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.				

TURN

Doc 8168: VOL II Part I

Section 2 Chapter 3

ICAO APAC FPP

OBJECTIVE

- The trainee should be capable:
  - to construct the inner boundary protection of a turn.
  - to construct the outer boundary protection of a turn.
  - to link between two segments.

USE OF TURNS

- No Procedure without turns
- Turns are always involved in different segments
- Conventional turns always unguided

TURN AREA CONSTRUCTION

- **Wind Spiral**
  - derived from the still air radius of turn (r).
  - wind effect E_θ for the time taken to change heading by θ degrees
- **Bounding Circles**
  - alternative to the wind spiral, a simplified method
  - the wind effect (E) used always that of a course change of 90° .
- **Circular Arc**

USE OF TURNS

- Wind Spiral/Bounding Circles
  - Departures
  - Missed approach
  - Final Approach Fix (>10°)
  - RNAV Turns at IAF and IF (>30°)
- Circular Arc

PARAMETERS

- Altitude. (appropriate selection)
- Indicated airspeed (IAS).
- Bank angle (α).
- Wind.
- Flight technical tolerances

CALCULATIONS

- *Fix tolerance.*
- *Rate of turn (R) in degrees/second*

  $R = 3\,431 \tan \alpha / \pi v$ (Max 3° /sec)

- *Radius of turn (r) at designated angle of bank in still air*

  $r = V/(20 \pi R)$ where V is the TAS.

- *Wind effect (E_θ) for change heading θ degrees, in NM.*
- *Gravity.* 9.80665 m/s^2 (68625 $NM/hour^2$).
- c pilot reaction time.

TYPE OF TURNS

- Turn at an altitude
- Turn at a designated point

❖Inner Boundary

❖Outer Boundary

TURN INNER BOUNDARY

- Turn at an altitude

➢ originates at the beginning of the **turn initiation area**

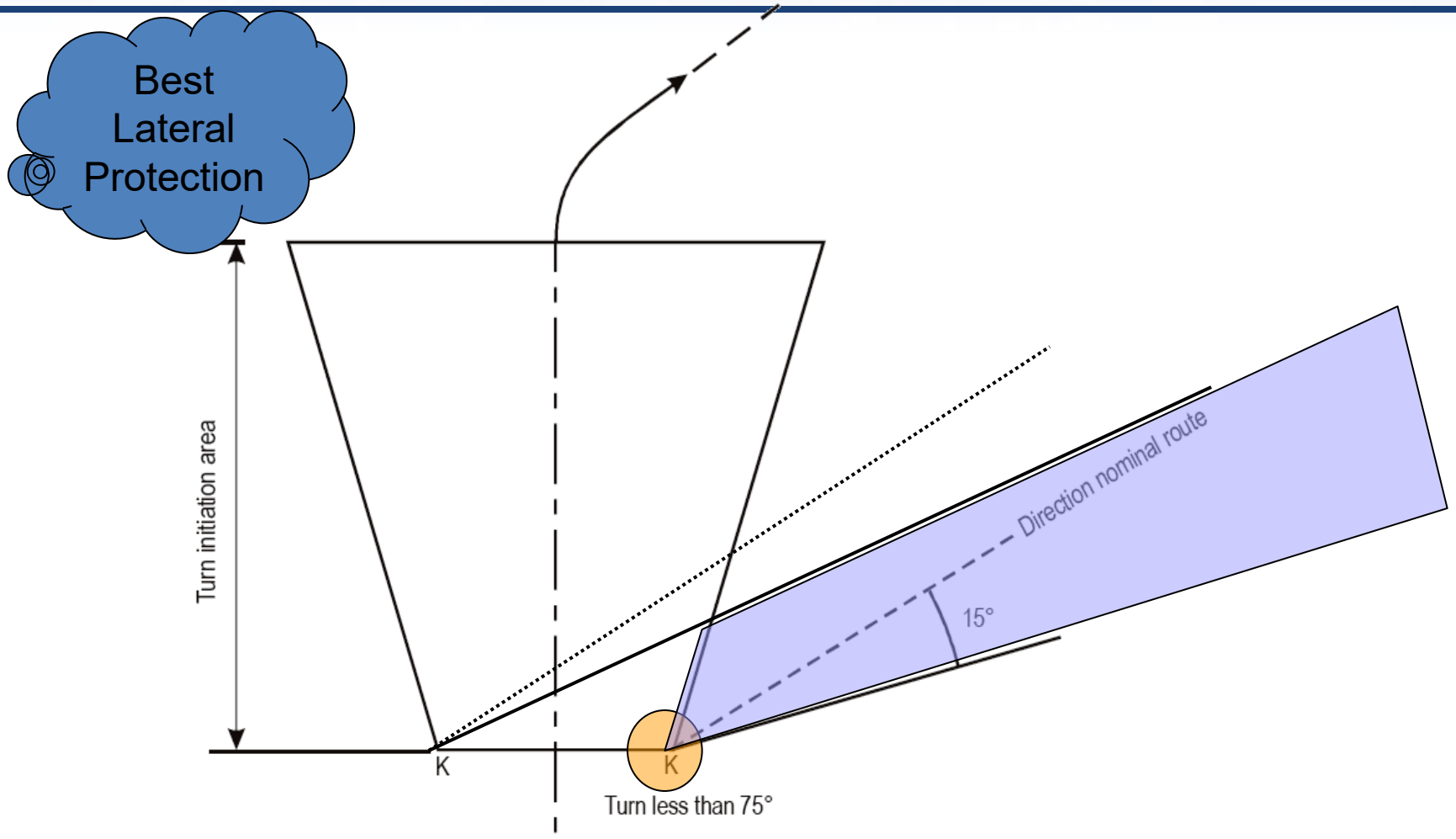
➢ from edge providing best lateral protection

- inner edge if turn < 75°
- outer edge if turn ≥ 75°

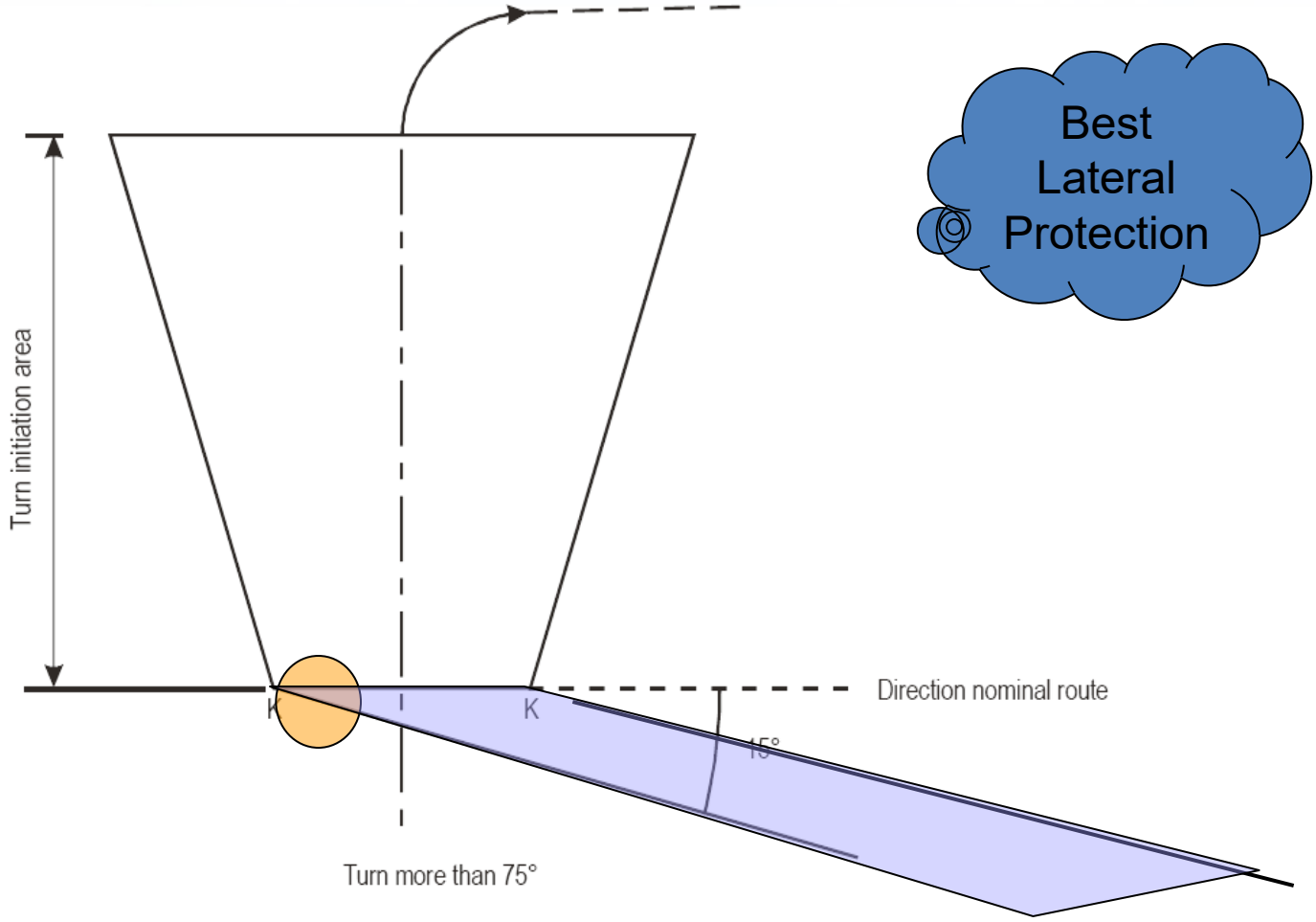
➢ diverges outwards with a splay of 15 degrees

within which the aircraft conducts a straight climb

TURN INNER BOUNDARY



TURN INNER BOUNDARY



TURN INNER BOUNDARY

- Turn at a designated point

➢ The edges of the primary and secondary areas are connected to their counterparts in the subsequent sections with the rules:

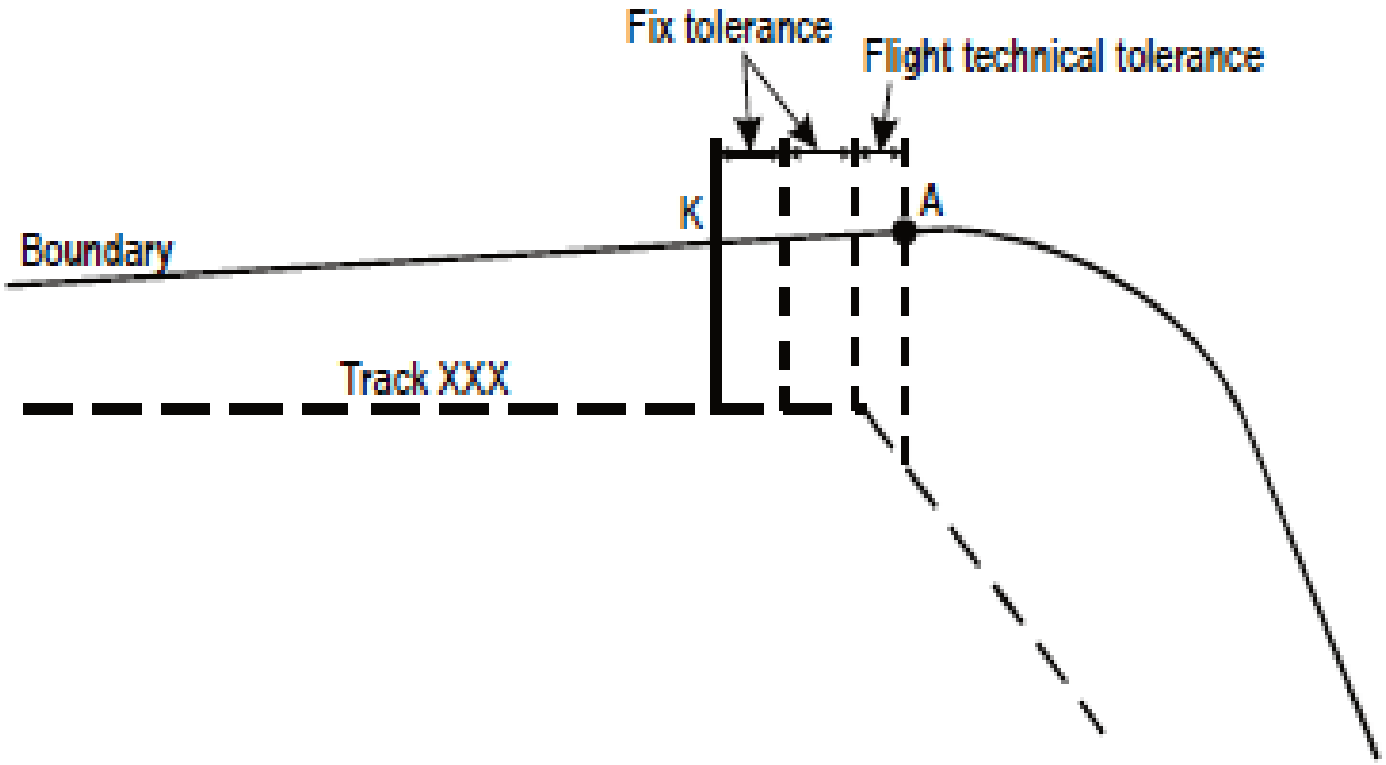
  ❖ if the point to connect is outside the protection area associated with the subsequent section, then the boundary converges with the nominal track after the turn at an angle equal to half the angle of turn (A/2); and

  ❖ if the point to connect is inside the protection area associated with the subsequent section, then the boundary diverges from the nominal track at an angle of 15 degrees.

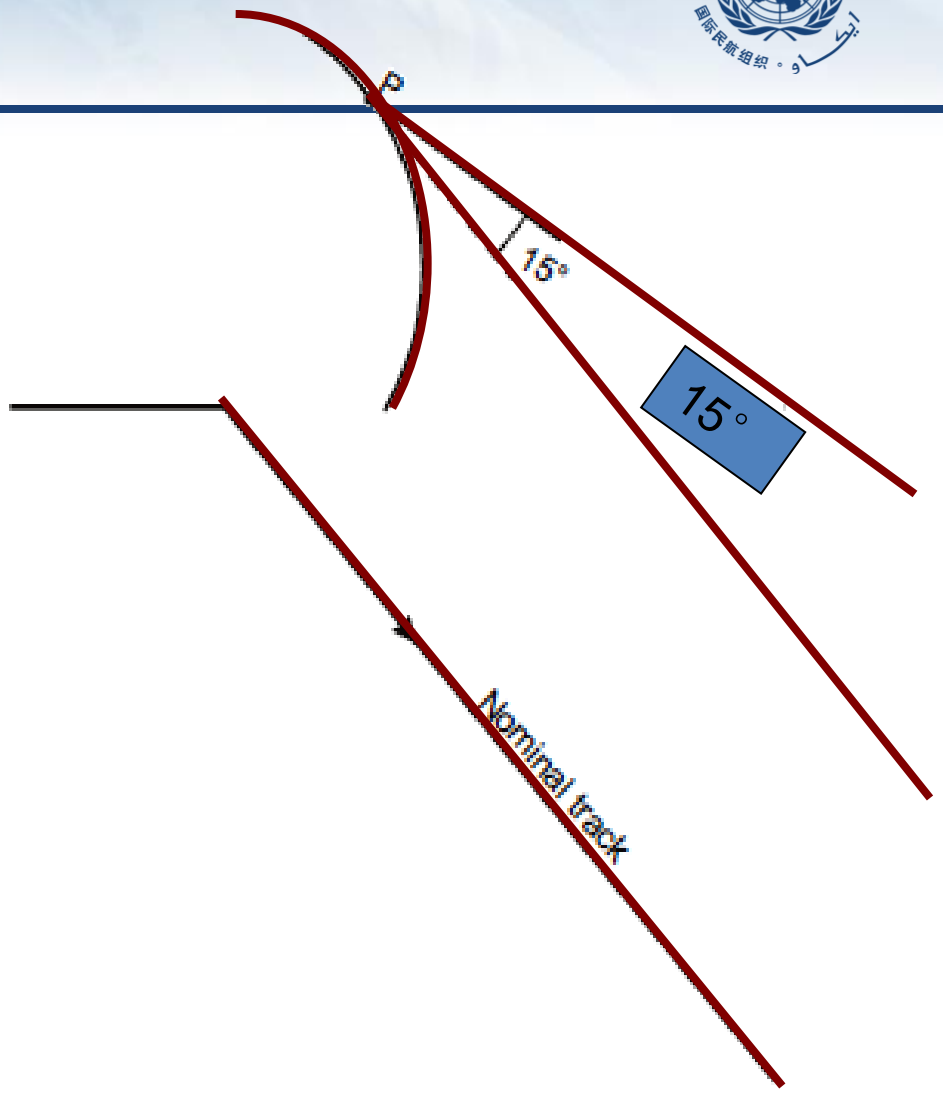
TURN OUTER BOUNDARY

- fix tolerance; and flight technical tolerance;
- wind spiral or bounding circles
- upto a point where tangent of the area becomes parallel to the nominal

TURN OUTER BOUNDARY

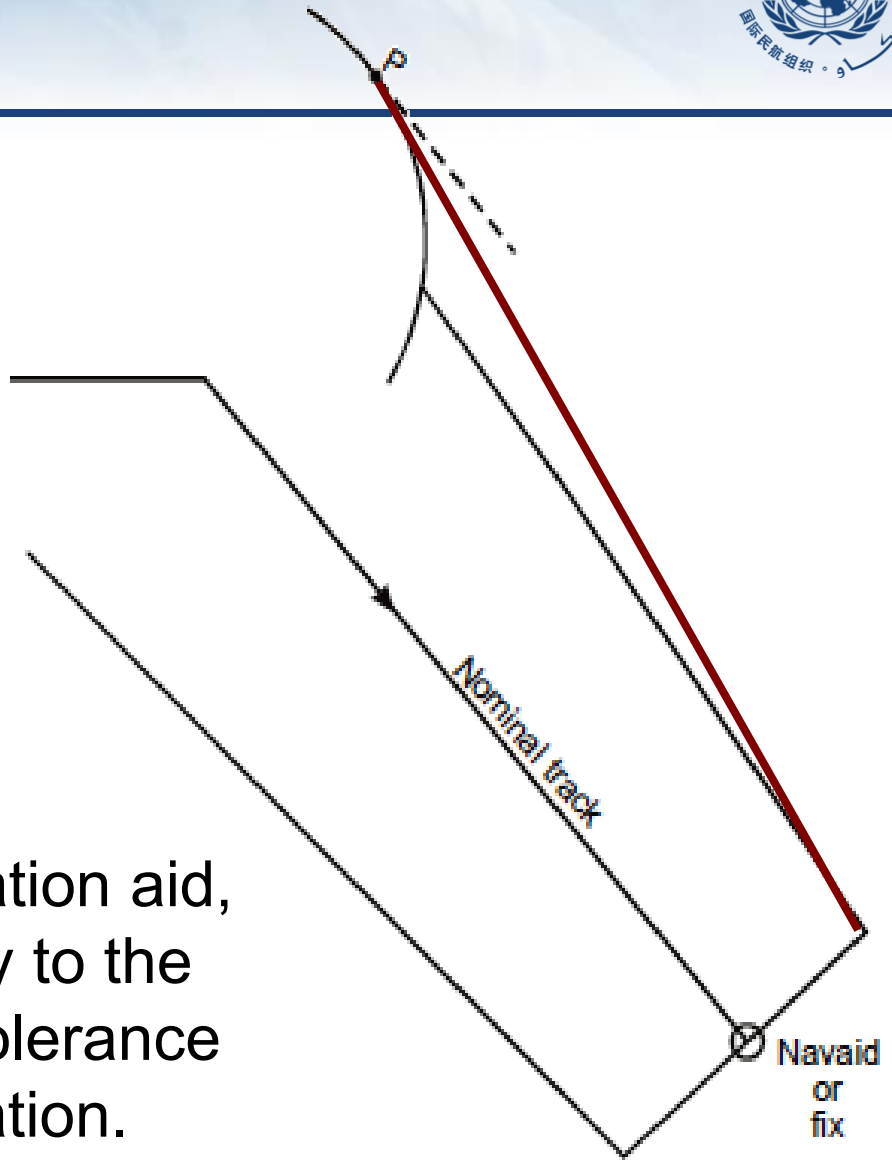


TURN OUTER BOUNDARY – NO GUIDANCE



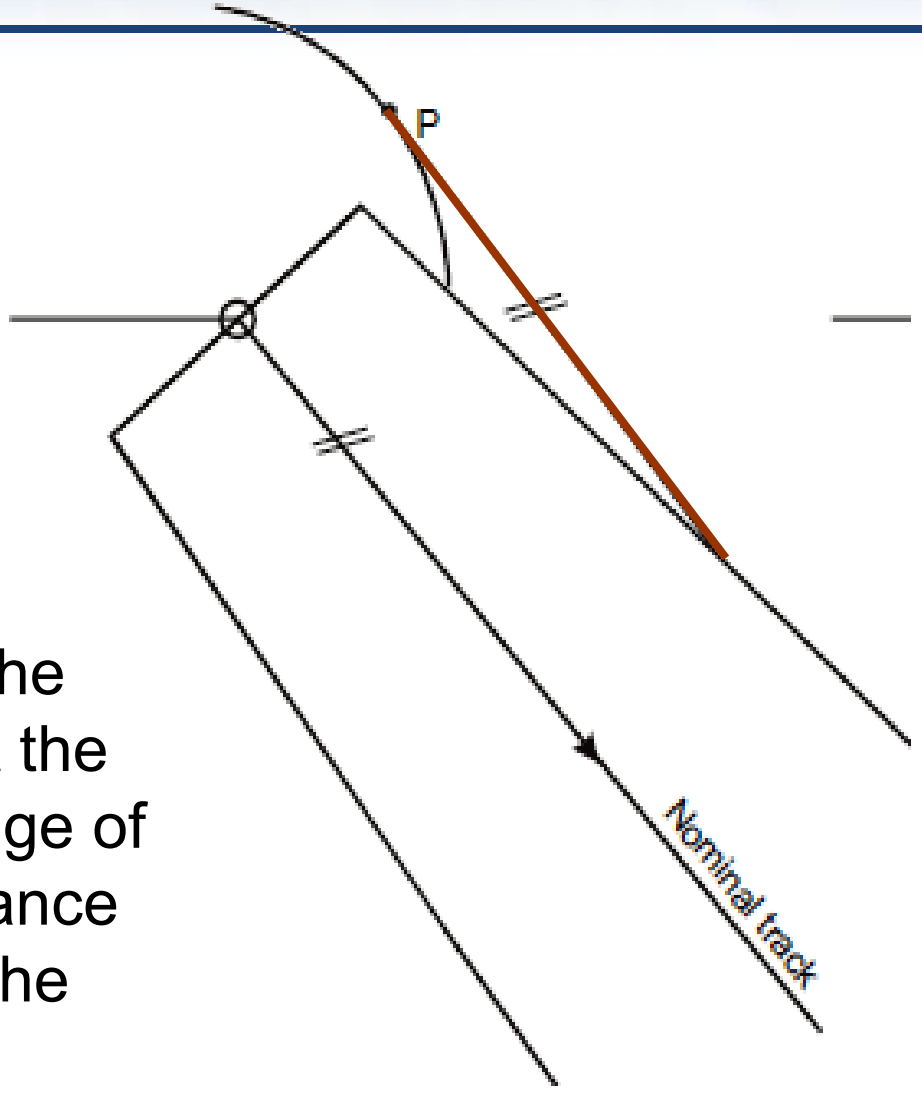
TURN OUTER BOUNDARY – GUIDANCE OUTSIDE – TOWARDS NAV AID

for flights towards the navigation aid, connect the outer boundary to the edge of the navigation aid tolerance at the navigation aid location.

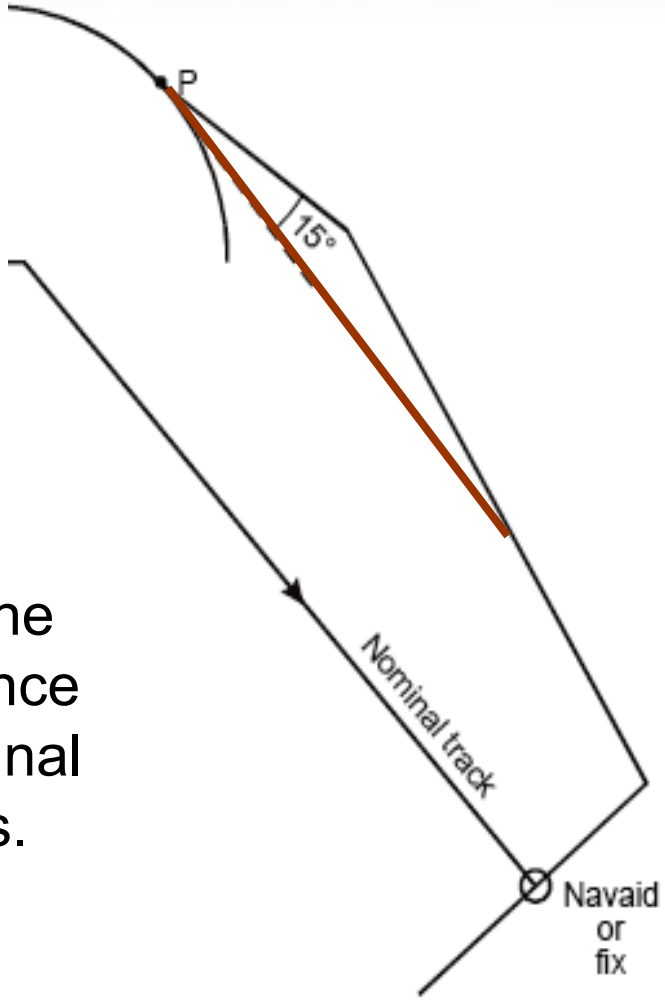


TURN OUTER BOUNDARY – GUIDANCE OUTSIDE – FROM NAV AID

for flights away from the navigation aid, connect the outer boundary to the edge of the navigation aid tolerance with a line parallel to the nominal track.

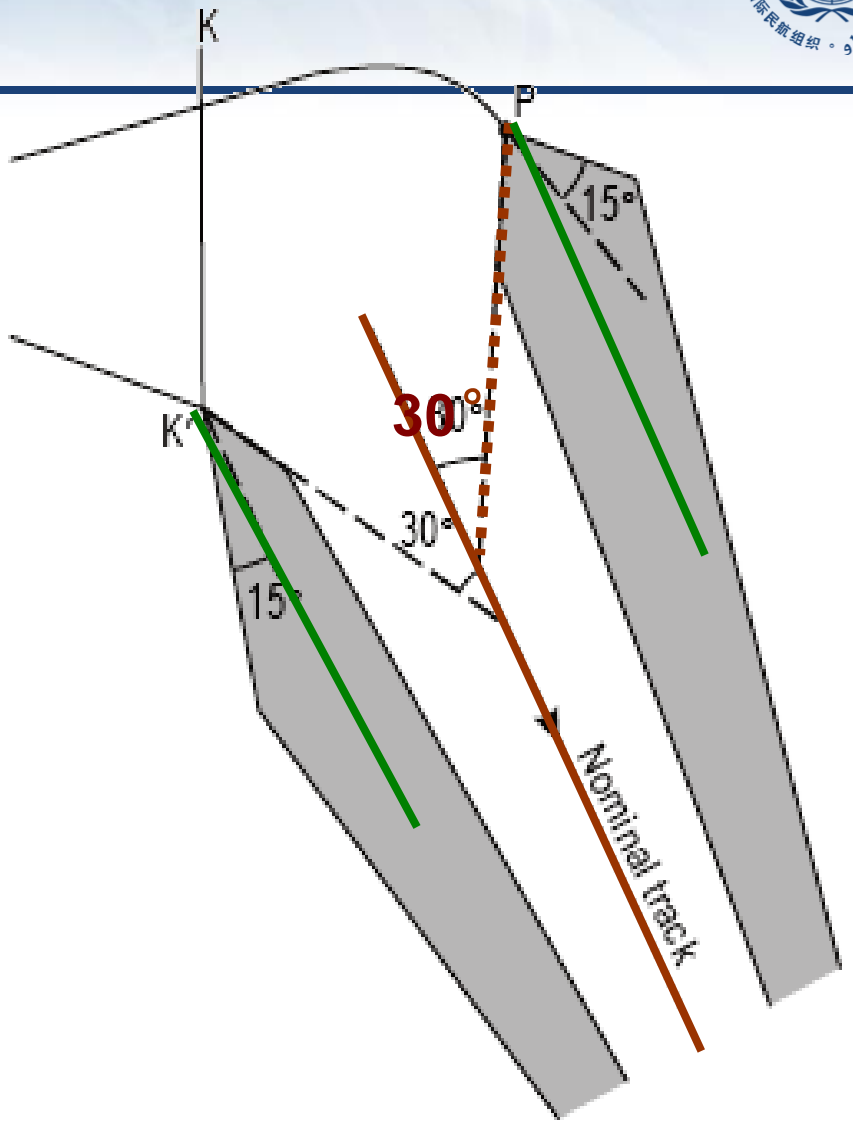


TRACK GUIDANCE
INSIDE NAVIGATION AID NAVAID OR FIX

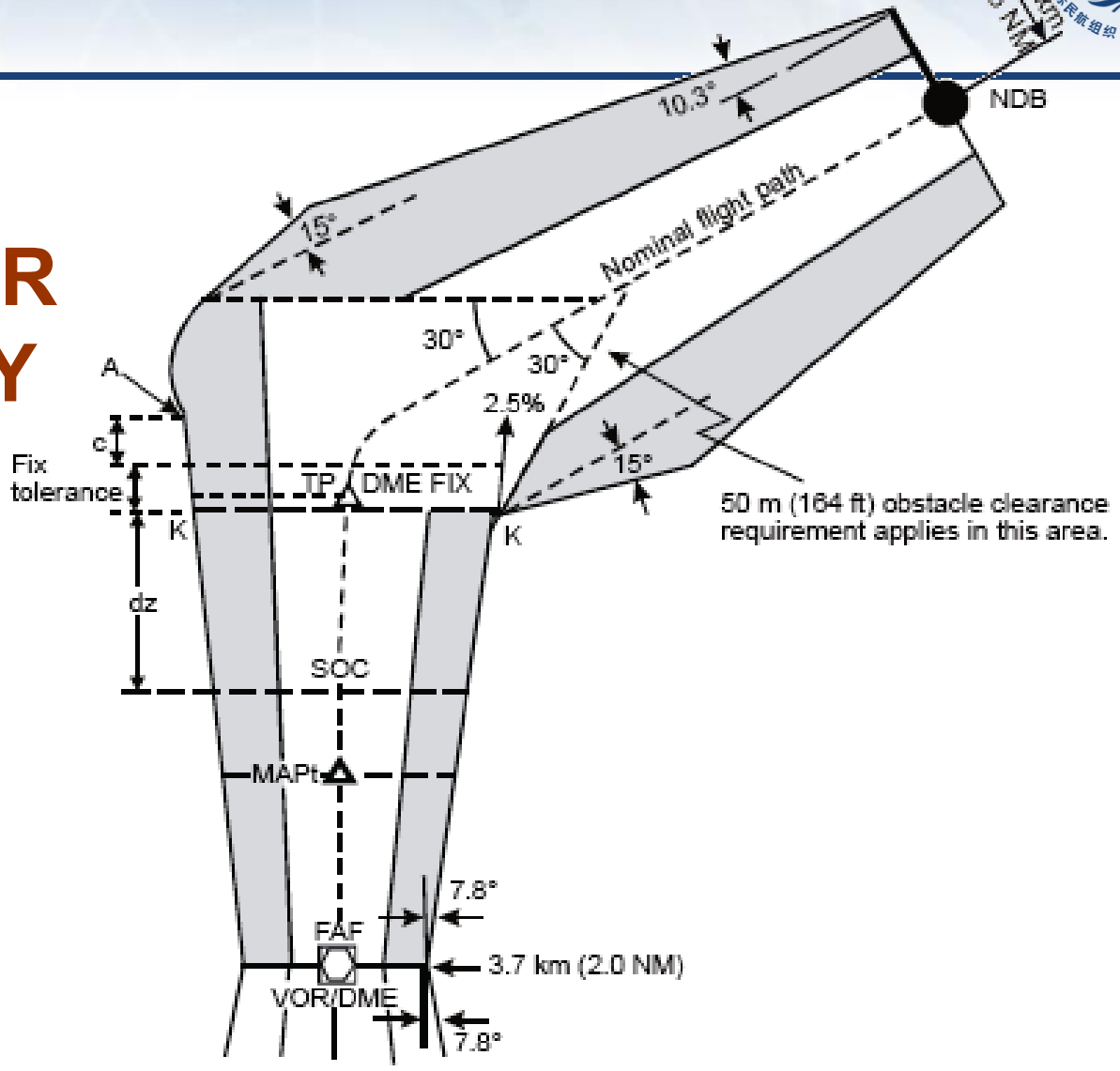


connect the outer boundary to the edge of the navigation aid tolerance with a line splayed from the nominal track at an angle of 15 degrees.

CONNECTION OF SECONDARY AREAS WITH ADDITIONAL TRACK GUIDANCE



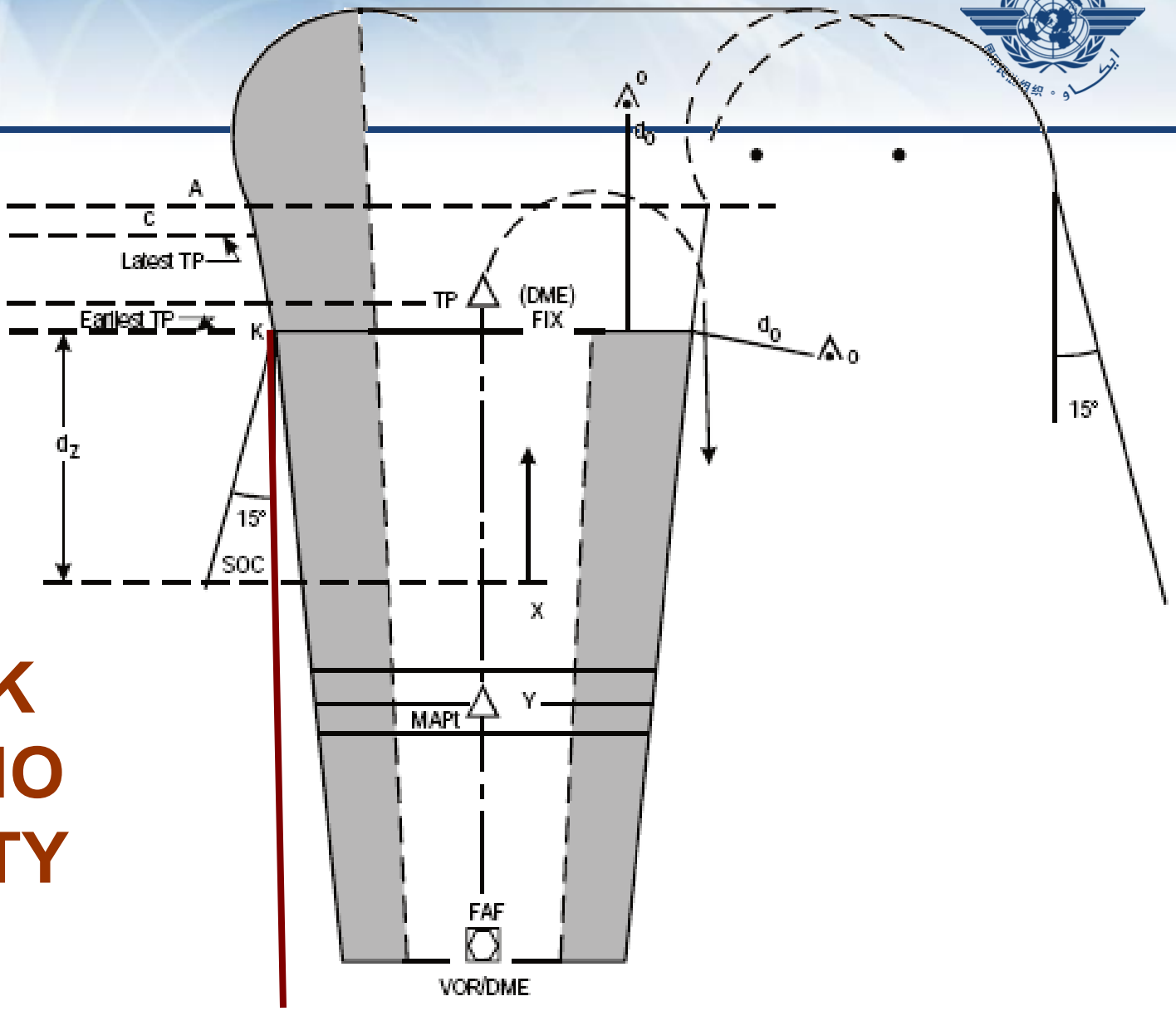
TO ANOTHER FACILITY



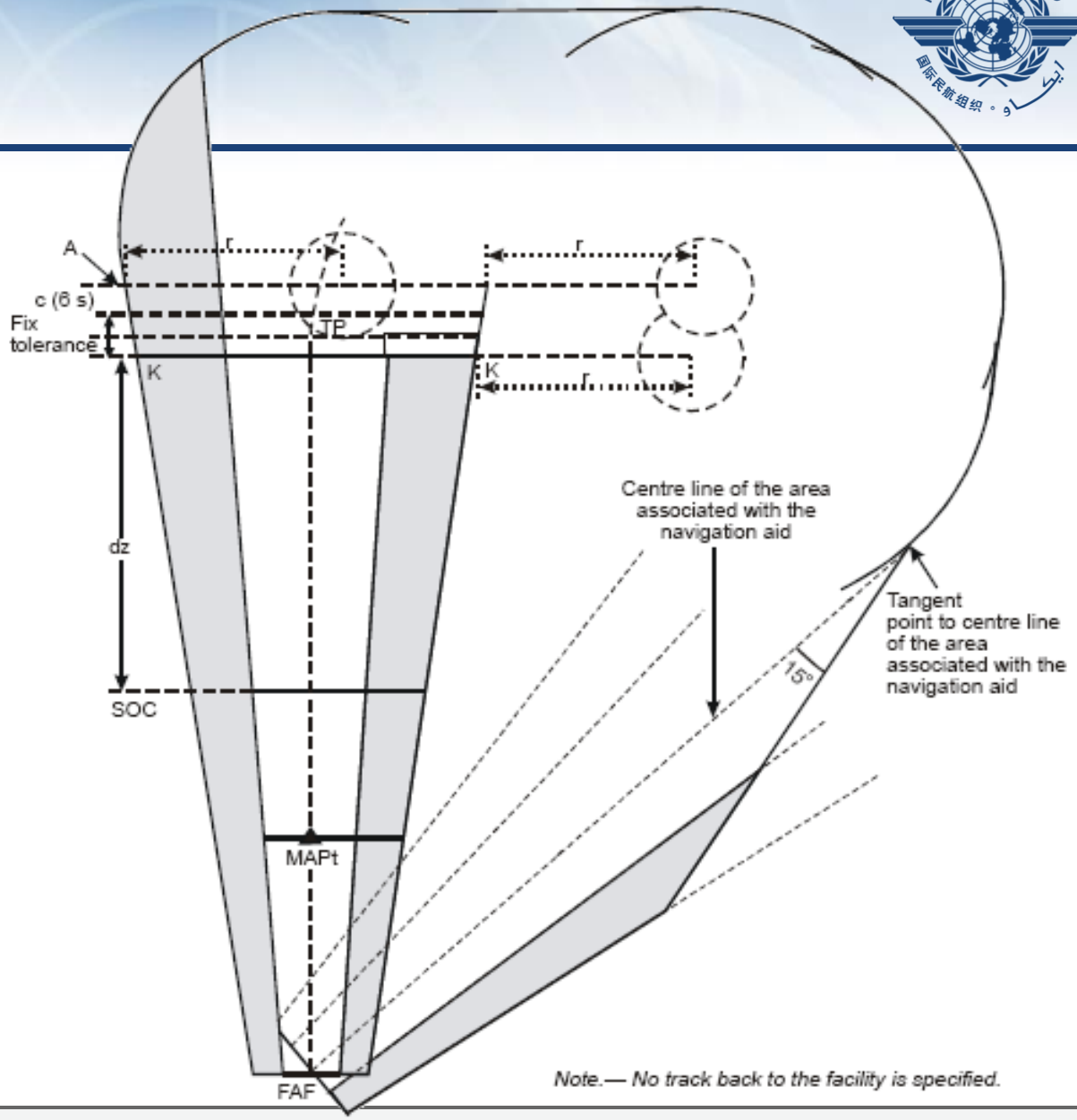
PARTICULAR CASES

- Turns more than 90° return towards FAF

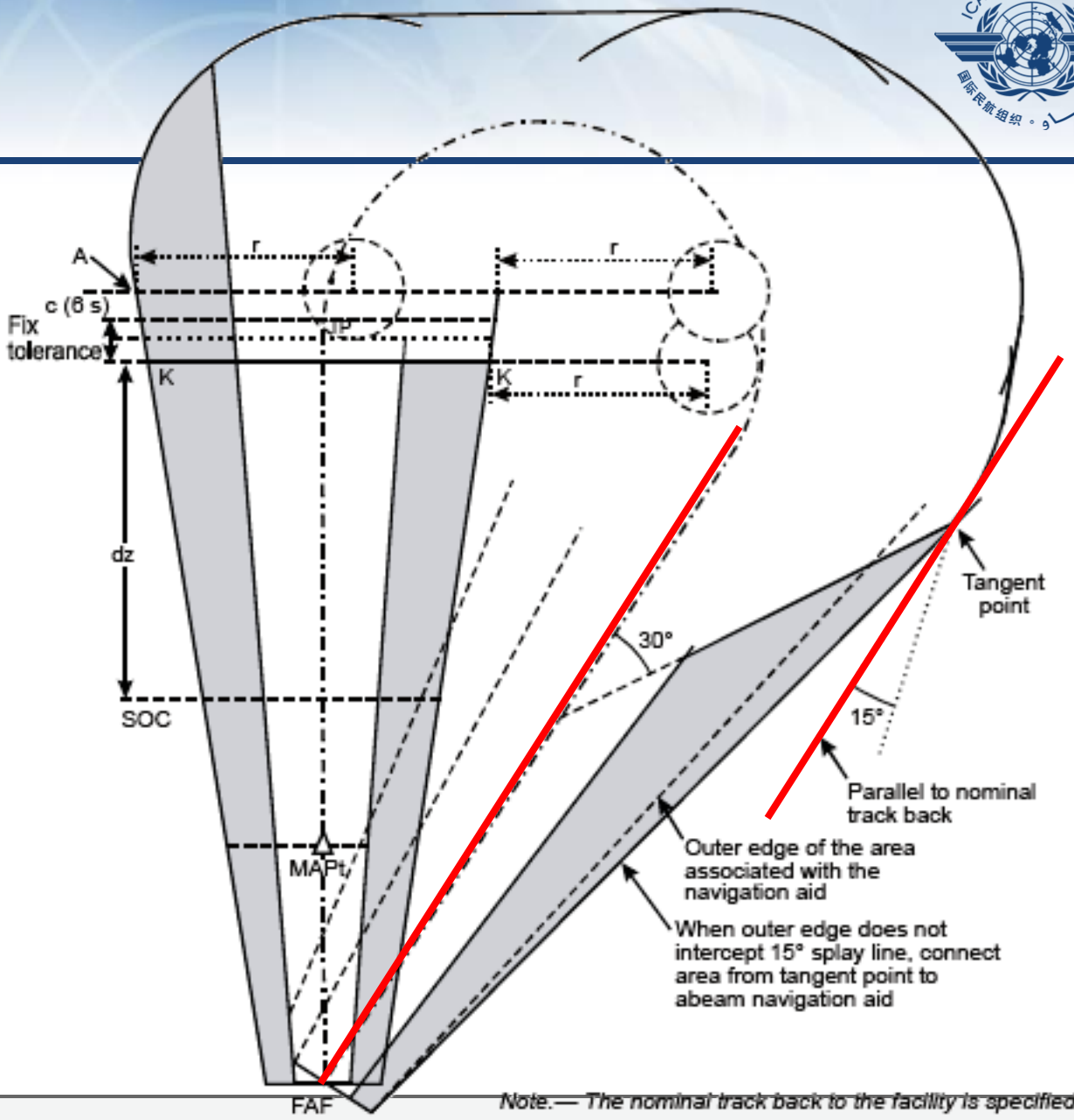
TRACK WITH NO FACILITY



NO TRACK BACK TO FACILITY

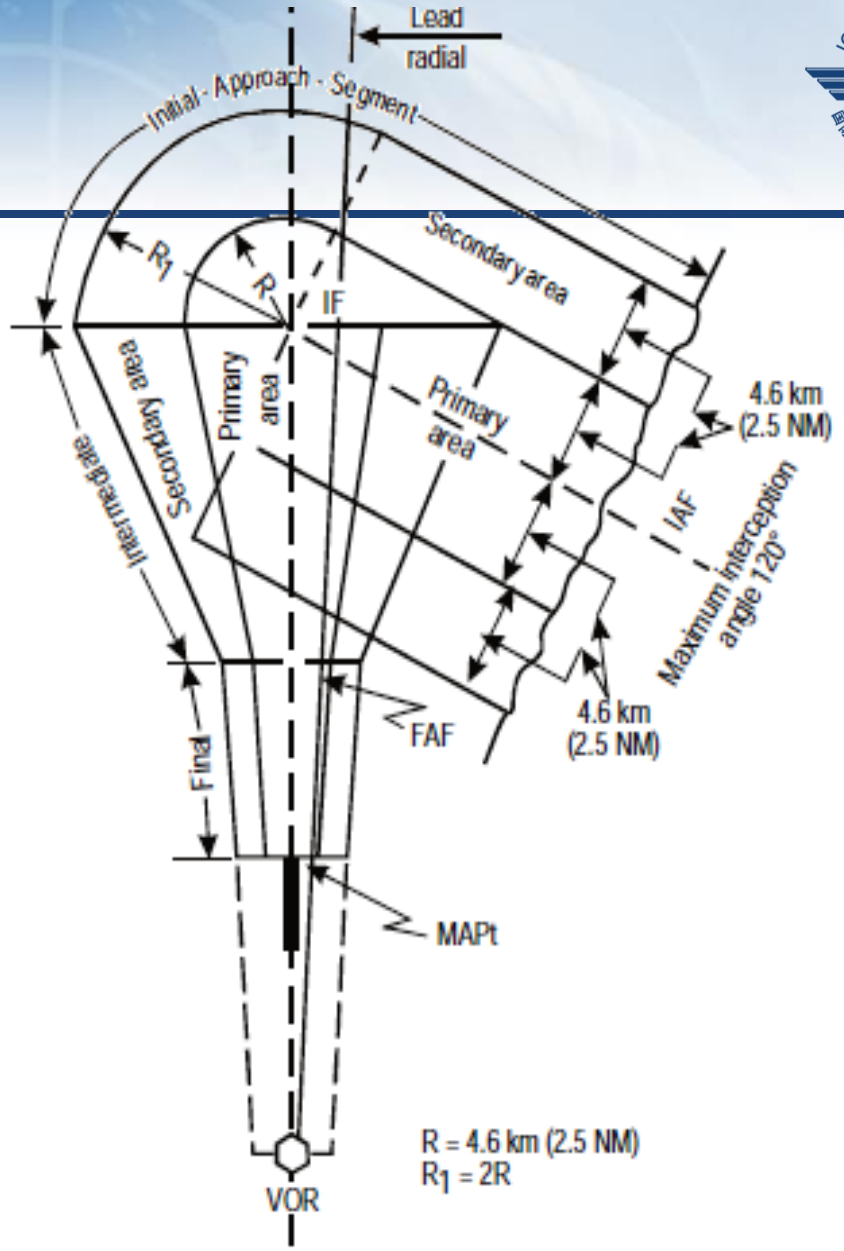


TRACK BACK TO FACILITY

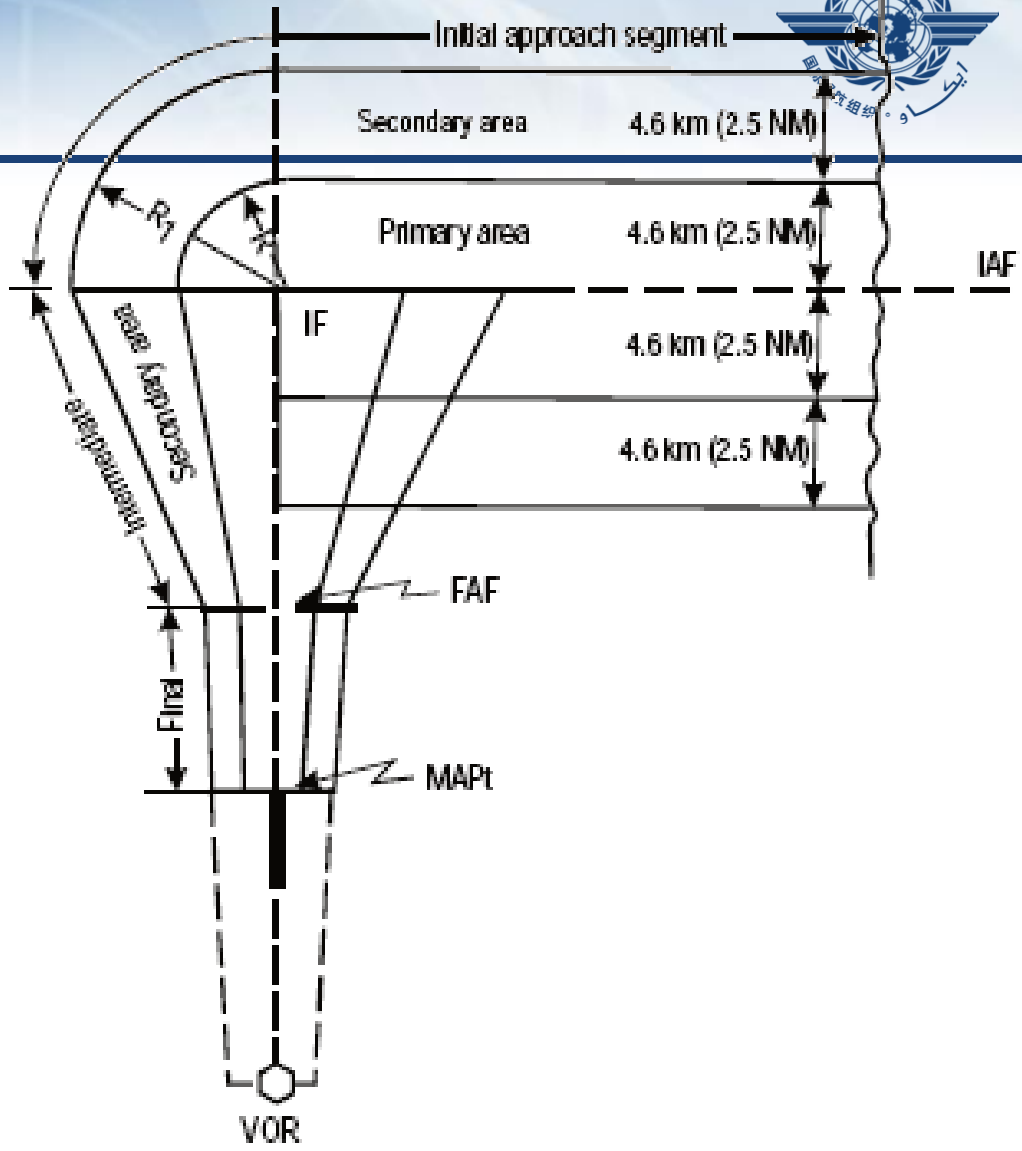


Note.— The nominal track back to the facility is specified.

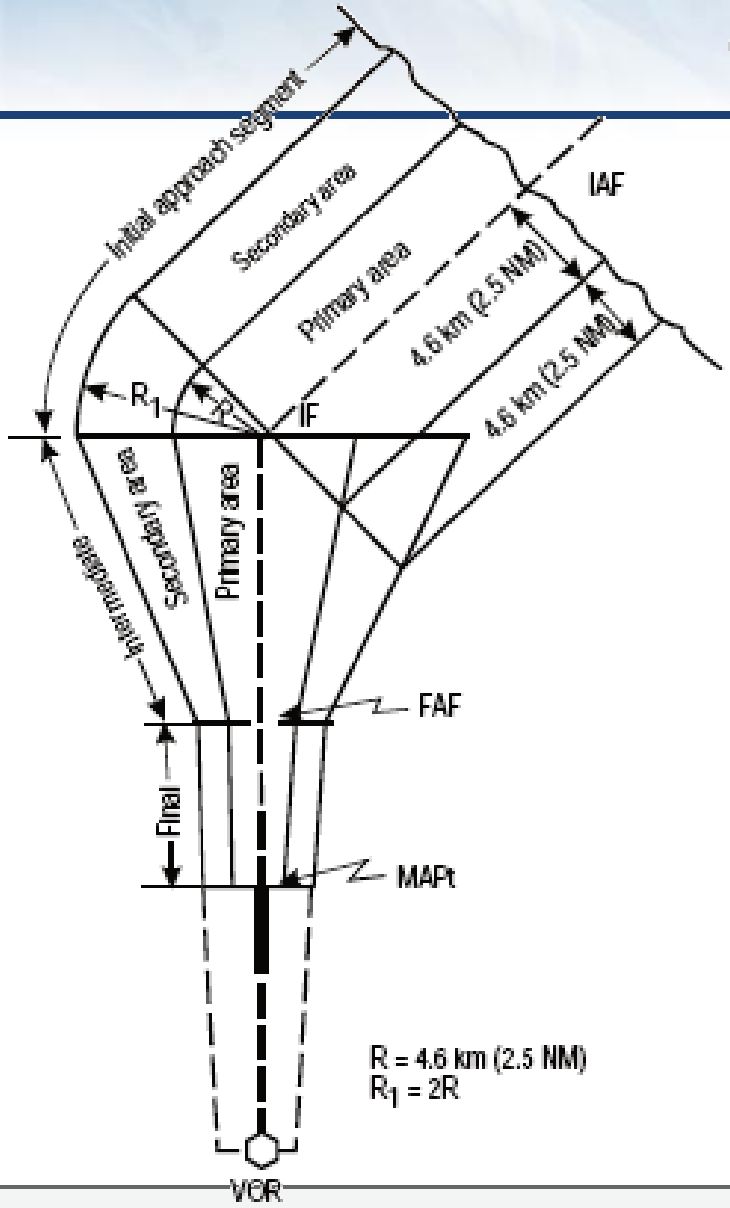
TURN AT INTERMEDIATE FIX



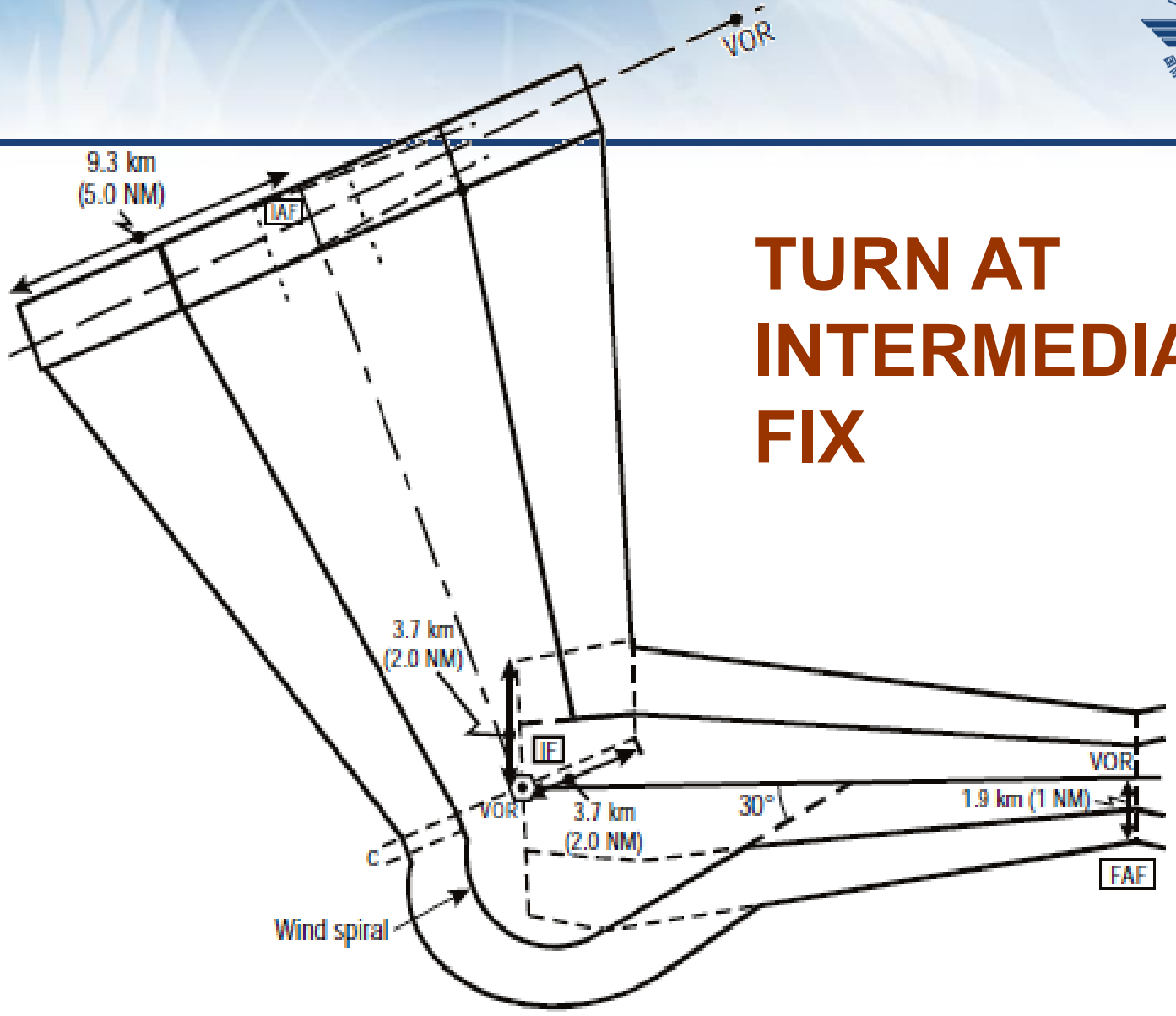
TURN AT INTERMEDIATE FIX



TURN AT INTERMEDIATE FIX



TURN AT INTERMEDIATE FIX




Questionsss?
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