICAO for Instrument Flight Procedures
- 1961: Operations procedures brought together into single document named as PANS-OPS
- 1966: Obstacle Clearance Panel (OCP) created to update the regulations
- 1979: Rearrangement of regulations into two volumes, one for user and the other for procedure designer
- 2003: Amendment 12 - OCP 13 major revisions on RNAV
- 2006: Complete restructuring of the document to provide a logical layout and more consistency
- 2008: OCP renamed as Instrument Flight Procedure Panel (IFPP)

OTHER RELATED ICAO DOCUMENTATION

- ICAO PANS-OPS Doc 8168 - OPS/611 Volume I
- Aeronautical Chart Manual Doc 8697
- ICAO Manual on the use of Collision Risk Model (CRM) for ILS Operations Doc 9274
- ICAO Template Manual for Holding, Reversal and Racetrack Procedures DOC 9371 - AN/912/2
- ICAO Instrument Flight Procedures Construction Manual Doc 9368
- ICAO Quality Assurance Manual for Flight Procedure Design Doc 9906
- ICAO Required Navigation Performance Authorization Required (RNP AR) Procedure Design Manual Doc 9905

PANS-OPS STRUCTURE

- Part
  - Major Subjects, e.g. Part I – General, Part II – Conventional Procedures
- Section
  - Main Types of Trajectories, e.g. Section 4 – Arrival and approach procedures
- Chapter
  - Segments, e.g. Chapter 5 – Final approach segment, Chapter 6 – Missed approach segment
- Appendix
  - Practical Considerations

PANS-OPS STRUCTURE

- Part I: General
- Part II: Conventional Procedures
- Part III: RNAV Procedures and Satellite-based Procedures
- Part IV: Helicopters

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AIRCRAFT PERFORMANCE

- ✈Aircraft performance has direct impact on airspace requirement
- ✈Most significant factor in performance is speed
- ✈Five categories of aircraft: A - E
- ✈Provide standardized basis for aircraft maneuverability to specific instrument approach procedure
- ✈Four Categories A – D common for civilian use
- ✈Cat H for helicopters

AIRCRAFT CATEGORIES

- **Vat:** The speed at threshold based on 1.3 times stall speed in the landing configuration at maximum certificated landing mass
- Indicated Air Speed (IAS) for procedure calculation in knot (kt)
- Reference – Table I-4-1-2

Aircraft Category	Vat	Range of Speeds for Initial Approach	Range of Final Approach Speeds	Maximum speeds for Visual maneuvering	Maximum Speeds for MAP	
					Intermediate	Final
A	<91	90/150(110*)	70/100	100	100	110
B	91/120	120/180(140*)	85/130	135	130	150
C	121/140	160/240	115/160	180	160	240
D	141/165	185/250	130/185	205	185	265
E	165/210	185/250	155/230	240	230	275

AIRCRAFT CATEGORIES

- ✈ Category A — less than 91 kt indicated airspeed IAS
- ✈ Category B — 91 kt or more but less than 121 kt IAS
- ✈ Category C — 121 kt or more but less than 141 kt IAS
- ✈ Category D — 141 kt or more but less than 166 kt IAS
- ✈ Category E — 166 kt or more but less than 211 kt IAS
- ✈ Category H — stall speed does not apply to helicopters

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MOC

（MINIMUM Obstacle Clearance)

OBSTACLE CLEARANCE

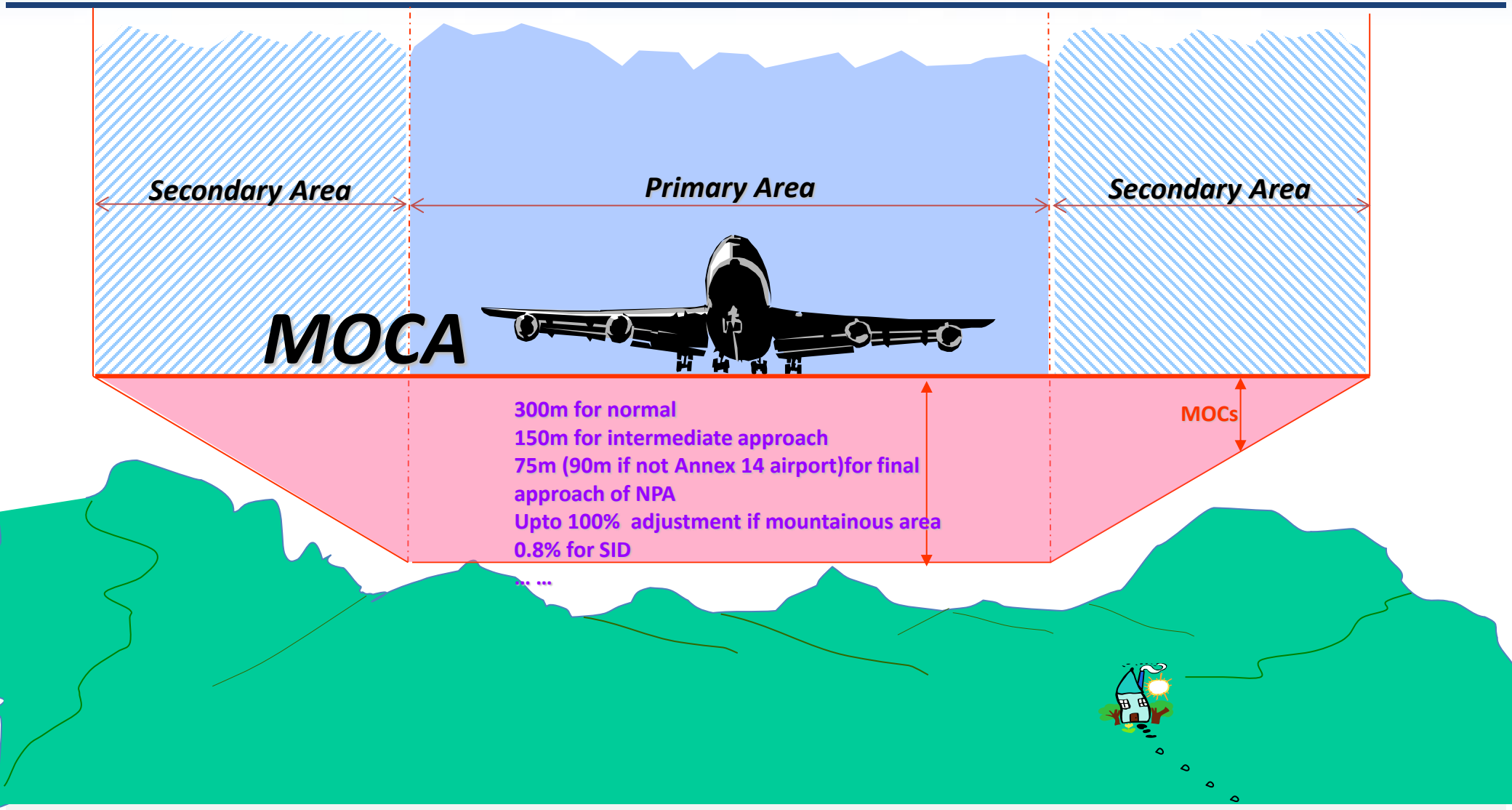
- **Primary Area (MOC)**

  A defined area symmetrically disposed about the nominal flight track in which **full** obstacle clearance is provided

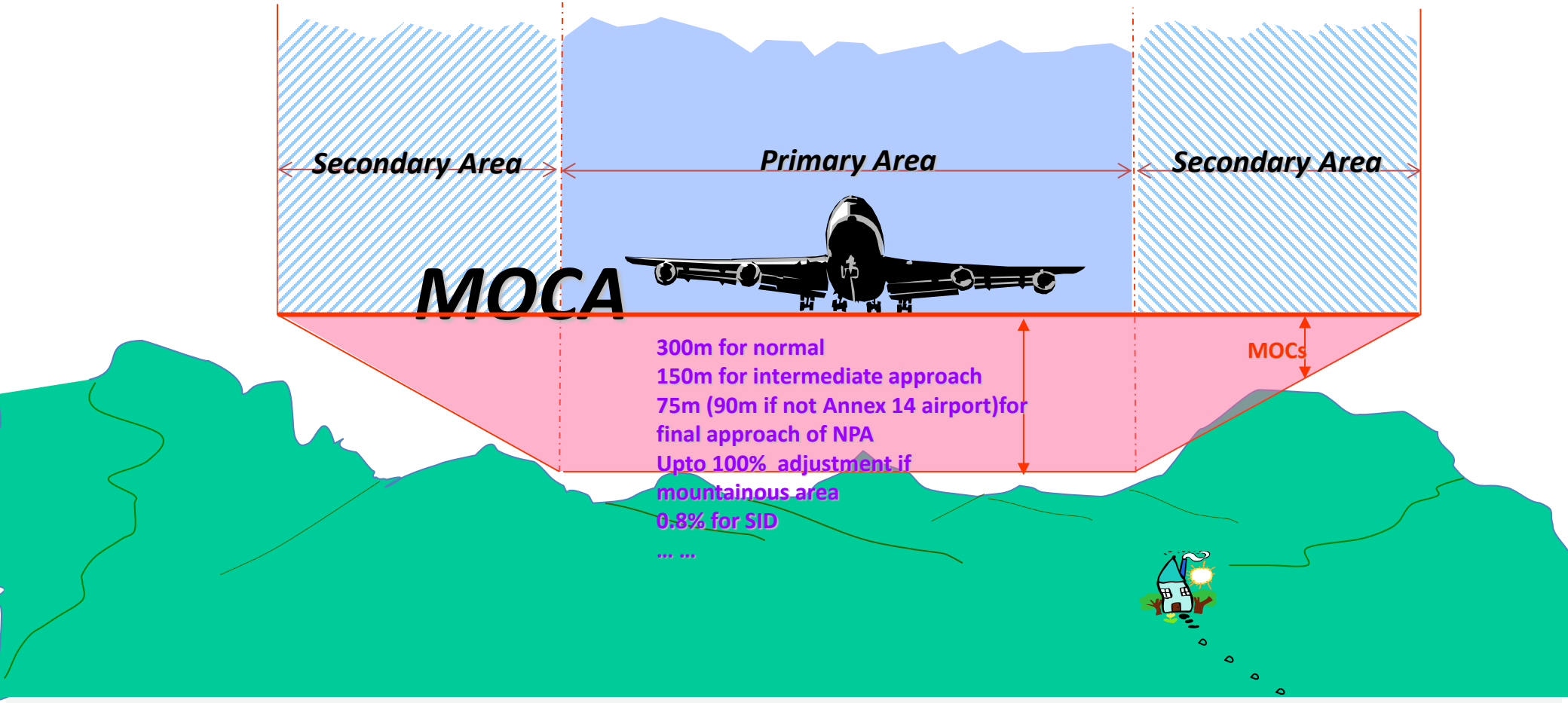
- **Secondary Area (MOCs)**

  A defined area on each side of the primary area located along the nominal flight track in which **decreasing** obstacle clearance is provided.

OBSTACLE CLEARANCE



OBSTACLE CLEARANCE



OBSTACLE CLEARANCE

- **MOCA:**
  - **An altitude computed/published for each segment**
- **Different altitudes:**
  - **Minimum Obstacle Clearance Altitude (MOCA)**
  - **Procedure Altitude: Operational Altitude at waypoint**

MOCA ≤ Procedure Altitude

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PREPARATION

- Applicable Regulation
  - ICAO Doc 8168 or National
- Aeronautical Data
  - Runways, Navigation aids, airspace, artificial obstacles etc.
- Suitable Maps
  - Departures, Initial/Intermediate/Final Segments & MAP
- Appropriate Equipment
  - Ruler, 45/30 Triangles, Protractor, Compass, Calculator, Templates etc.

OTHER CONSIDERATIONS

- Use of correct aeronautical data
- Use of appropriate formulas
- Preferable use of same units
- Documentation - worksheets & calculation
- Plotting of plan & profile view

CONVERSION FACTORS

- Conversion from NM to meters: Multiplied by 1852
- Conversion from meters to feet: Multiplied by 3.2808
- Conversion from NM to feet : Multiplied by 6076
- Conversion from knots to m/s: Multiplied by 1852 and divided by 3600
- Conversion from degree to radian: Multiplied by π and divided by 180 (2πrd are equal to 360°)
- Only the final result of computations should be rounded (Up or Down??)

CONVERSION FACTORS

- 3.1NM=? m
- 3600m=? Ft
- 10000Ft=? m
- 5.4NM=? Ft
- 210Kt= ? m/s
- 185Kt= ? Km/hr
- 400 Km/hr= ? Kt
- 131 degree = ? Rad
- 2.18734Nm=? NM(round up to 0.1Nm)
- 2.18734NM=? NM(round down to 0.1NM)
- 2.18734Nm=? NM(round up to 0.01Nm)
- 2.18734NM=? NM(round down to 0.01NM)

UNIT OF MEASUREMENT

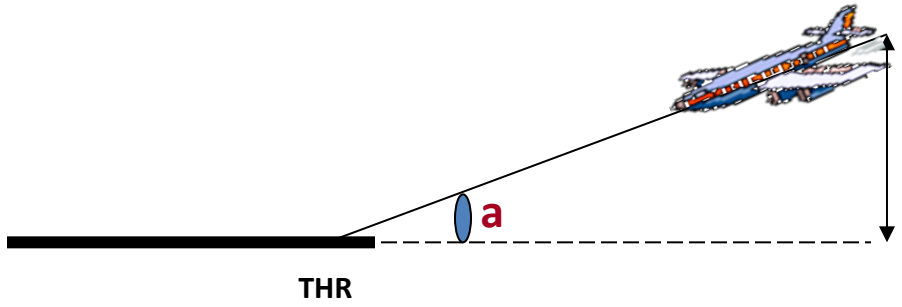
On the Instrument Approach Chart, aeronautical units are normally expressed in:

- ✈ Horizontal distance in nautical mile (NM)
- ✈ Vertical distance in feet (ft)
- ✈ Rate of descent in feet per minute (ft/min)
- ✈ Gradient of slope in percentage (%)
- ✈ Time in minutes and seconds (min & sec)
- ✈ Speed in knots (kt)
- ✈ Angle in degrees (°)

UNIT OF MEASUREMENT

✈Gradient of Slope is normally expressed in Percentage (%)

✈For Final Approach, the slope is also calculated by using the Tangent of the Angle between trajectory and the horizontal plane corresponding to Threshold Elevation



Slope in % = Tan a x 100

✈Question: For a 3° descent angle, what is the slope in %?

PROCEDURE UPDATE

- Modification of airport infrastructure
- Modification of navaids (type, location….)
- New aircraft category
- Modification of the surrounding environment
- Noise abatement requirements
- Modification of design criteria

Aerodrome Reference Code ~ Annex 14

Table 1-1. Aerodrome reference code

(see 1.7.2 to 1.7.4)

Code element 1		Code element 2		
Code number (1)	Aeroplane reference field length (2)	Code letter (3)	Wingspan (4)	Outer main gear wheel span[a] (5)
1	Less than 800 m	A	Up to but not including 15 m	Up to but not including 4.5 m
2	800 m up to but not including 1 200 m	B	15 m up to but not including 24 m	4.5 m up to but not including 6 m
3	1 200 m up to but not including 1 800 m	C	24 m up to but not including 36 m	6 m up to but not including 9 m
4	1 800 m and over	D	36 m up to but not including 52 m	9 m up to but not including 14 m
		E	52 m up to but not including 65 m	9 m up to but not including 14 m
		F	65 m up to but not including 80 m	14 m up to but not including 16 m

a. Distance between the outside edges of the main gear wheels.


Questionsss?