

COURSE NAME : ANNEX 14



HOMA Aviation Training Center
مرکز آموزش های هوایی همالا



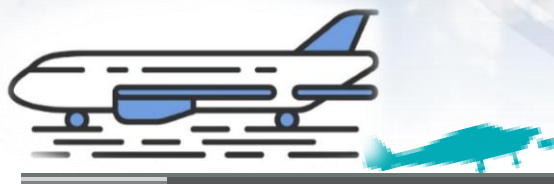
Amir Ahmad Toopchi



Annex 14 to the Convention on International Civil Aviation

Aerodromes

Volume I
Aerodrome Design and Operations
Ninth Edition, July 2022



Annex 14 to the Convention on International Civil Aviation

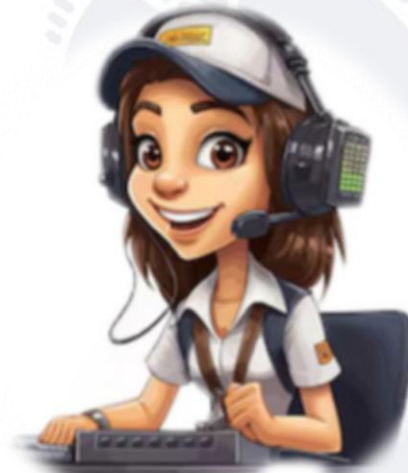
Aerodromes

Volume II
Heliports
Fifth Edition, July 2020





who is this course for?





Why attended ? What is it for me?



Familiar with ICAO ANNEX14 and their objective

Familiar with AERODROME and its structure

Importance rules of design aerodrome in aviation





Module objective

This module learns to us about aerodrome and runway characteristic's in civil aviation and gets good foundation of definitions that used in aerodromes.



90 min





Lesson Plans

Lesson plan

Upon completion of this module learners will be able to:

- 1- Explain definitions related to aerodrome , runway, runway conditions, PCR,ACR and other shapes and signs and marking in aerodrome
- 2- define clearway, STOPWAY, TORA,TODA,LDA,ASDA, and explain color in signs and lights in aerodrome surface









Aerodrome. A defined area on **land** or **water** (including any *buildings*, *installations* and *equipment*) intended to be used either wholly or in part for the *arrival*, *departure* and *surface movement* of aircraft.

'Airfield': a defined area of **grass** on which runways may be marked out or the direction of landing is indicated (an airfield is exactly that: a field (usually unprepared) which is **occasionally used as a landing ground for aeroplanes**).

'Airport': a point of entry or exit from a country by air, that may have several defined **paved runways**.

The accepted and legally correct term is an aerodrome.

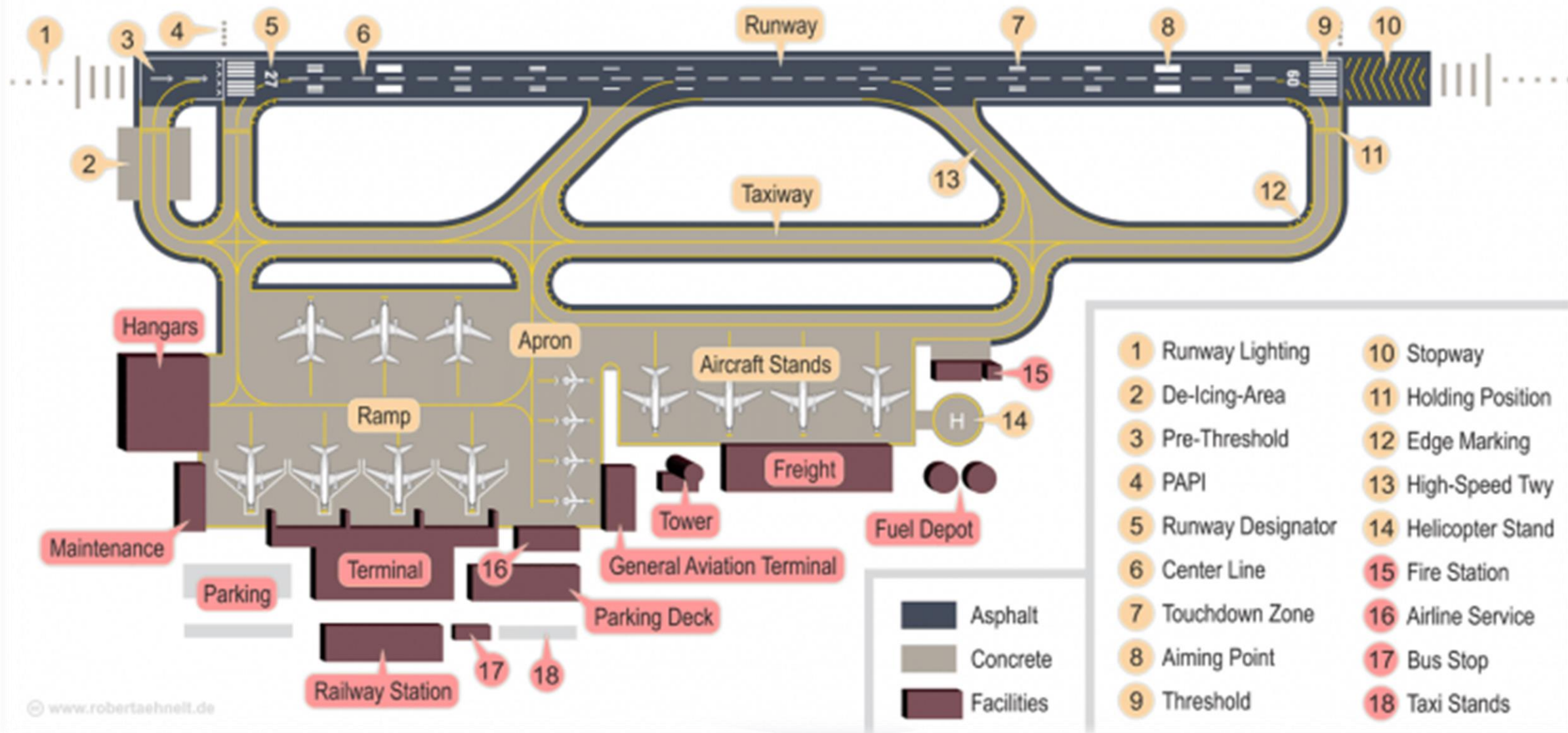


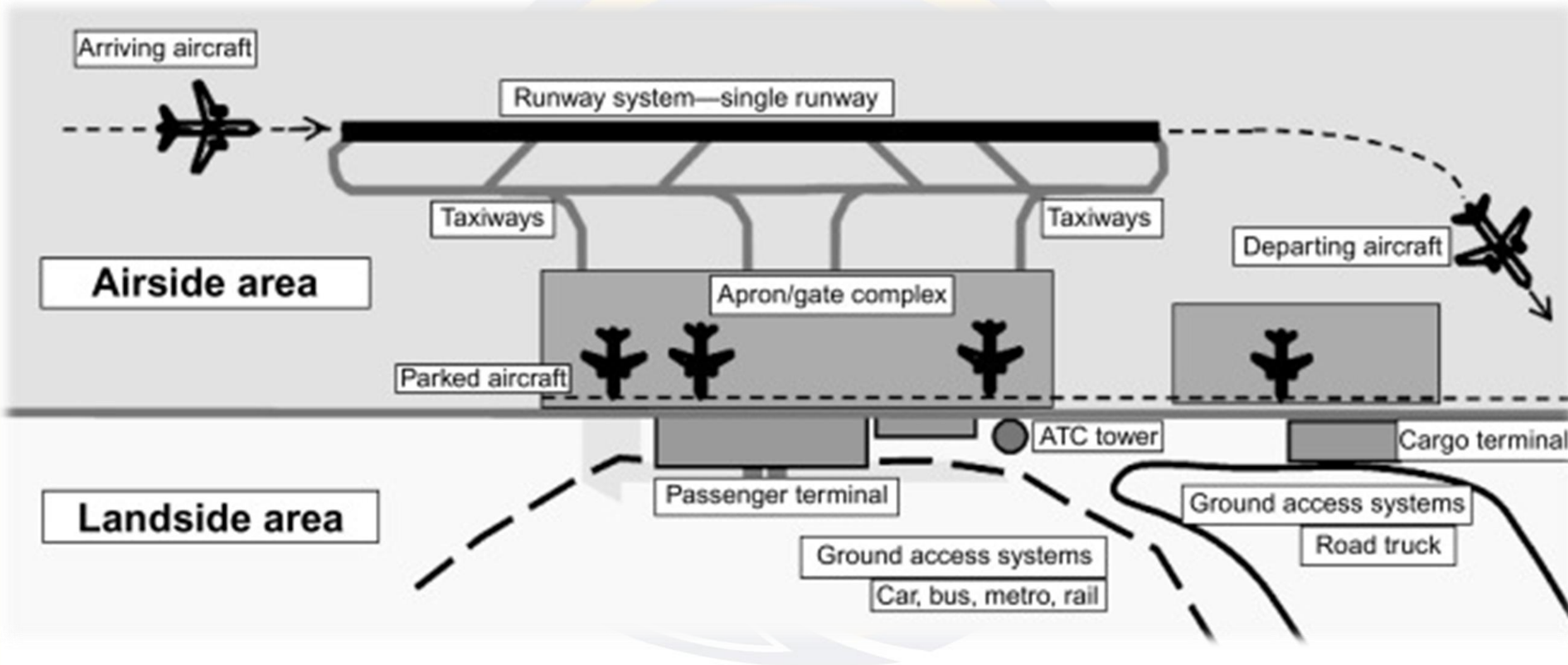










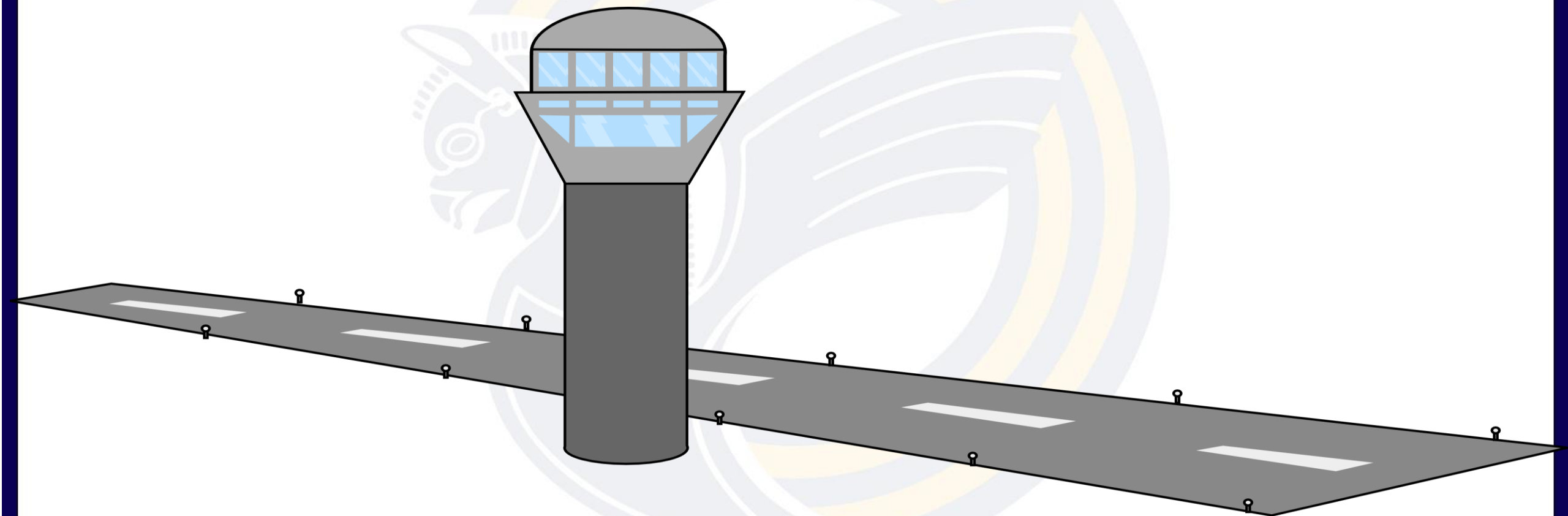




Runway

A defined **rectangular** area on a **land** aerodrome prepared for the landing and take-off of aircraft.







Threshold. The beginning of that portion of the runway usable for landing.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first *contact the runway*.

Touchdown. The point where the nominal glide path intercepts the runway.

Note.— “Touchdown” as defined above is only a datum and is not necessarily the actual point at which the aircraft will touch the runway. (Doc4444)





- **Aerodrome elevation.** The elevation of the **highest** point of the **landing area**.
- **Landing area.** That part of a **movement area** intended for the landing or take-off of aircraft.

Movement area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, including aprons.

Manoeuvring area. That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.





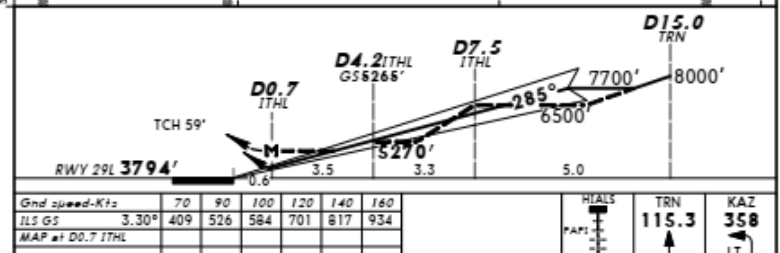
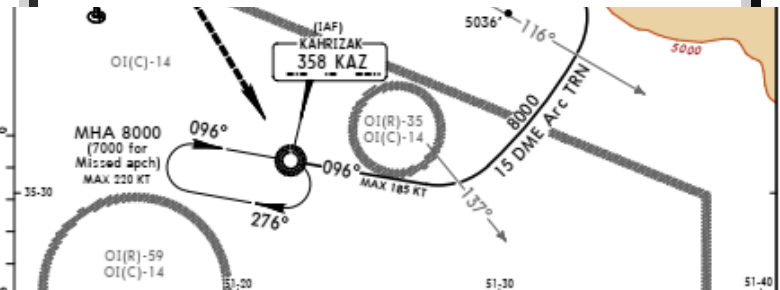
- **Aerodrome elevation.** The elevation of the **highest** point of the landing area.



JEPPESSEN
 OIII/THR MEHRABAD INTL 24 AUG 12 (11-4) TEHRAN, IRAN ILS-4 Rwy 29L

ATIS	MEHRABAD Approach (R)	MEHRABAD Tower	Ground
128.0	119.7 125.1	124.45 126.1	121.9
LOC ITHL	Final Appch Crs	G5 DA(H)	DA(H)
109.9	285°	5265' (1471')	4040' (246')
MISSED APCH: Climb STRAIGHT AHEAD to VOR, then to 10,000' to KAZ NDB to join holding at 7000'.		Apt Elev 3962'	RWY 3794'
Alt Set: hPa		Rwy Elev: 131 hPa	Trans level: FL 110 Trans alt: 9000' MSA TRN VOR

Apt Elev 3962'



STRAIGHT-IN LANDING RWY 29L		CIRCLE-TO-LAND	
ILS		LOC (GS out)	
DA(H) 4040' (246')		MDA(H) 4450' (656')	
FULL		ALS out	
A		RVR 1500m VIS 1600m	
B		4560' (598')	
C		2000m 2800m	
D		4560' (598')	
E		2400m 3200m	
F		4660' (698')	
G		3600m	

After LOC (GS out): VIS 2800m.
 CHANGES: Minimums. © JEPPESSEN, 2012. ALL RIGHTS RESERVED.

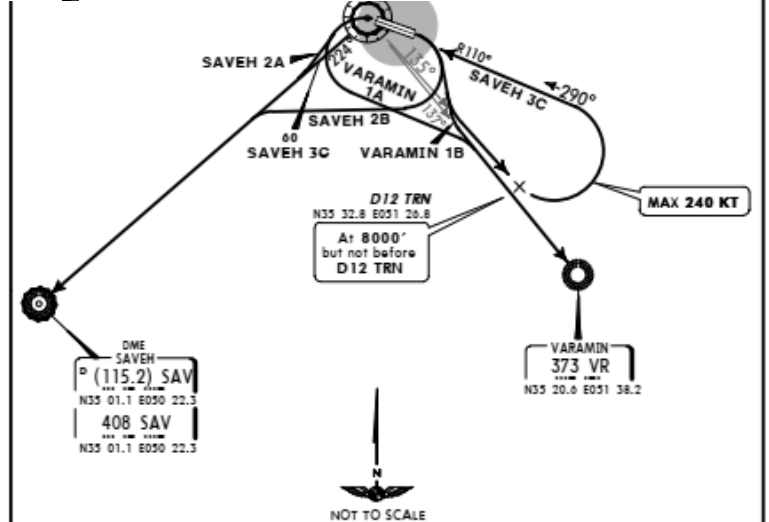
JEPPESSEN
 OIII/THR MEHRABAD INTL 3 JUN 11 (10-3E) TEHRAN, IRAN SID

Apt Elev 3962'	Trans level: FL110 Trans alt: 9000'
----------------	-------------------------------------

SAVED 2A [SAV2A]
 MEHRABAD INTL [MIVA2A], MIVAK 1B [MIVA1B], MIVAK 1B [NAGM1B], RIVALS, OW FL200, 25 DME, 140

Direct distance from Mehrabad Intl to VR: 26 NM

Apt Elev 3962'



SID	RWY	ROUTING
SAVED 2A	29L/R	Turn LEFT, intercept TRN R-224 to SAV, climb to cleared FL.
SAVED 2B	11L/R	Turn RIGHT, intercept TRN R-224 to SAV, climb to cleared FL.
SAVED 3C		Turn RIGHT, intercept TRN R-135, at 8000', but not before D12 TRN turn LEFT, intercept TRN R-110 inbound to TRN, TRN R-224 to SAV, climb to cleared FL.
VARAMIN 1A	29L/R	Turn LEFT, intercept TRN R-137 to VR, climb to cleared FL.
VARAMIN 1B	11L/R	Turn RIGHT, intercept TRN R-137 to VR, climb to cleared FL.

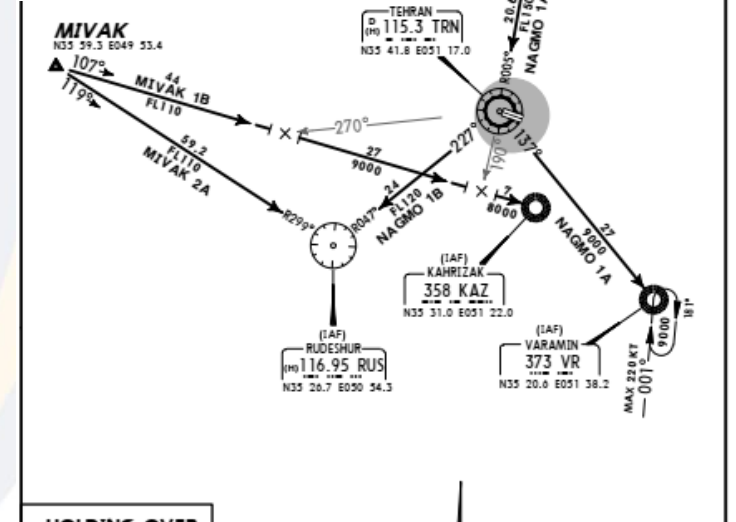
CHANGES: Transition level. © JEPPESSEN, 2007, 2011. ALL RIGHTS RESERVED.

HOMAviation Training Center
 مرکز آموزش های هوایی هوما
 OIII/THR MEHRABAD INTL 18 MAY 12 (10-2A) TEHRAN, IRAN STAR

ATIS	Apt Elev 3962'	Alt Set: hPa	Trans level: FL110 Trans alt: 9000'
109.9	3962'	131 hPa	Actual descent clearance will be as directed by ATC.

SAVED 2A [MIVA2A], MIVAK 1B [MIVA1B], MIVAK 1B [NAGM1B], RIVALS, OW FL200, 25 DME, 140

Apt Elev 3962'

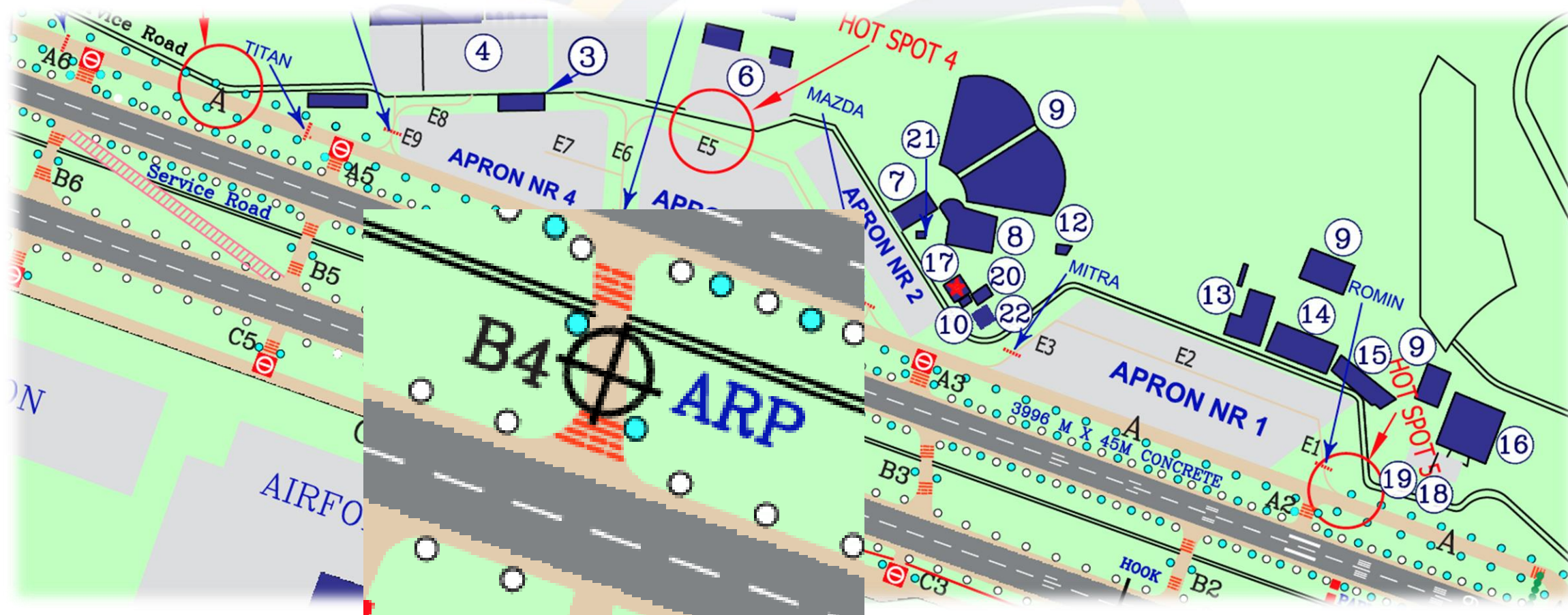


STAR	ROUTING
MIVAK 2A	At MIVAK intercept TRN R-299 inbound to RUJ.
MIVAK 1B	At MIVAK intercept 107° bearing to KAZ.
NAGMO 1A	At NAGMO intercept TRN R-005 inbound to TRN, TRN R-137 to VR.
NAGMO 1B	At NAGMO intercept TRN R-005 inbound to TRN, TRN R-227 to RUJ.

CHANGES: VR holding. © JEPPESSEN, 2004, 2012. ALL RIGHTS RESERVED.

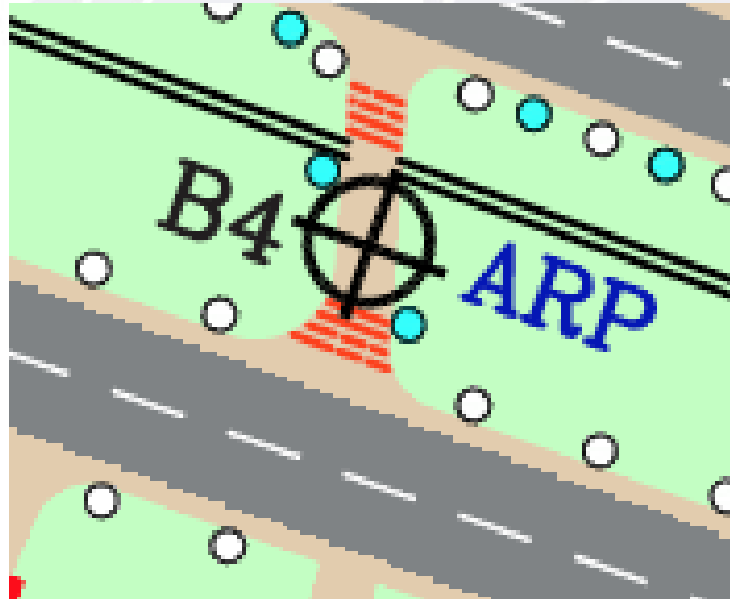


- **Aerodrome reference point.** The designated geographical location of an aerodrome.





- The **aerodrome reference point (ARP)** provides the aerodrome's position in terms of coordinates; its geographic position in longitude and latitude. These coordinates are provided in degrees, minutes, and seconds, and they form the basis for the aerodrome's position published on maps and charts.





Aeronautical ground light. Any light specially provided as an aid to air navigation, **other than a light displayed on an aircraft.**





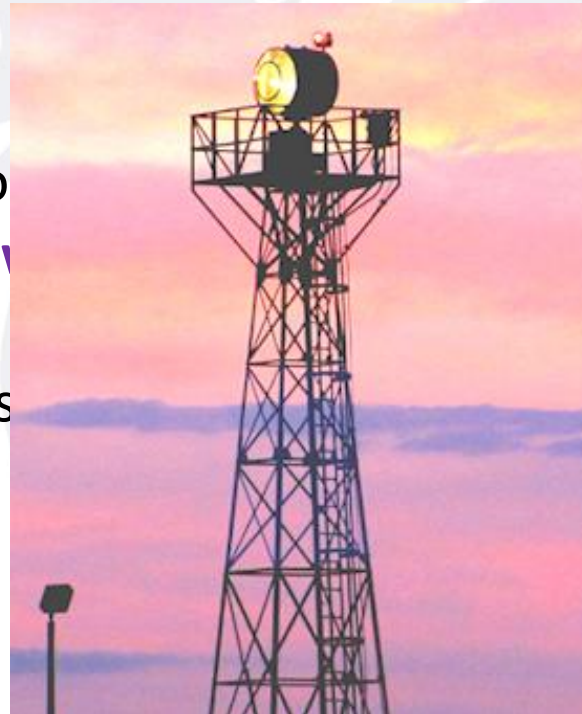
Aerodrome beacon. Aeronautical beacon used to indicate the **location of an aerodrome** from the air.





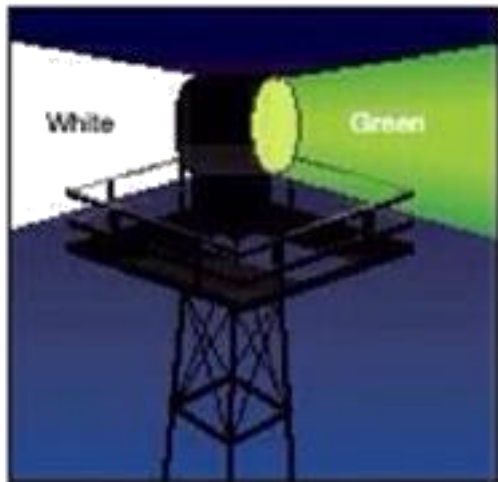
Location

5.3.3.4 The aerodrome beacon shall be located **on or adjacent** to the aerodrome in an area of low ambient background lighting.

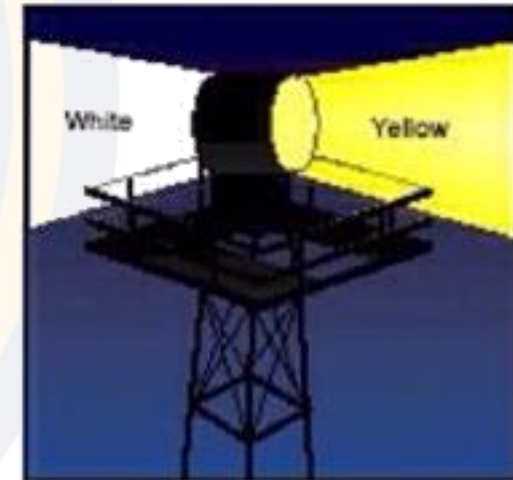




Where used, the **coloured flashes** emitted by beacons at **land aerodromes** shall be **green**, and coloured flashes emitted by beacons at **water aerodromes** shall be **yellow**.



Land aerodrome

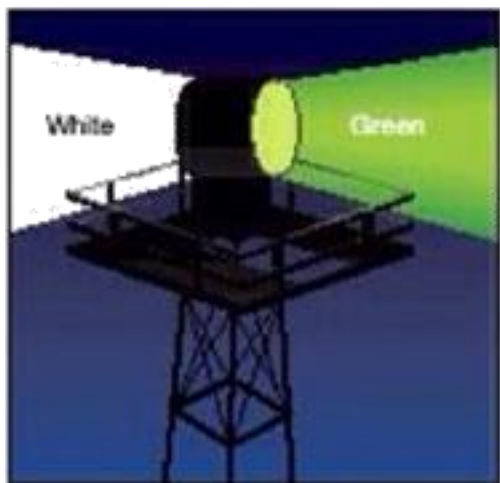


Water aerodrome

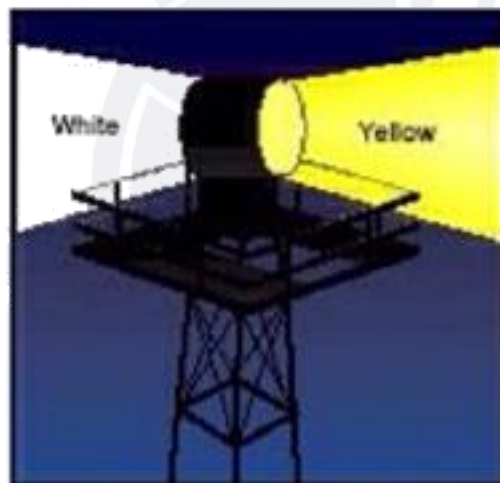


In the case of a **combined water and land aerodrome** , coloured flashes, if used, shall have the colour characteristics of whichever section of the aerodrome is designated as the principal facility.

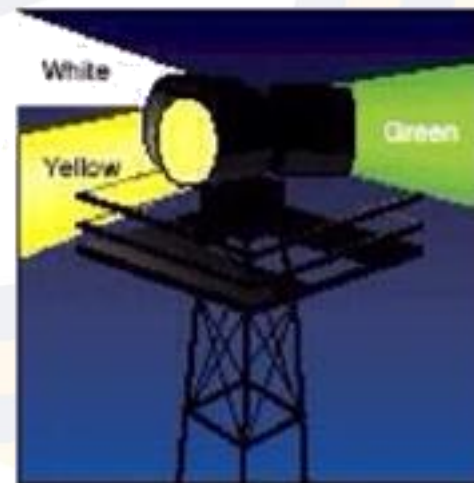
Aeronautical beacon used to indicate the location of an aerodrome from the air.



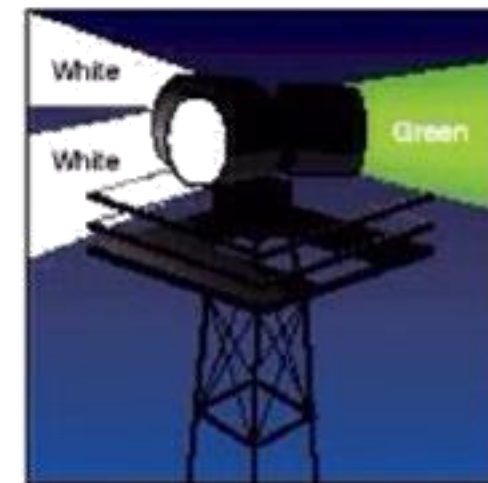
Land aerodrome



Water aerodrome



Heliport



Military aerodrome



Barrette. Three or more aeronautical ground lights closely spaced in a transverse line so that from a distance they appear as a short bar of light.



APPROACH AND RUNWAY LIGHTING
TYPICAL CAT I SYSTEM SHOWING
TAKE-OFF STARTER EXTENSION AND
STOPWAY LIGHTING





Apron. A defined area, on a **land** aerodrome, intended to accommodate aircraft for purposes of **loading** or **unloading** passengers, mail or cargo, **fuelling**, **parking** or **maintenance**.





Pavement classification number (PCN). A number expressing the bearing strength of a pavement for **unrestricted operations**.

It means that no special permission is required prior to each operation.





Applicable as of 28 November 2024

Pavement classification rating (PCR). A number expressing the bearing strength of a pavement.

Aircraft classification rating (ACR). A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

2.6.3 The PCR reported shall indicate that aircraft with an aircraft classification rating (ACR) equal to or less than the reported PCR may operate on the pavement subject to any limitation on the tire pressure or aircraft all-up mass for specified aircraft type(s).

The Current software ICAO-ACNw1.0 will be replaced by ICAO ACR1.0 (already developed) to compute every aircraft ACRs at any weight and center of gravity position.



OIII 29L 90 /F /A /X /T
Example: OIII 29R 72 /R /A /W /T

Pavement Type

F - Flexible

Asphalt
Base
Subbase
Subgrade

R - Rigid

Concrete
Subbase
Subgrade

Subgrade Strength

- A - High
- B - Medium
- C - Low
- D - Ultralow

Tire Pressure

- W - Unlimited
- X - High (254 psi)
- Y - Medium (181 psi)
- Z - Low (73 psi)

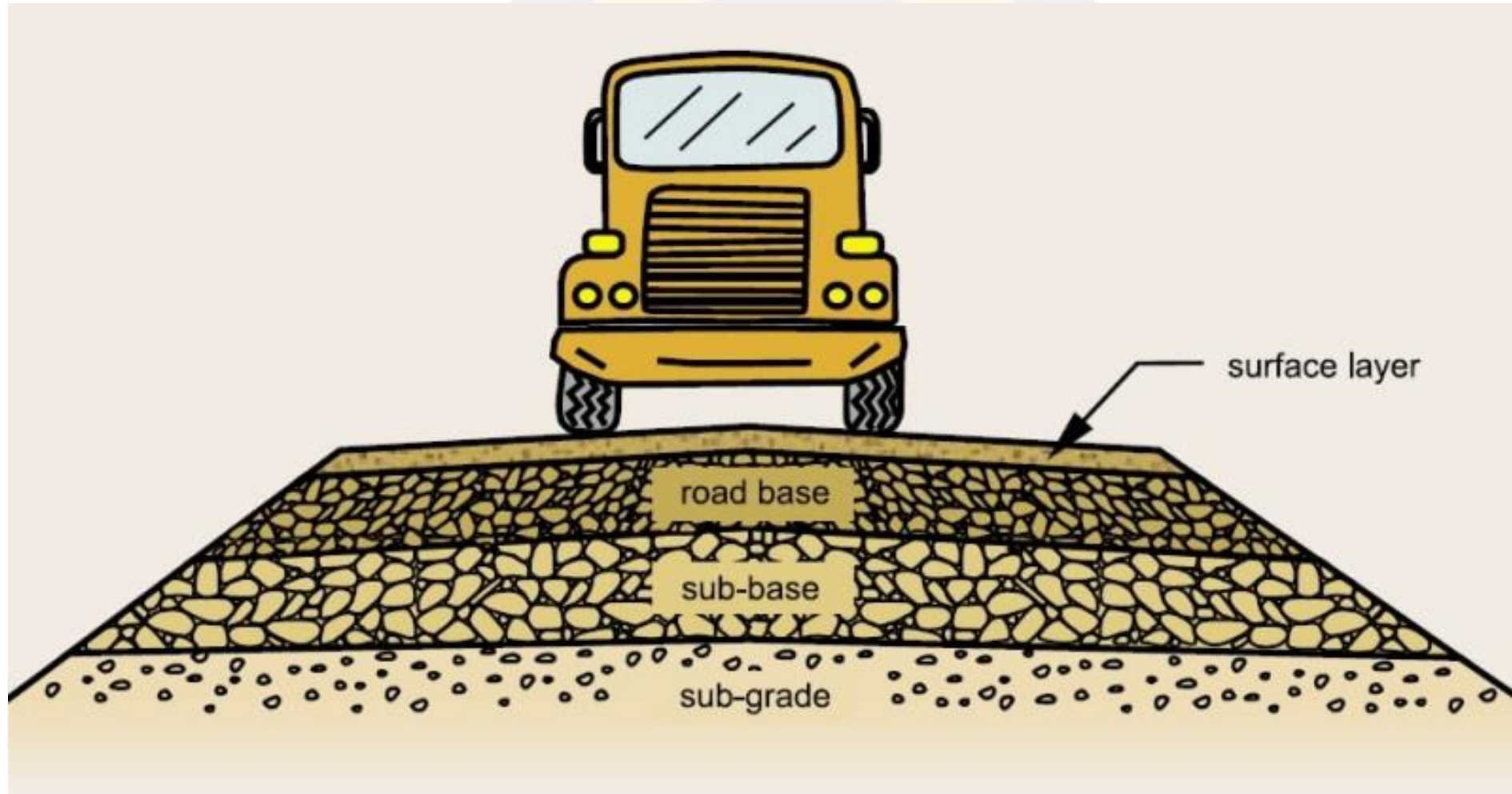
Evaluation Method

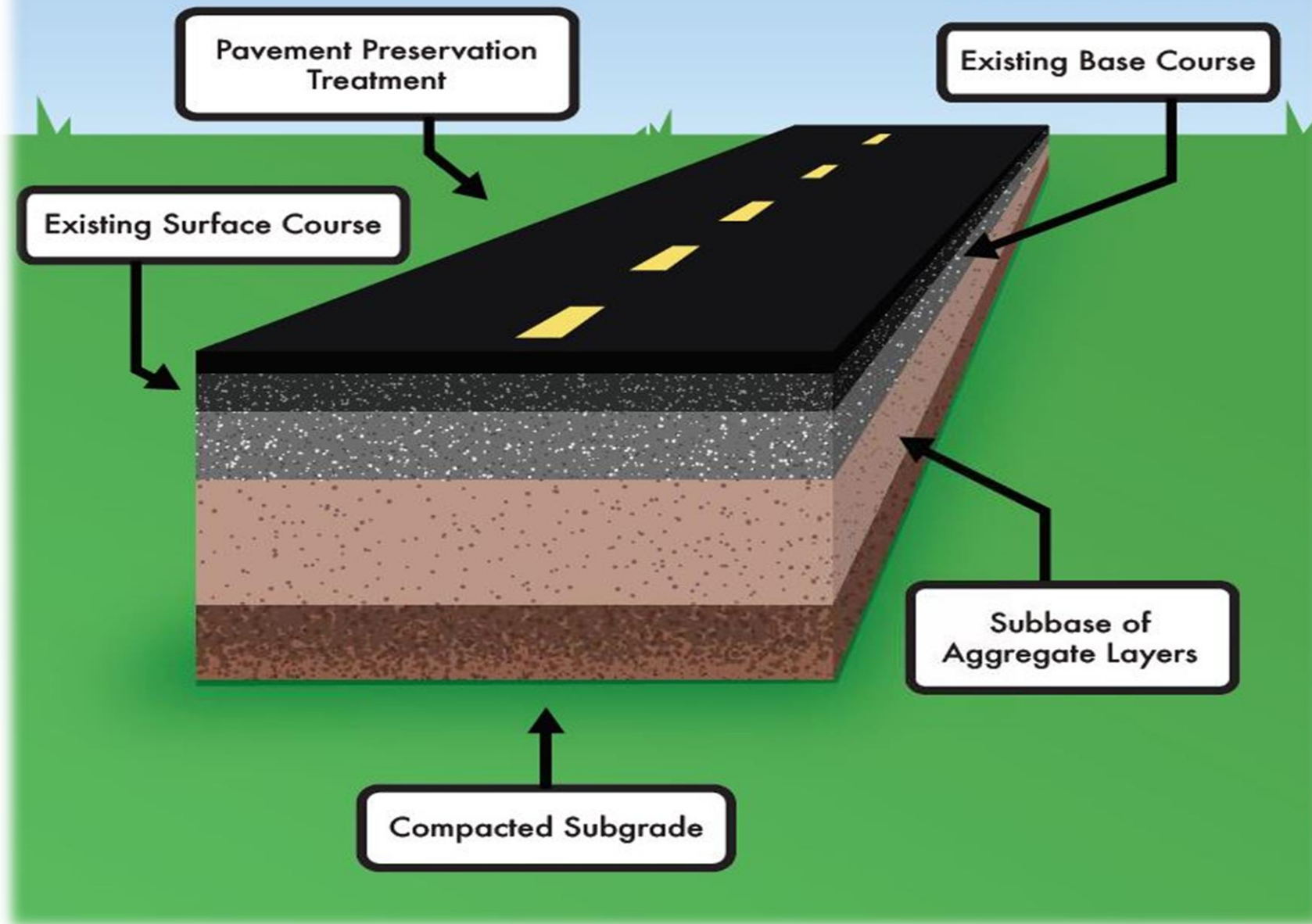
- T - Technical
- U - Aircraft Experience

ACN at Maximum Taxi Weight

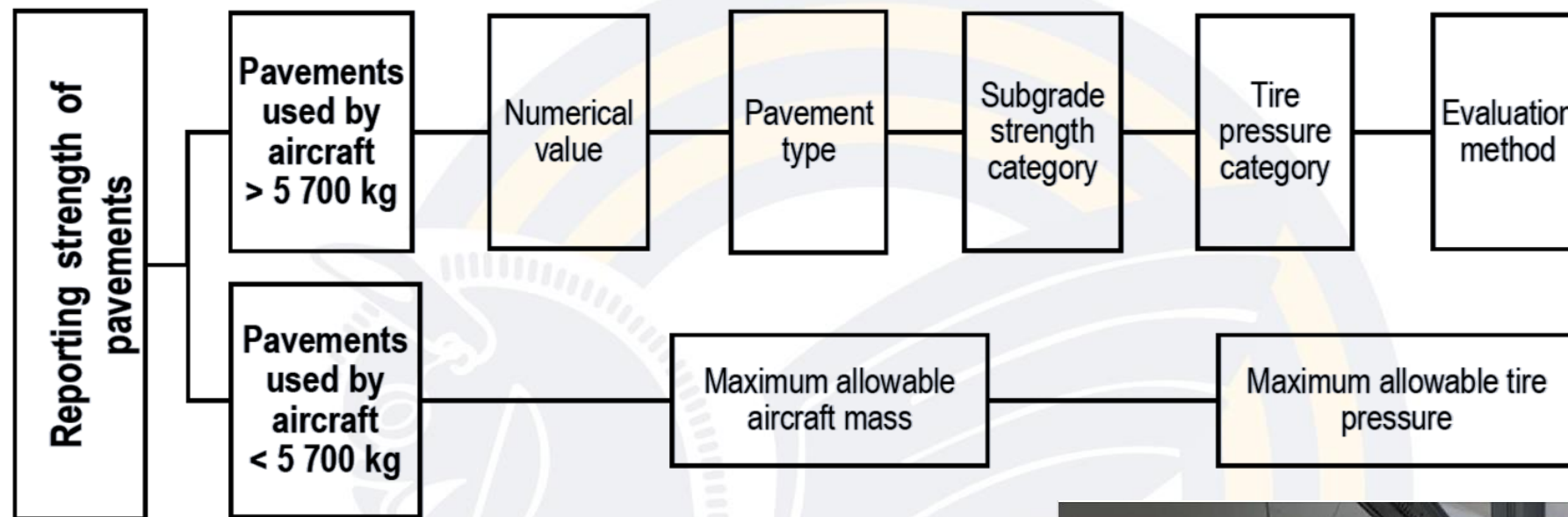
@787guide

AIRCRAFT TYPE	MAXIMUM TAXI WEIGHT	TIRE PRESSURE	ACN FOR RIGID PAVEMENT SUBGRADES				ACN FOR FLEXIBLE PAVEMENT SUBGRADES			
			A	B	C	D	A	B	C	D
787-8	228 383 kg (503 500 lbs)	228 psi	61	71	84	96	60	66	81	106
787-9	254 692 kg (561 500 lbs)	226 psi	65	76	90	104	66	73	88	118
787-10	254 692 kg (561 500 lbs)	226 psi	66	77	91	105	67	74	89	119









PCN value
(max 200)

PCN pavement subgrade
A [high] – D [ultra low]
z.b. B [medium strength subgrade.]

PCN evaluation method
T [Technical evaluation.] or
U [using aircraft experience.]

80 / R / B / X / T

PCN pavement type
R [Rigid] or F [Flexible]

PCN max tire pressure code
W [high] – Z [very low]
z.b. X [Medium: pressure limited to 1.50 MPa (217 psi)]





Example: A **B722** with 78500kg on a rigid pavement, medium strength subgrade, tire pressure of 1.15 Mpa the ACN is calculated to be **48**. (Doc 9157, Part3, 1.1.3.10)

Aircraft classification number (ACN). A number expressing the relative effect of an aircraft on a pavement for a specified standard subgrade category.

Note.— The aircraft classification number is calculated with respect to the **centre of gravity (CG) position** which yields the **critical loading on the critical gear**. Normally the **aft most CG** position appropriate to the maximum gross **apron (ramp) mass** is used to calculate the ACN. In exceptional cases the forwardmost CG position may result in the nose gear loading being more critical.

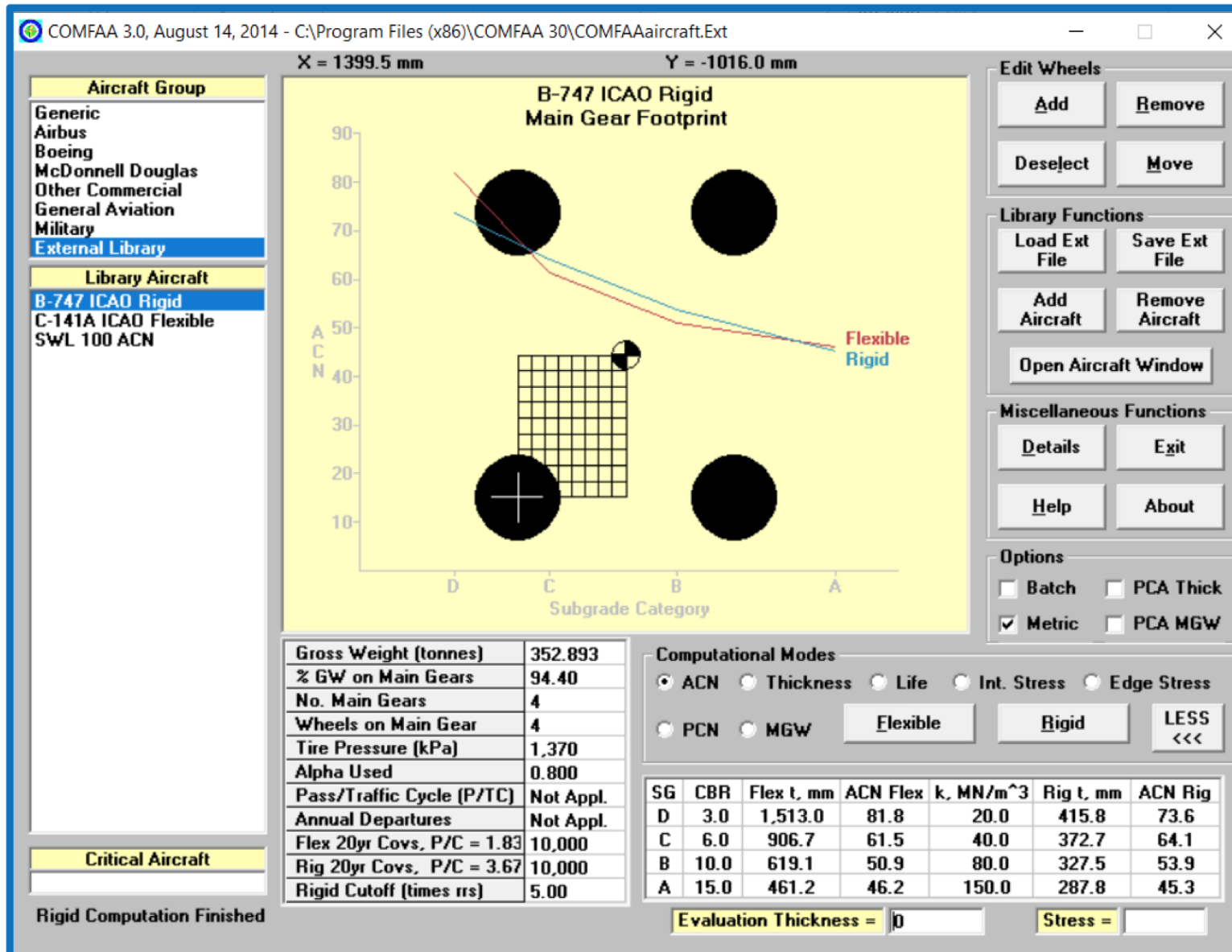
AERODROME DESIGN MANUAL



PART 3

PAVEMENTS

SECOND EDITION — 1983



14:32 100 %

< More ACN / PCN F-HKAR

Runway PCN

18/F/A/W/T

Decoding

PCN number 18
Pavement Flexible
Subgrade High strength
Tire pressure No limitation
Method By technical study

Aircraft limitation

Weight Limited to 67 055 Lbs

Tire pressure:

Main landing gear No limitation
Nose landing gear No limitation

Aircraft ACN

Pavement ☒ Flexible ☐ Rigid

Subgrade ☒ A ☐ B ☐ C ☐ D

Aircraft weight (Lbs)

ACN number

Flight Planning Airports Weather Map More



Example 2: An AIP contains the following information related to a runway pavement:

PCN of the pavement = 80

Pavement type = rigid

Subgrade category = medium strength

Tire pressure limitation = none

Determine whether the pavement can accept the following aircraft at the indicated operating masses and tire pressures:

		<u>Mass</u>	<u>Tire pressure</u>
Airbus A 300 Model B2	at	142 000 kg	1.23 MPa
B747-100	at	334 751 kg	1.55 MPa
Concorde	at	185 066 kg	1.26 MPa
DC-10-40	at	253 105 kg	1.17 MPa

Solution: ACNs of these aircraft from Appendix 5 of this Manual are 44, 51, 71 and 53, respectively. Since the pavement in question has a PCN of 80 it can accept all of these aircraft.



Aircraft type	All-up mass (kg)	Load on one main gear leg (%)	Tire pressure (MPa)	ACN FOR RIGID PAVEMENT SUBGRADES - MN/m ³				ACN FOR FLEXIBLE PAVEMENT SUBGRADES - CBR			
				High 150	Medium 80	Low 40	Ultra-low 20	High 15	Medium 10	Low 6	Very low 3
				5	6	7	8	9	10	11	12
A300 B2 Airbus	137 000 85 910	47.0	1.2	35 18	42 21	50 25	58 29	39 20	43 22	53 24	68 34
A300 B2 Airbus	142 000 85 910	47.0	1.29	35 19	45 22	53 26	61 30	40 21	45 22	55 25	71 34
A300 B4 Airbus	150 000 88 180	47.0	1.39	41 20	49 22	57 26	65 31	43 21	49 22	59 25	76 35
A300 B4 Airbus	157 000 88 330	47.0	1.48	45 20	53 22	62 26	70 31	46 21	52 22	63 25	80 36
A300 B4 Airbus	165 000 88 505	47.0	1.29	46 17	55 20	64 25	73 29	49 20	56 21	68 25	84 36

(Doc 9157, Part3, Appendix 5)



ACN TABLES

Aircraft Type	All-up Mass ¹ (Maximum Apron Mass) (Operating Mass Empty)		Load on one main gear leg (%)	Standard Aircraft Tire Pressure			ACN relative to							
							Rigid Pavement Subgrades				Flexible Pavement Subgrades			
							High K = 150 MN/m ³	Medi- um K = 80 MN/m ³	Low K = 40 MN/ m ³	Ultra- low K = 20 MN/m ³	High CBR = 15%	Medi- um CBR = 10%	Low CBR = 6%	Very low CBR = 3%
	lbs	kgs		psi	kg/c m ²	mPa	A	B	C	D	A	B	C	D
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Airbus A300-B2	304014	13790	47.0	174	12.2	1.20	34	41	49	57	35	39	47	62
	192371	0 87259					19	22	26	31	20	21	24	32
Airbus A300-B2	315037	14290	47.0	186	13.1	1.28	37	44	53	60	37	41	50	65
	193676	0 87851					20	23	27	31	20	22	25	33
Airbus A300-B4	332674	15090	47.0	203	14.3	1.40	41	49	58	66	41	45	54	70
	202858	0 92016					22	25	29	34	22	23	26	35

The California Bearing Ratio (CBR) is a measure of the strength of the subgrade of a road or other paved area, and of the materials used in its construction. The ratio is measured using a standardized penetration test first developed by the California Division of Highways for highway engineering

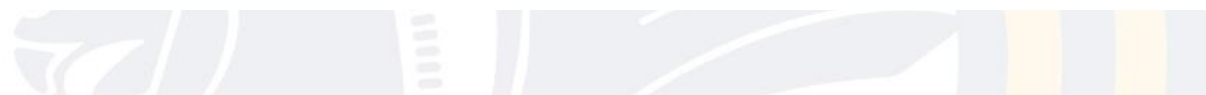






6- What shall be the color of aerodrome beacon signal alternating with white flashes at land aerodrome?

- A) Yellow.
- B) Green.
- C) Red.
- D) None.



16- What shall be the frequency of total flashes per minute of aerodrome beacon?

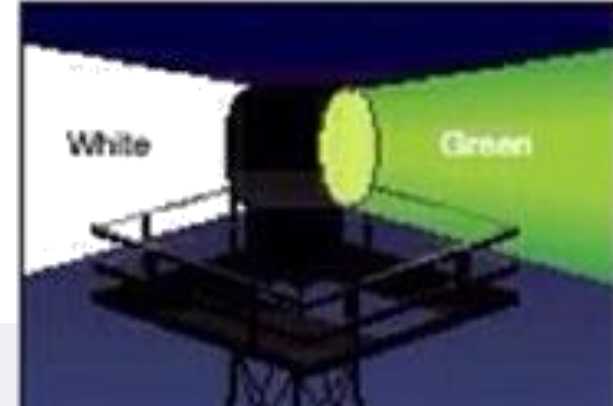
- A) 10-20
- B) 10-30
- C) 20-30
- D) 20-40





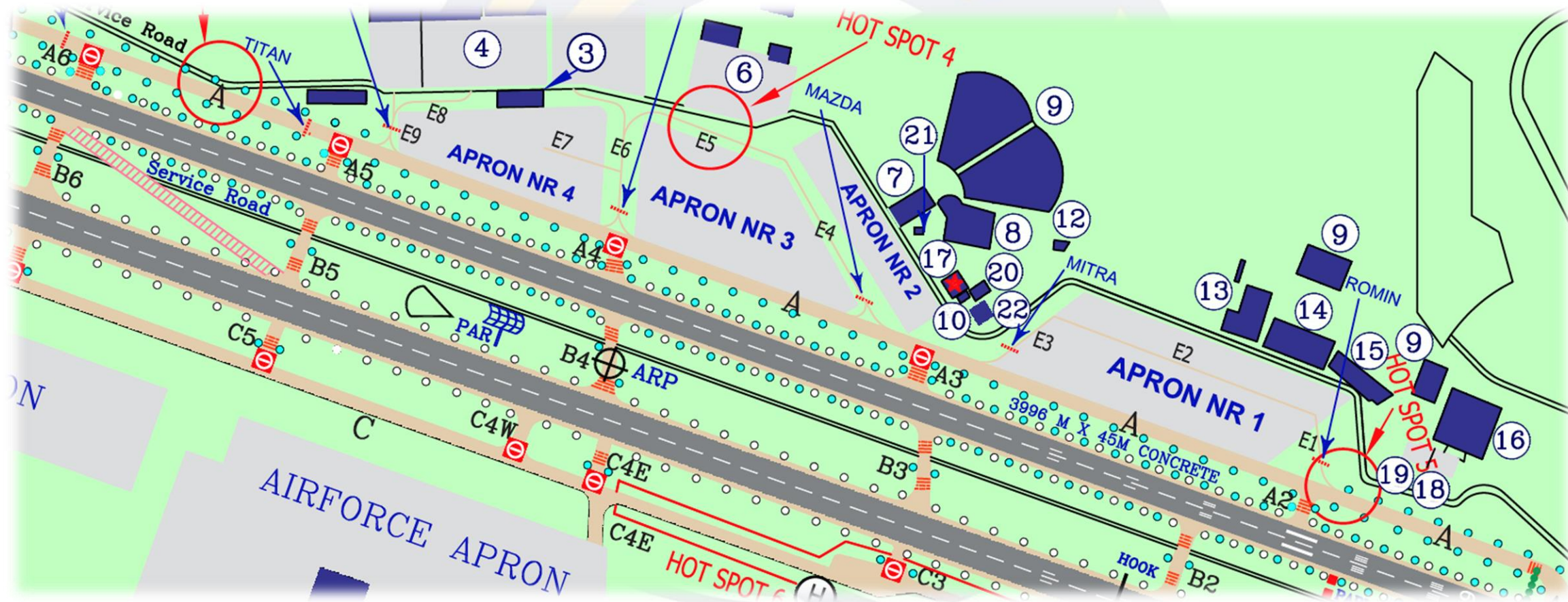
6- What shall be the color of aerodrome beacon signal alternating with white flashes at land aerodrome?

- A) Yellow.
- B) Green.
- C) Red.
- D) None.



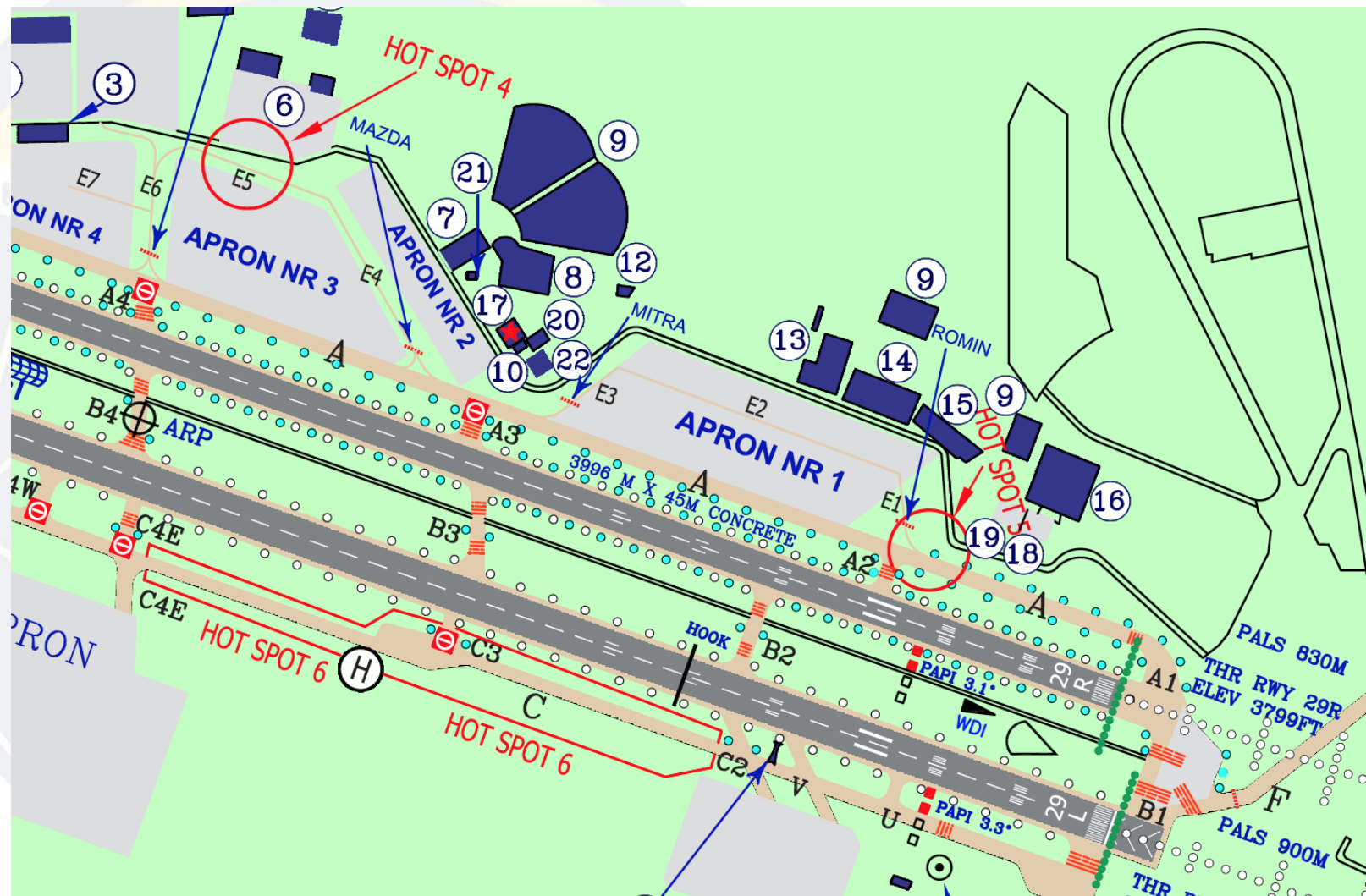
16- What shall be the frequency of total flashes per minute of aerodrome beacon?

- A) 10-20
- B) 10-30
- C) 20-30
- D) 20-40





Hot spot. A location on an aerodrome **movement area** with a history or **potential risk** of collision or runway incursion, and where heightened attention by pilots/drivers is necessary.





Aircraft stand. A designated area on an apron intended to be used for **parking an aircraft**.

AIP
ISLAMIC REPUBLIC OF IRAN

Tehran / Imam Khomeini INTL

AD 2-5 OIII
WEF 5 DEC 19

IKA AIRCRAFT DOCKING GUIDANCE SYSTEM -SAFEDOCK

1. INTRODUCTION

1.1 The Aircraft Docking Guidance System is a fully automatic aircraft docking guidance system installed at the fixed gates in Terminal of Imam Khomeini INTL Airport.

2. DESCRIPTION OF SYSTEM

2.1 The system is based on a laser scanning technique and

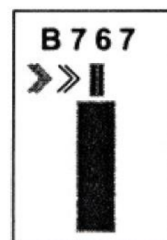
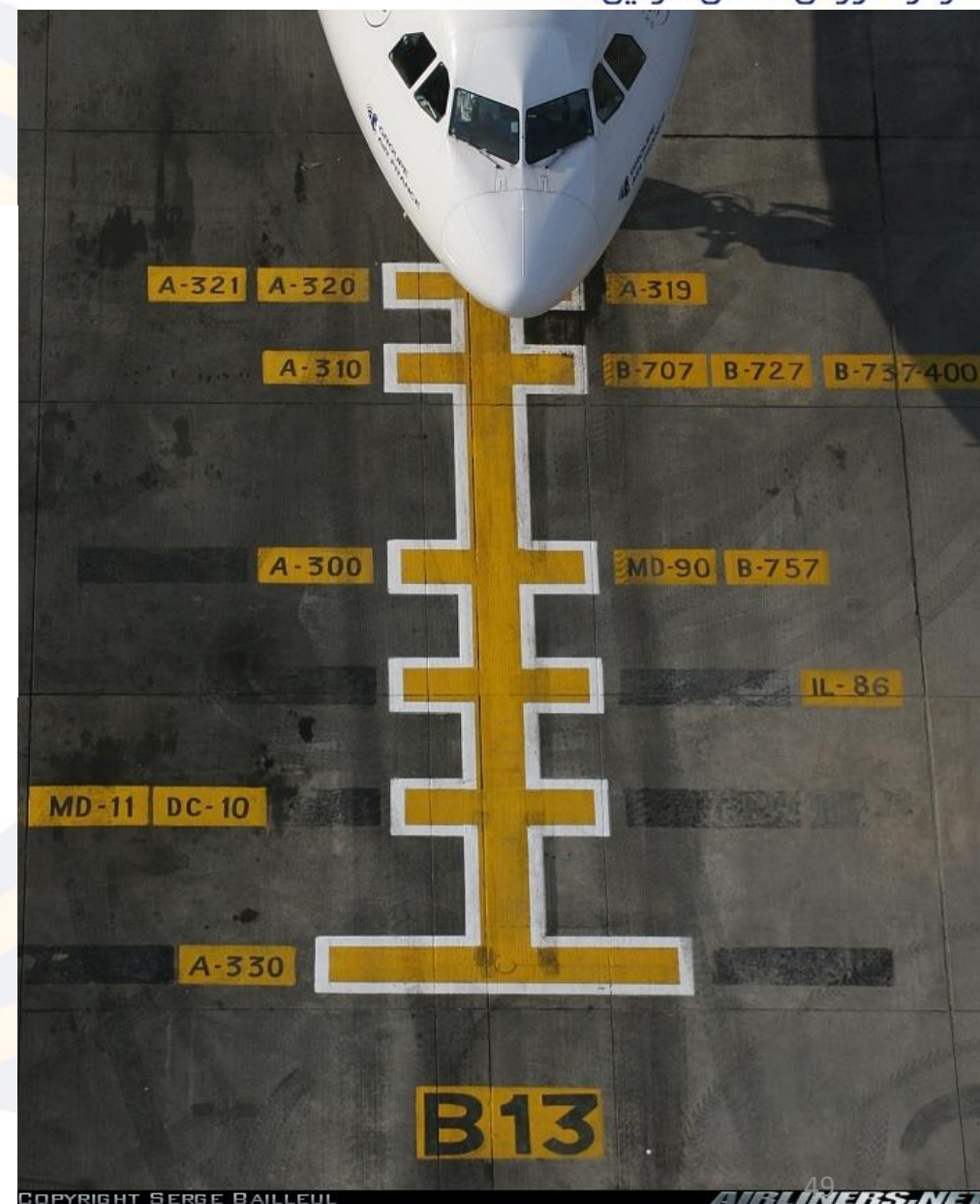
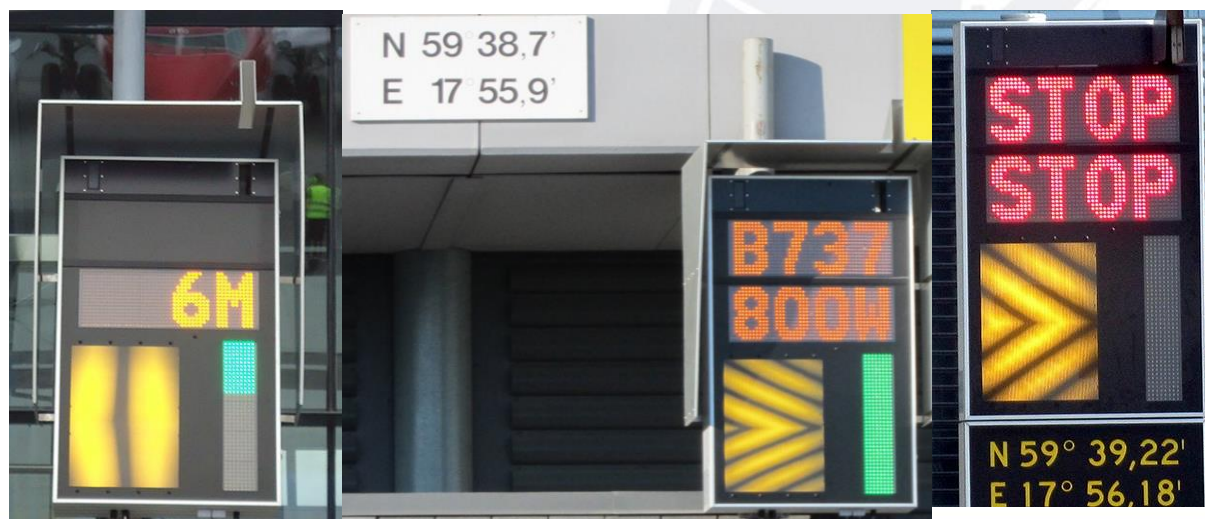
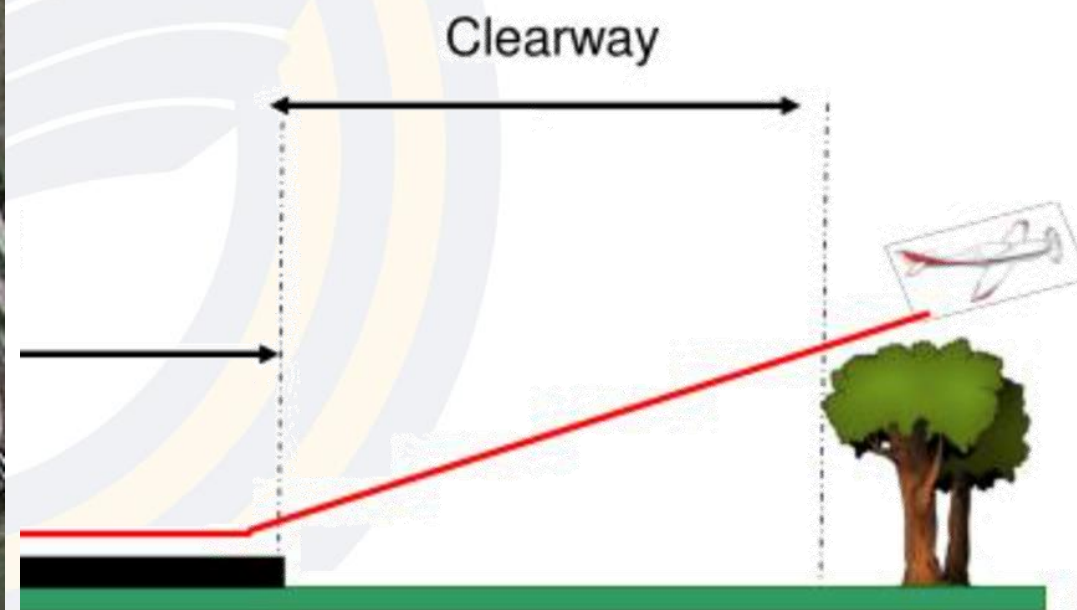


Figure 2
Aircraft tracked and identified correctly.





Clearway. A defined rectangular area on the **ground or water** under the control of the appropriate authority, selected or prepared as a suitable area over which an aeroplane may make a portion of its **initial climb to a specified height**.



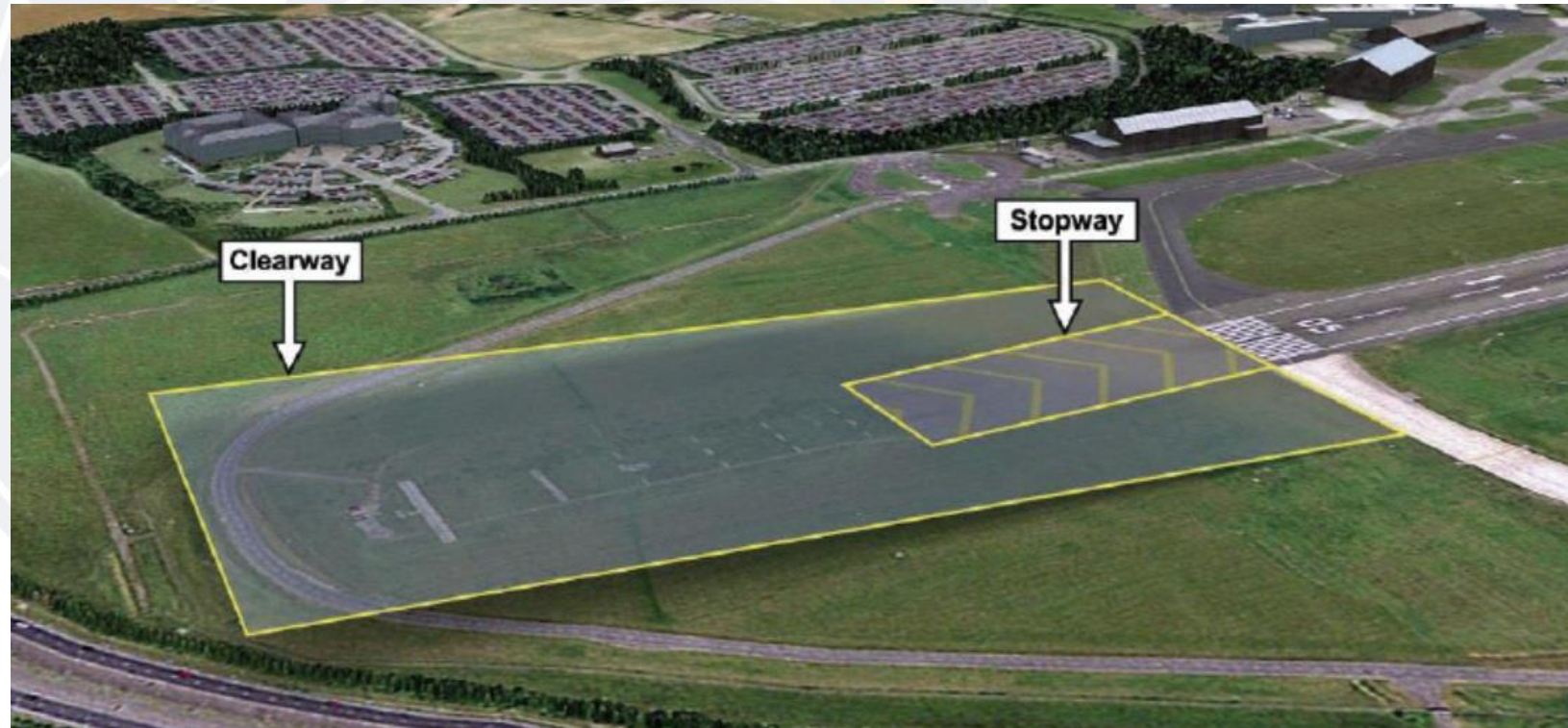


3.6.1 **Recommendation**.— The **origin** of a clearway should be at the **end of the TORA**.

3.6.2 **Recommendation**.— The **length** of a clearway should not exceed **half the length of the TORA**.

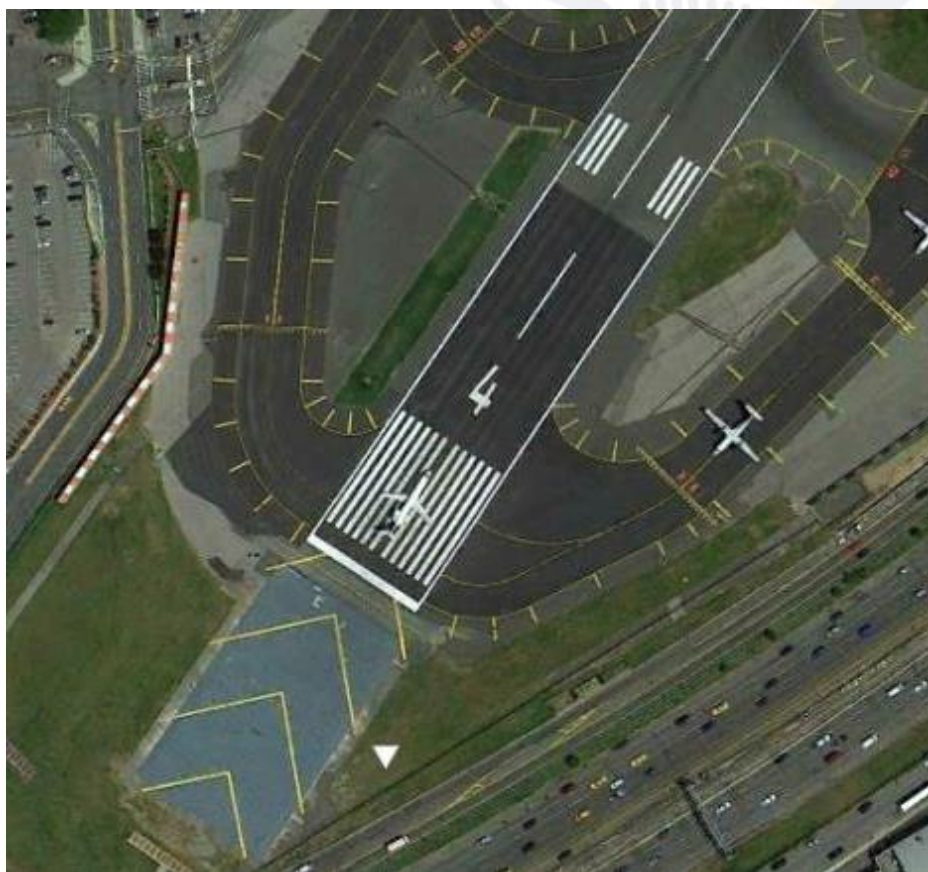
3.6.3 **Recommendation**.— A clearway should extend **laterally** to a distance of **at least 75 m** on each side of the extended centre line of the runway.

3.6.4 **Recommendation**.— The ground in a clearway should not project above a plane having an upward slope of **1.25 per cent**.



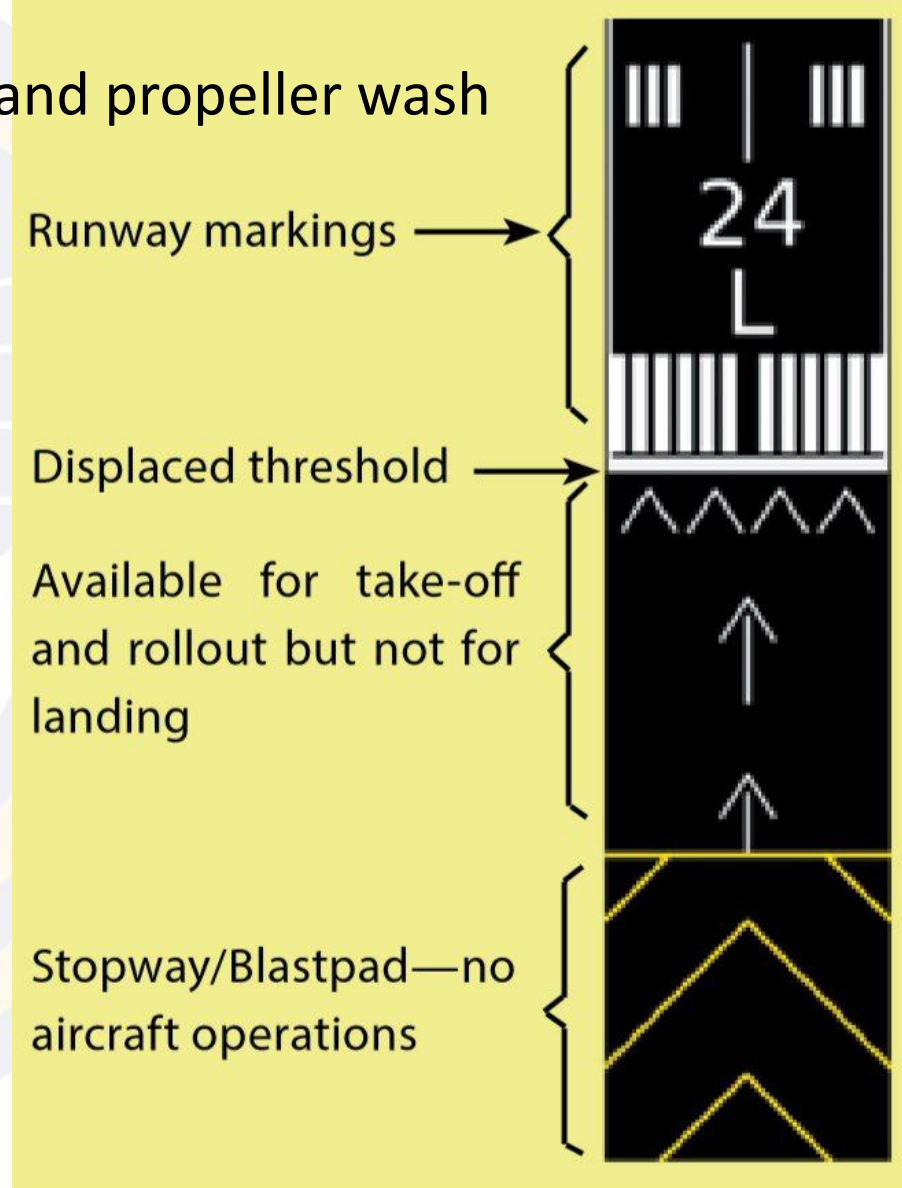


Stopway. A defined rectangular area on the **ground** at the end of take-off run available prepared as a suitable area in which **an aircraft can be stopped in the case of an abandoned take-off.**





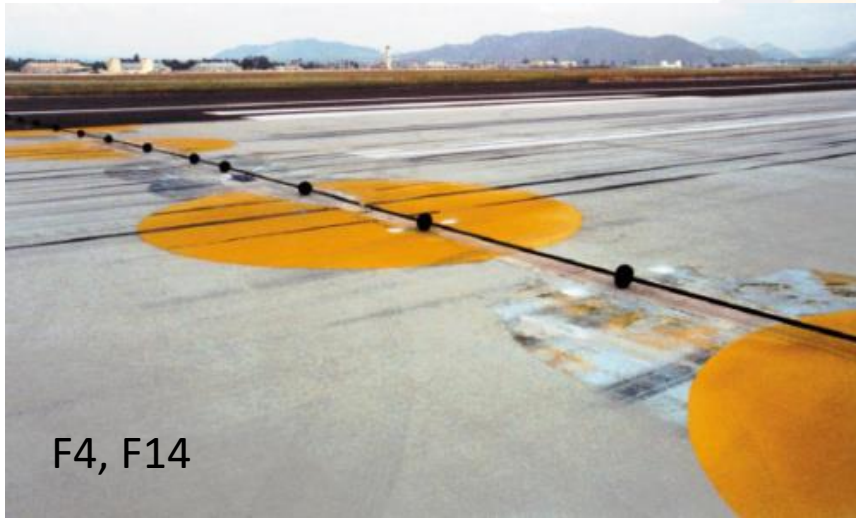
The area provided to reduce the erosive effects of jet blast and propeller wash may be referred to as a **blast pad**



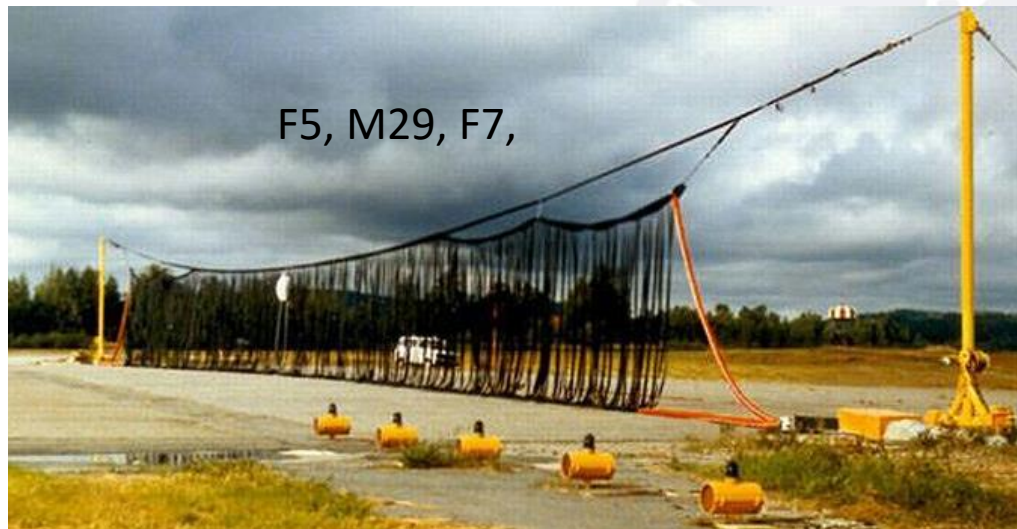




Arresting system. A system designed to decelerate an aeroplane overrunning the runway.



F4, F14



F5, M29, F7,



EMAS

engineered material arresting system





3.7.1 A stopway shall have the same width as the runway with which it is associated.

3.7.4 The surface of a paved stopway shall be so constructed or resurfaced as to provide surface friction characteristics at or above those of the associated runway.

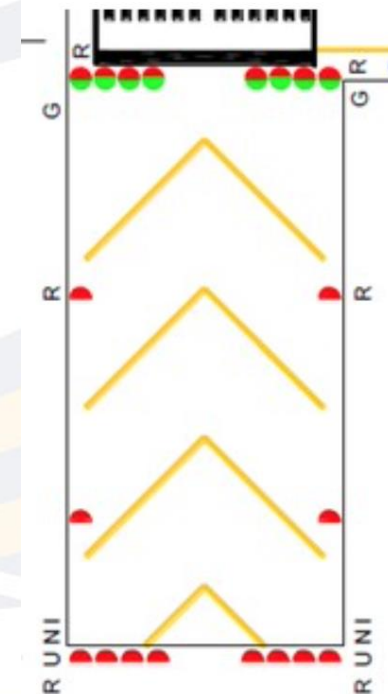


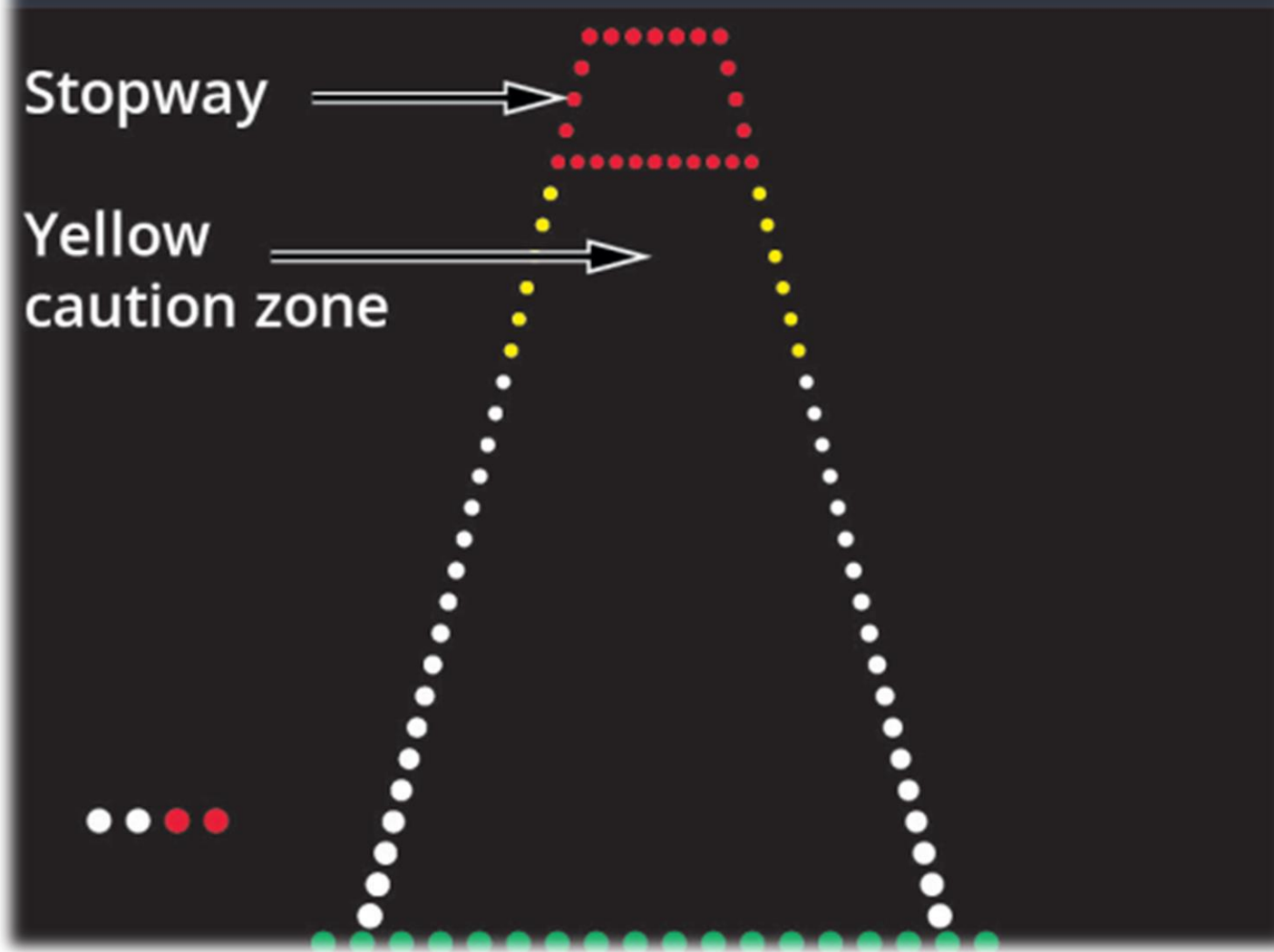


5.3.16 Stopway lights

5.3.16.1 Stopway lights shall be provided for a stopway **intended for use at night**.

5.3.16.2 Stopway lights shall be placed along the **full length of the stopway** and shall be in **two parallel rows** that are equidistant from the centre line and coincident with the rows of the runway edge lights. Stopway lights shall also be provided **across the end of a stopway** on a line at right angles to the stopway axis as near to the end of the stopway as possible and, in any case, **not more than 3 m outside the end**.







Runway threshold lights





5.3.16.3 Stopway lights shall be fixed unidirectional lights showing red in the direction of the runway.





Runway strip. A defined area including the runway and stopway, if provided, intended: a) to reduce the risk of damage to aircraft **running off a runway**; and

b) to protect aircraft flying over it during take-off or landing operations.





Runway end safety area (RESA).

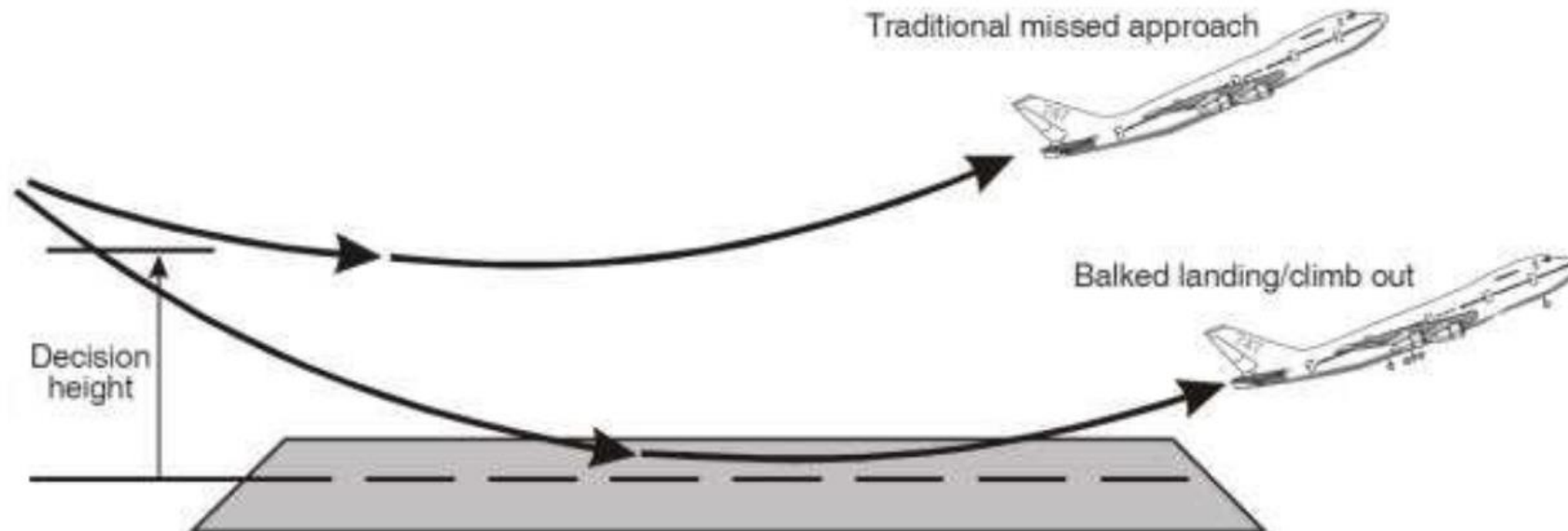
An area symmetrical about the extended runway center line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane **undershooting or overrunning** the runway.

The runway-end safety area must extend at least 90 meters for all instrument runways (codes 1 to 4) and must be at least twice the width of the runway.





Balked landing. A landing manoeuvre that is unexpectedly discontinued at any point **below the obstacle clearance altitude/height (OCA/H).**





44- A lighted heliport may be identified by a:

- A) Green, yellow, and white rotating beacon.
- B) Flashing yellow light.
- C) Blue lighted square landing area.
- D) Two quick white flashes between green flashes.

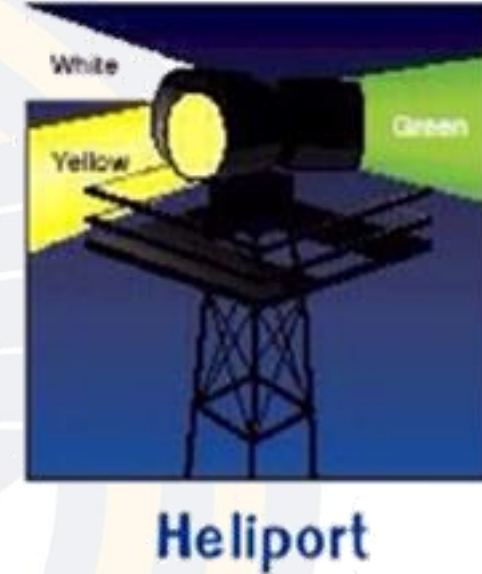
34- The color of the fixed, unidirectional runway threshold and wing bar lights shall

- A) Yellow
- B) White
- C) Green
- D) Blue



44- A lighted heliport may be identified by a:

- A) Green, yellow, and white rotating beacon.
- B) Flashing yellow light.
- C) Blue lighted square landing area.
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34- The color of the fixed, unidirectional runway threshold and wing bar lights shall

- A) Yellow
- B) White
- C) Green
- D) Blue



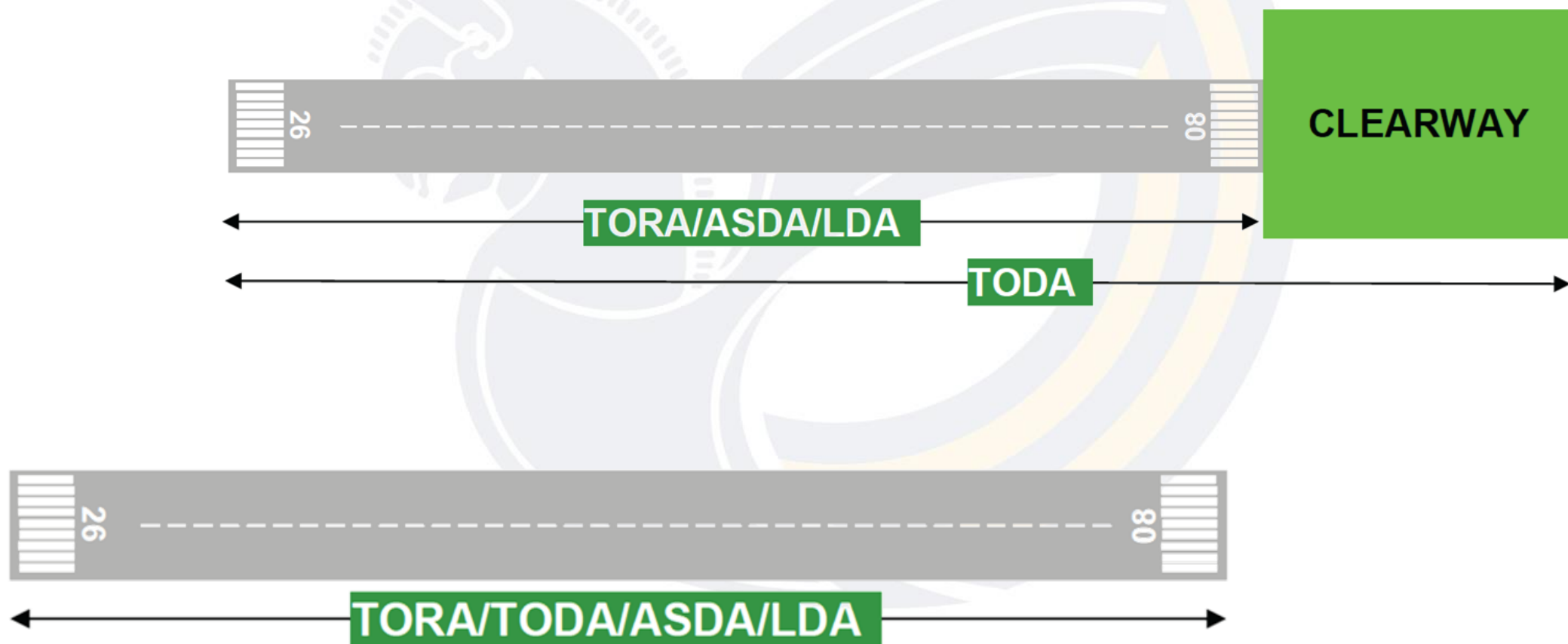


- Declared distances are needed for aircraft performance calculations. They are used to calculate if a runway can safely be used for takeoffs and landings.
- **a) Take-off run available (TORA).** The length of runway declared available and suitable for the *ground run of an aeroplane taking off.*

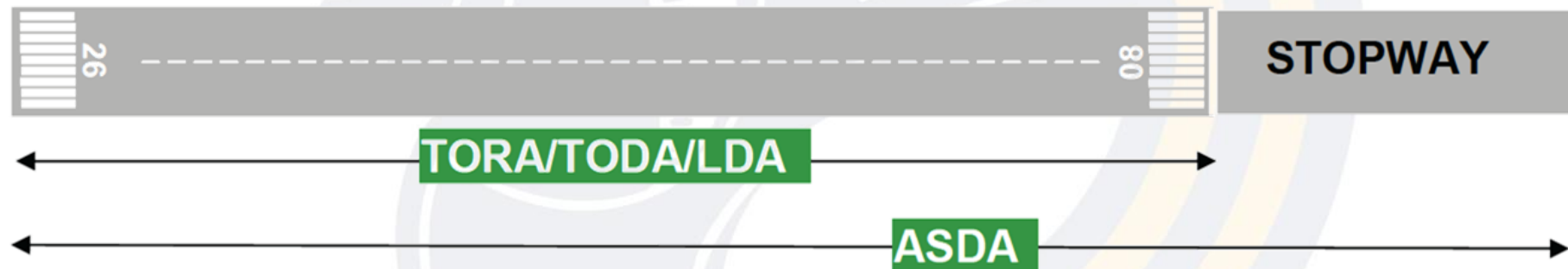




- **b) Take-off distance available (TODA).** The length of the *take-off run available* plus the length of the *clearway*, if provided.

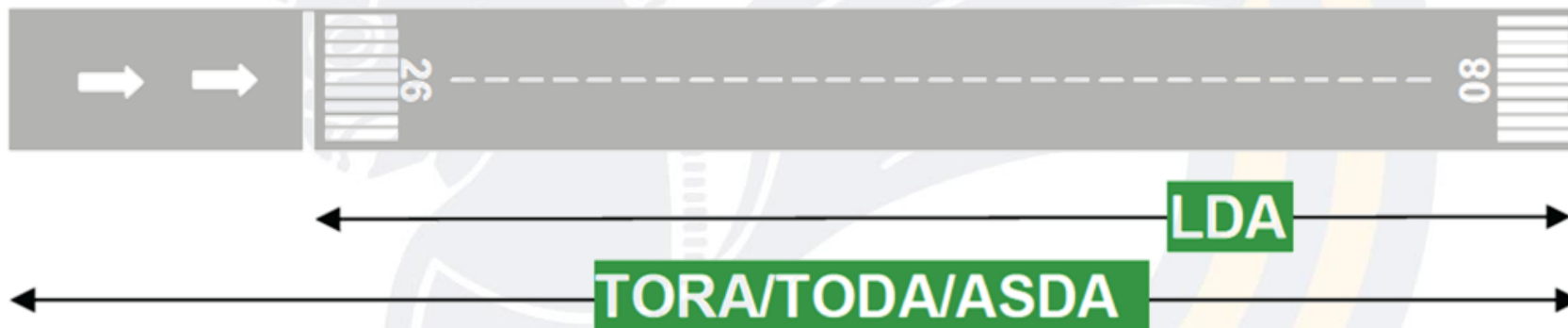


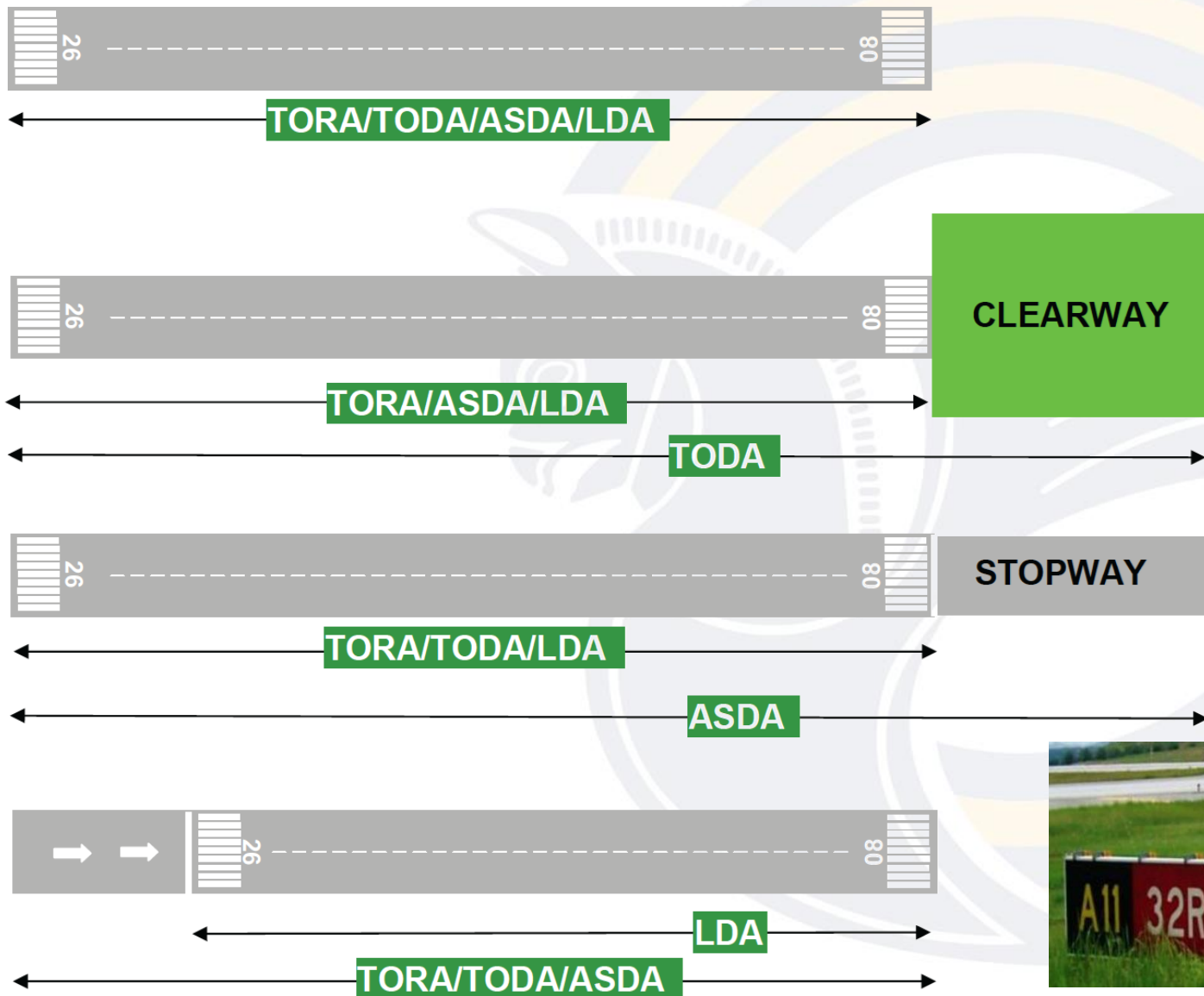
c) Accelerate-stop distance available (ASDA). The length of the *take-off run available* plus the length of the *stopway*, if provided.

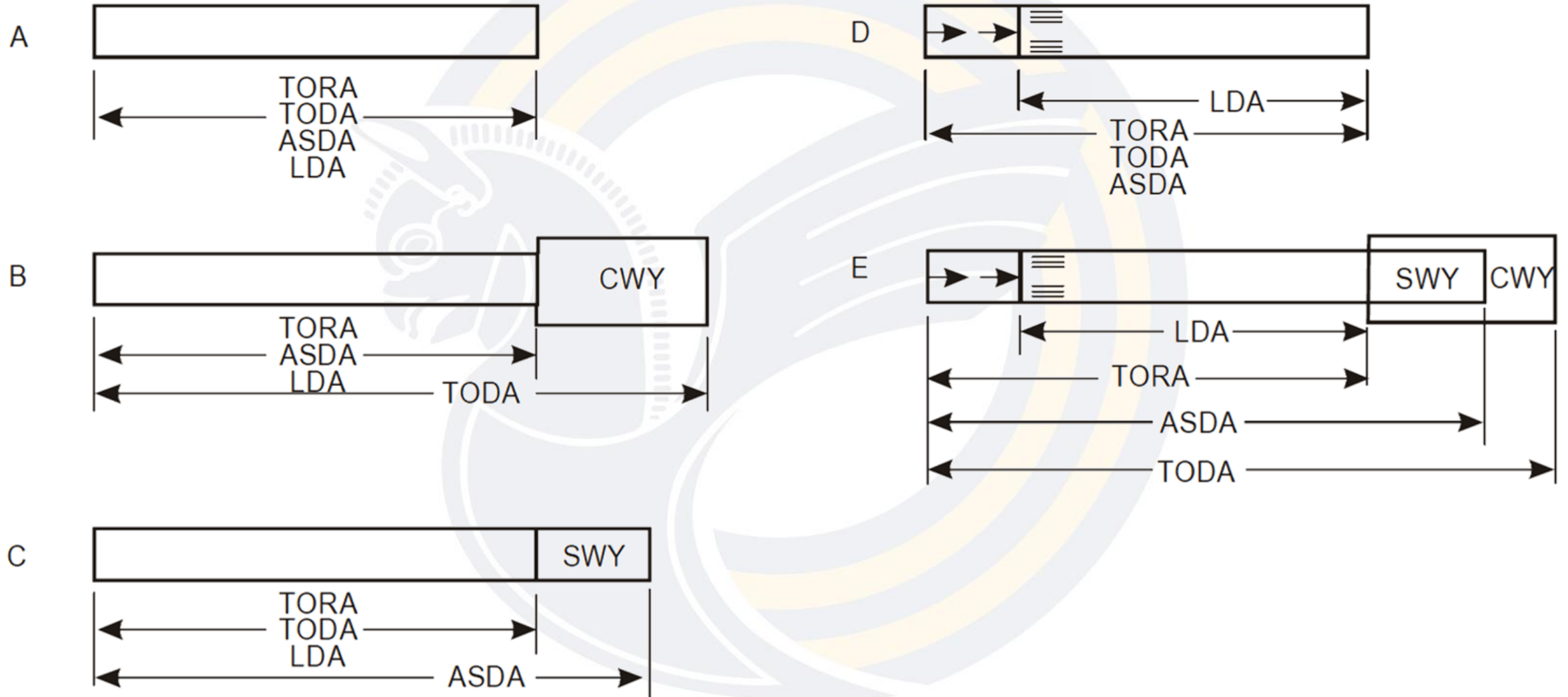


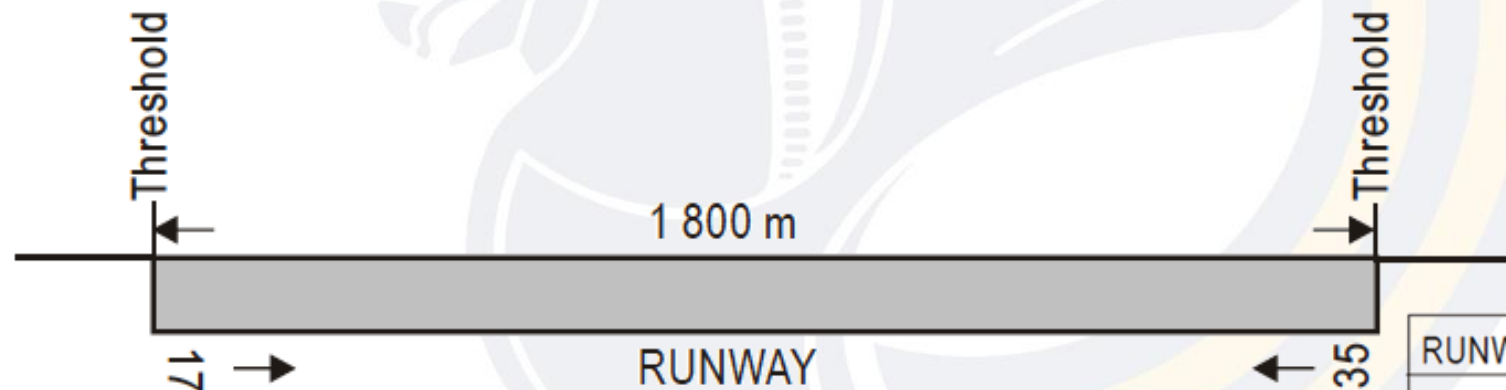
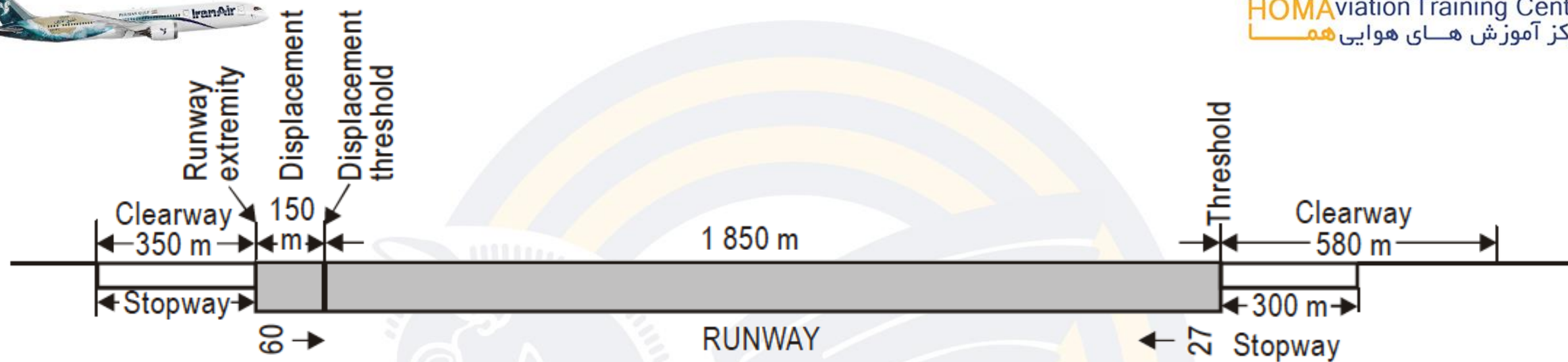


- **d) Landing distance available (LDA).** The length of runway which is declared available and suitable for the *ground run of an aeroplane landing*.

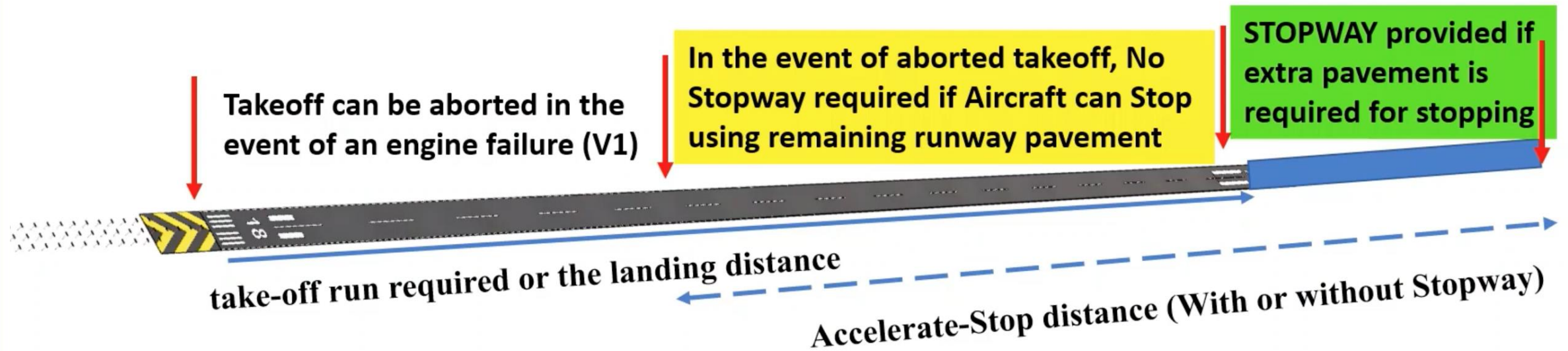






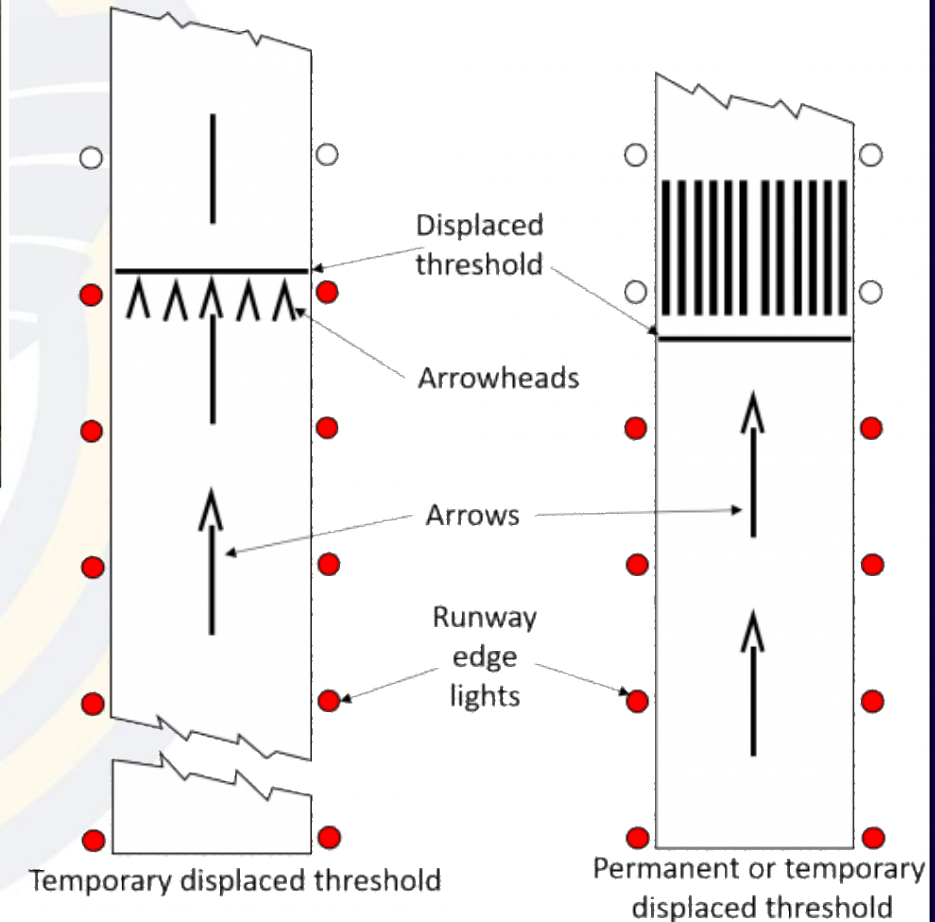
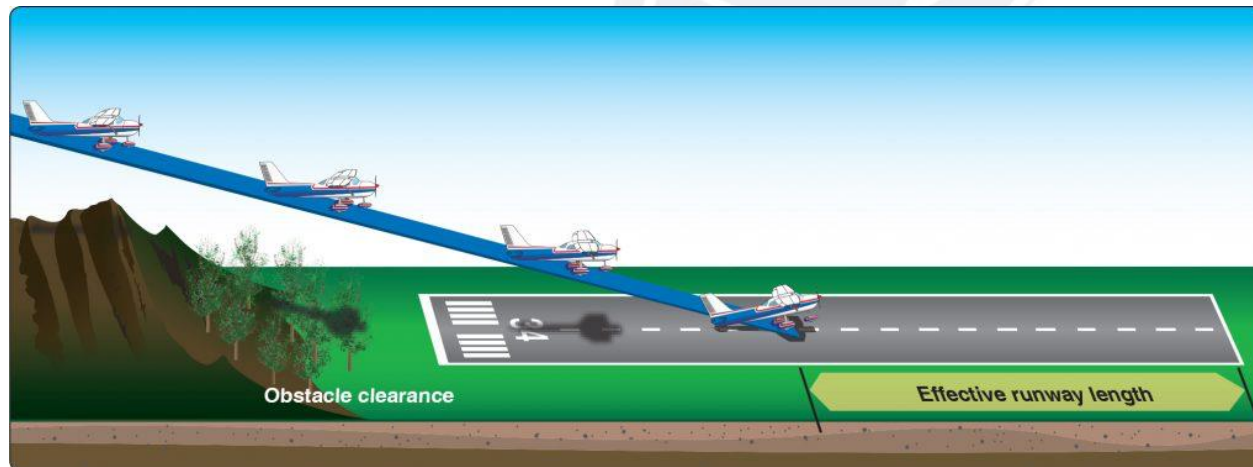


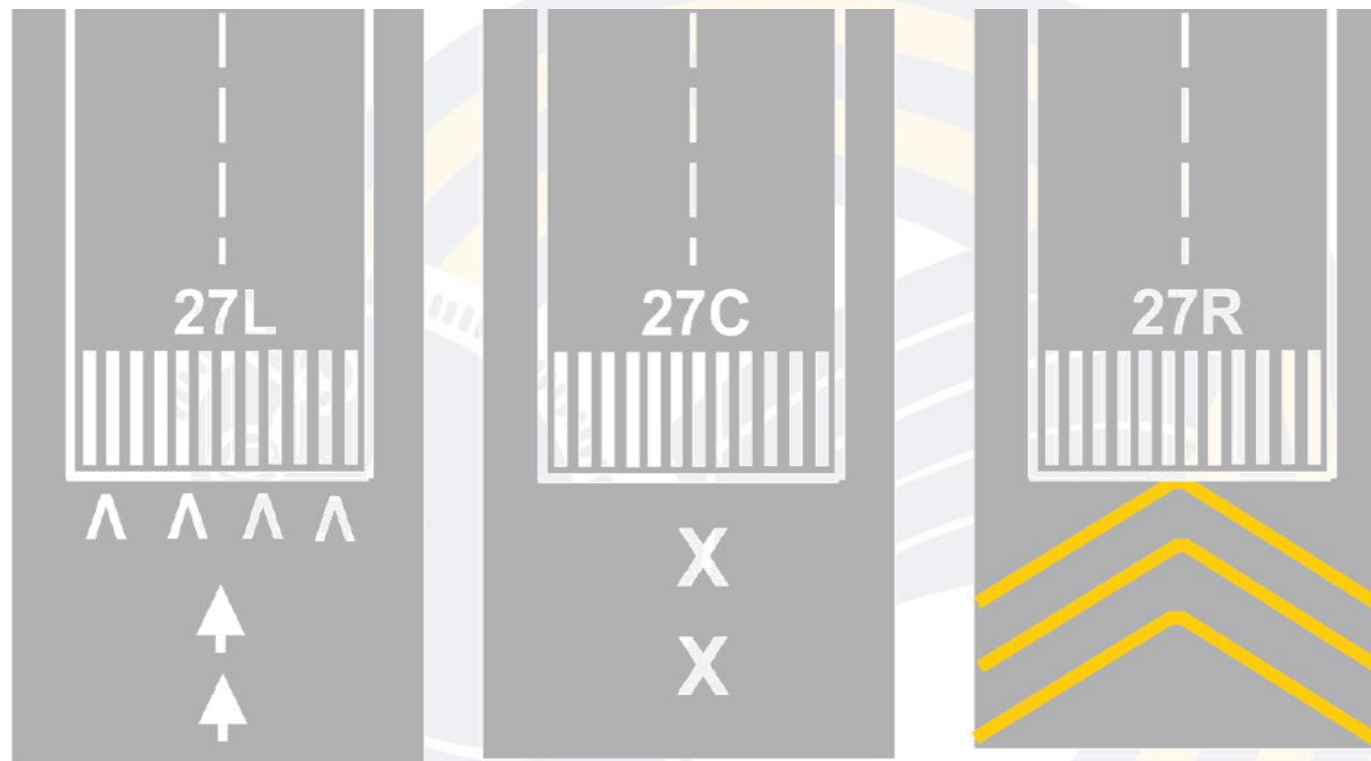
RUNWAY	TORA m	ASDA m	TODA m	LDA m
09	2 000	2 300	2 580	1 850
27	2 000	2 350	2 350	2 000
17	NU	NU	NU	1 800
35	1 800	1 800	1 800	NU





Displaced threshold. A threshold not located at the extremity of a runway.





**Pre-threshold area
usable for take-off
or stopway threshold.
Threshold temporarily
displaced for 6 months
or less**

**Pre-threshold area
un-usable for aircraft
movements**

**Pre-threshold area fit
for use as stopway
but not for normal
movement of aircraft**

**Note: If there are 4 parallel runways, the
numbers are changed e.g. 26L; 26R; 27L; 27R**

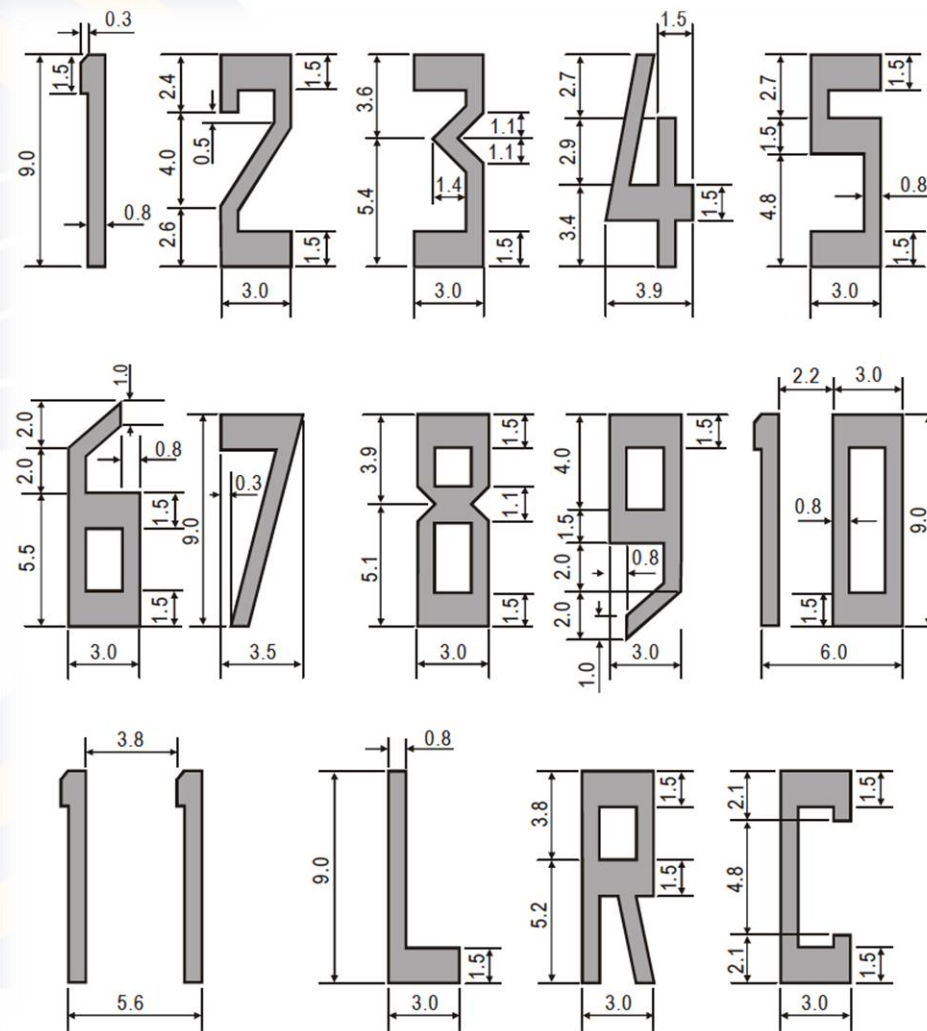


5.2.2 Runway designation marking

5.2.2.1 A runway designation marking shall be provided at the **thresholds** of a **paved** runway.

[NOT INSTRUMENT]

5.2.2.4 A **runway designation marking** shall consist of a **two-digit** number and on parallel runways shall be supplemented with a **letter**. The two-digit number shall be the whole number nearest the **one-tenth of the magnetic North** when viewed from the direction of approach.



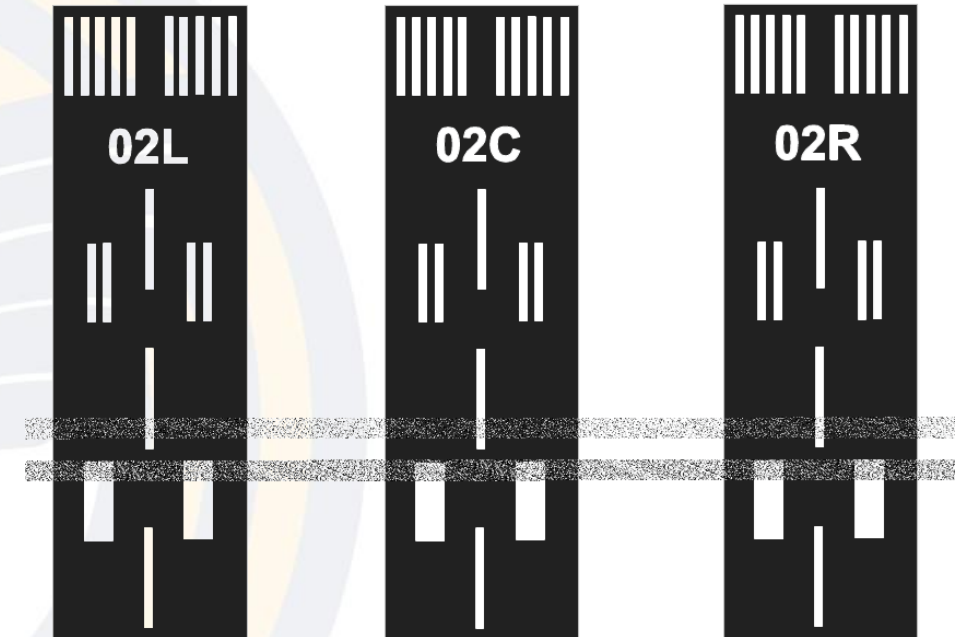


5.2.2.5 In the case of parallel runways, each runway designation number shall be supplemented by a letter as follows, in the order shown from left to right when viewed from the direction of approach:

- for two parallel runways: “L” “R”;
- for three parallel runways: “L” “C” “R”;
- for four parallel runways: “L” “R” “L” “R”;
- for five parallel runways: “L” “C” “R” “L” “R” or “L” “R” “L” “C” “R”;
- for six parallel runways: “L” “C” “R” “L” “C” “R”.

5.2.1.4 Runway markings shall be white.

5.2.1.5 Taxiway markings, runway turn pad markings and aircraft stand markings shall be yellow.



Example:
29L, 29C, 29R



Six Parallel Runways



Foreign object debris (FOD). An **inanimate** object within the **movement area** which has no operational or aeronautical function and which has the potential to be a hazard to aircraft operations.

Holding bay. A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.





Holding bay





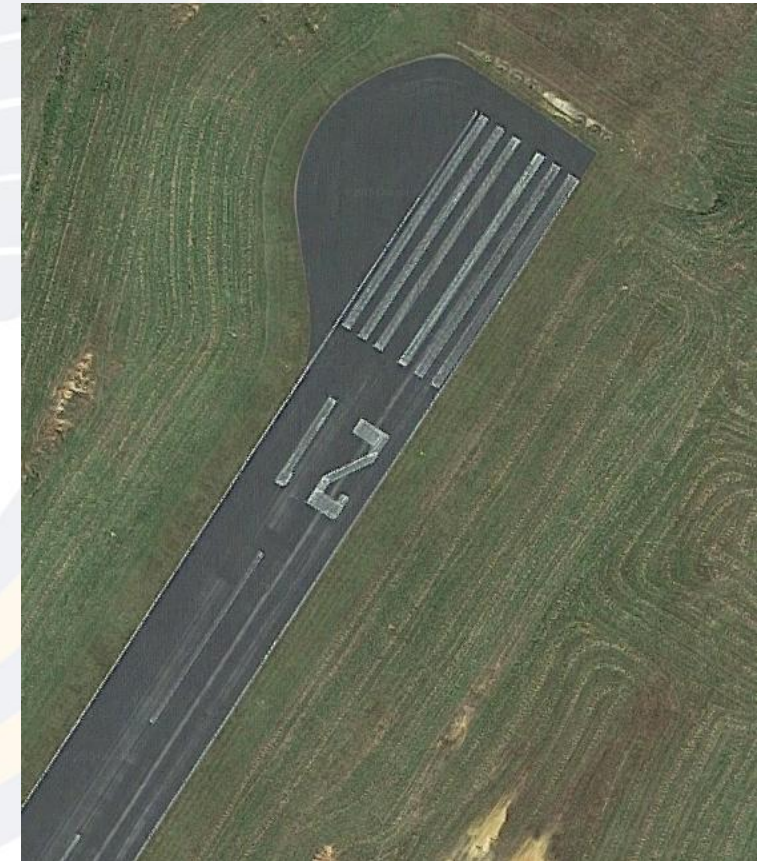
TAXIWAY MARKINGS



Taxiway
markings
are
YELLOW



Runway turn pad. A defined area on a *land* aerodrome adjacent to a runway for the purpose of completing a **180-degree turn on a runway**.



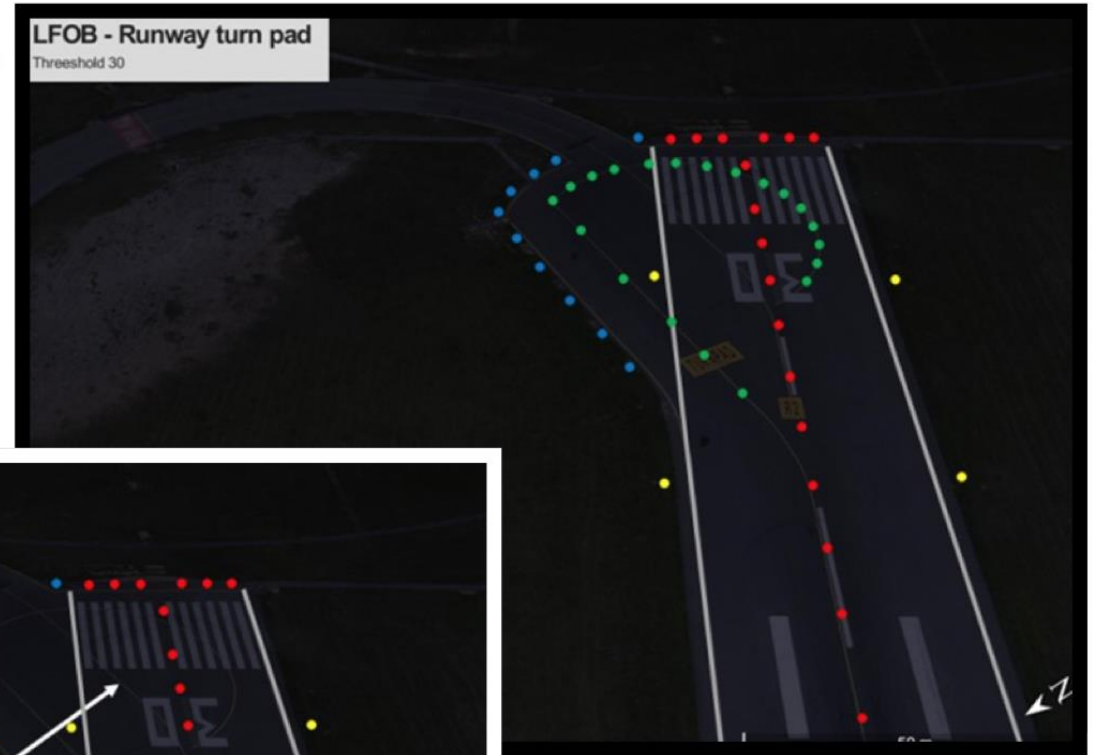


LFOB - Runway turn pad
Threshold 30

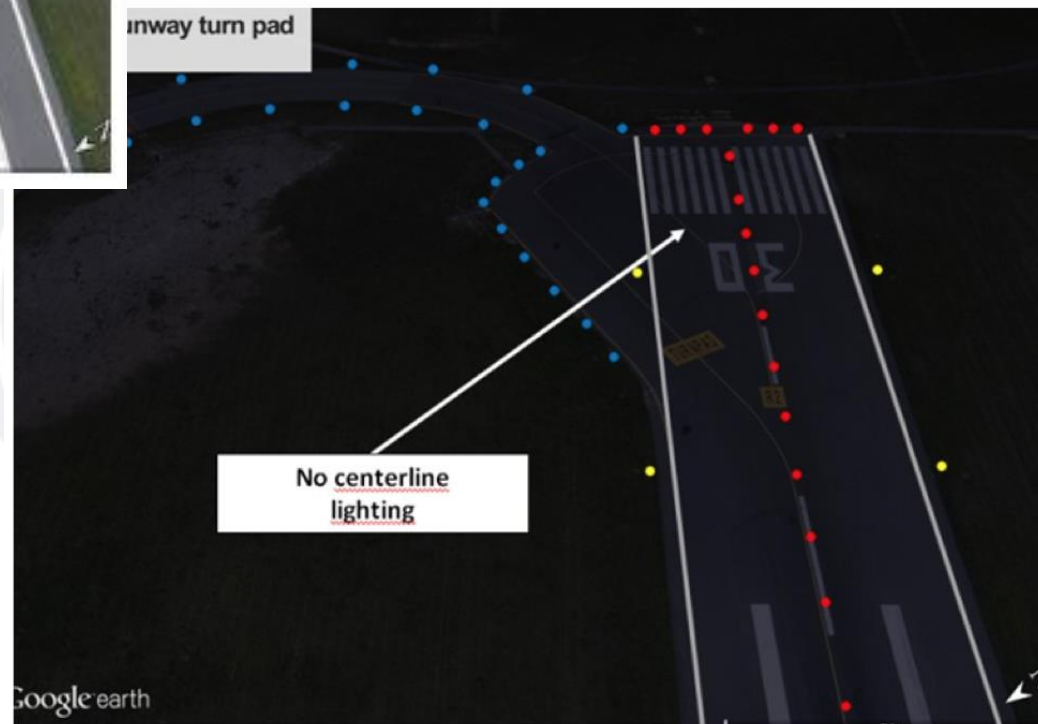


THR 30 turn pad (night)

LFOB - Runway turn pad
Threshold 30



Runway turn pad



THR 30 TWY R exit (night)



5.1.1 Wind direction indicator (windsock)

5.1.1.1 An aerodrome shall be equipped with at least one wind direction indicator.

5.1.1.2 A wind direction indicator shall be located so as to be visible from aircraft in flight or on the movement area.

5.1.1.3 The colour or colours should be so selected as to make the wind direction indicator clearly visible and understandable from a height of at least 300 m, having regard to background.

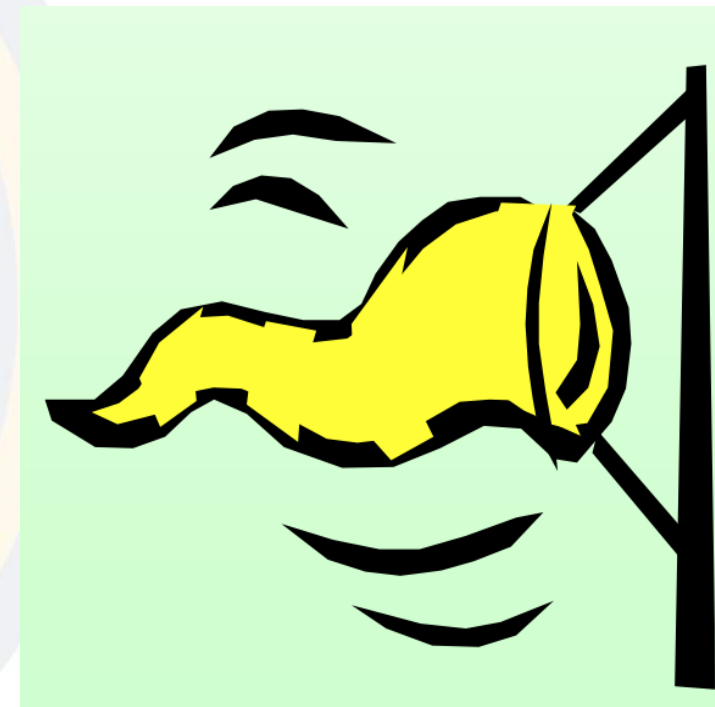


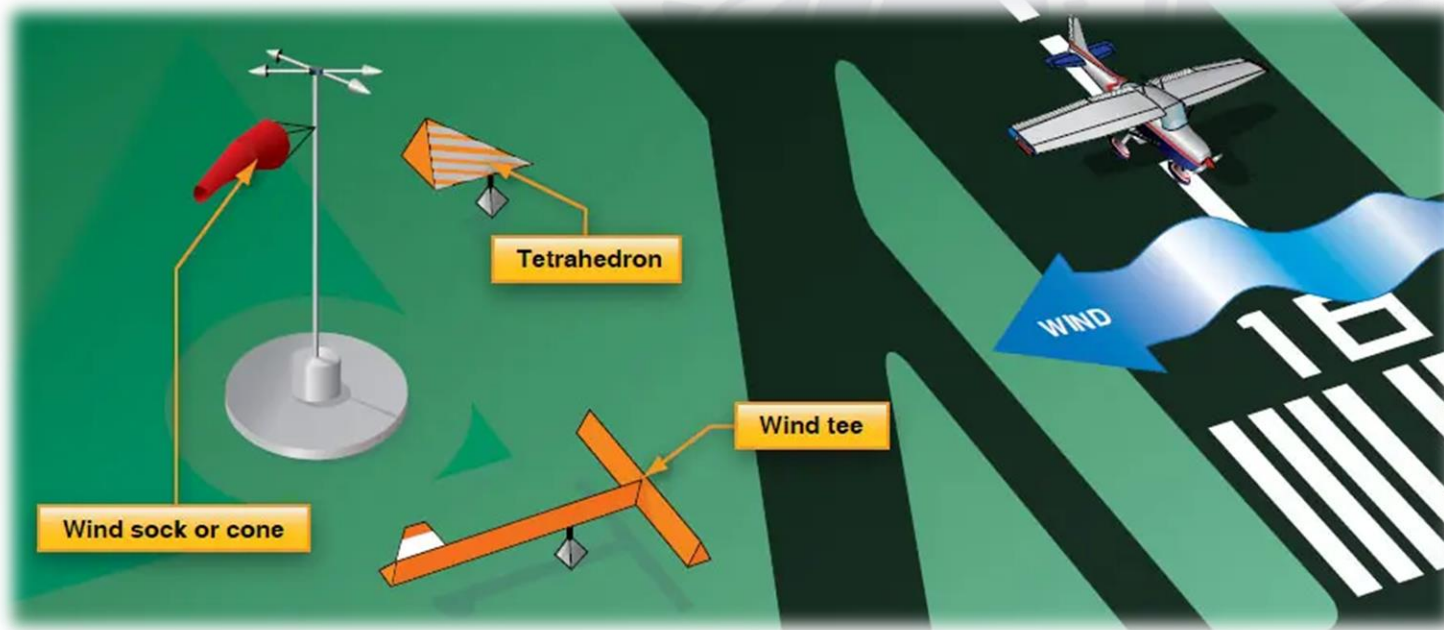
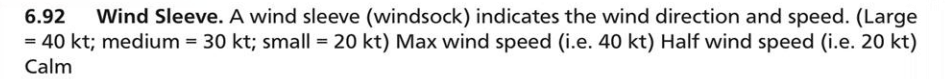


5.1.1 Wind direction indicator (windsock)

Preferably white or orange. Where a combination of two colors is required to give adequate conspicuity against changing backgrounds, they should preferably be orange and white, red and white, or black and white, and should be arranged in five alternate bands, the first and last bands being the darker colour.

The wind direction indicator should be in the form of a truncated cone made of fabric and should have a length of not less than 3.6 m and a diameter, at the larger end, of not less than 0.9 m.





Wind tees and **tetrahedrons** can swing freely, and will align themselves with the wind direction.

The wind tee and tetrahedron can also be manually set to align with the runway in use, therefore a pilot should also look at the wind sock if available.



Obstacle

Obstacle. All **fixed** (whether temporary or permanent) and **mobile** objects, or parts thereof, that:

- a) are located on an area intended for the **surface movement of aircraft**; or
- b) extend above a defined surface intended to **protect aircraft in flight**; or
- c) stand outside those defined surfaces and that have been assessed as being a **hazard to air navigation**.





11- From what height, the wind direction indicator shall be visible?

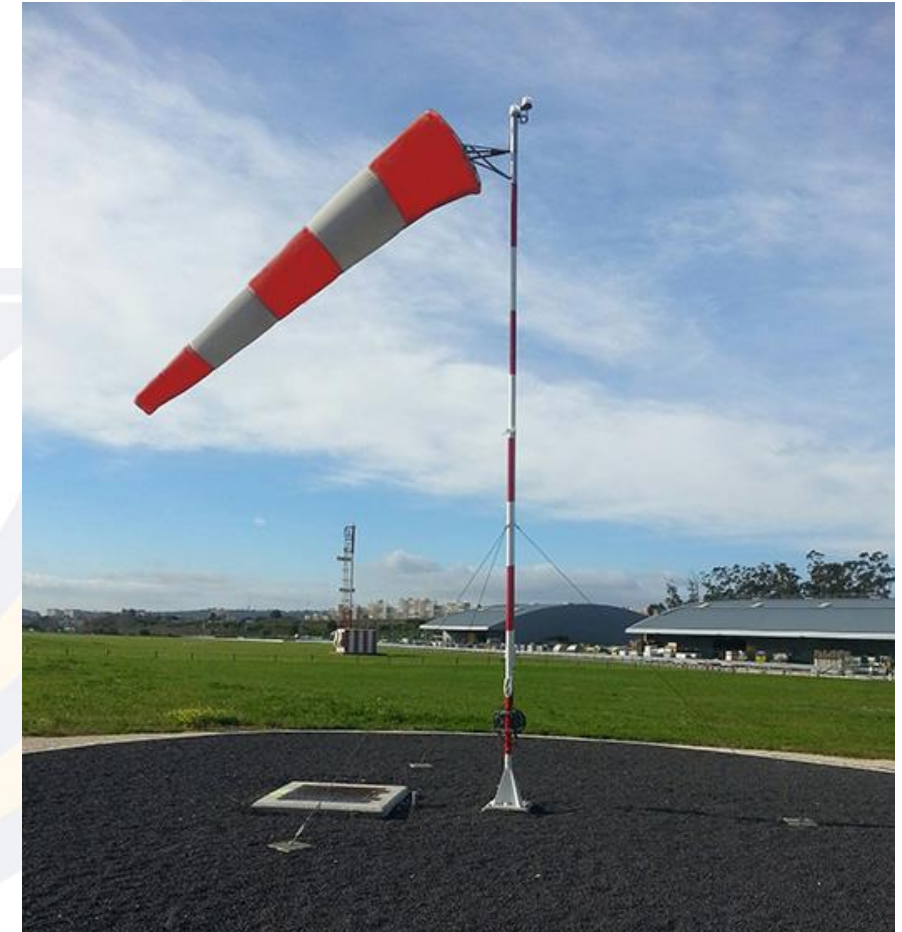
- A) 200 m
- B) 300 m
- C) At least 300 m
- D) All answers are correct



11- From what height, the wind direction indicator shall be visible?

- A) 200 m
- B) 300 m
- C) At least 300 m
- D) All answers are correct

5.1.1.3 The colour or colours should be so selected as to make the **wind direction indicator** clearly **visible** and understandable from a **height of at least 300 m**, having regard to background.





12- The runway designated number shall be provided from?

- A) Magnetic (N)
- B) True (N)
- C) Grid (N)
- D) Compass (N)



22- The “Stopway” is a defined rectangular area on the ground at the end of takeoff run available prepared as a suitable area where:

- A) A landing aircraft can be stopped only in emergency.
- B) A landing aircraft can be stopped if overcoming the end of runway.
- C) An aircraft can be stopped in the case of an abandoned takeoff.
- D) An aircraft taking-off or landing can be stopped.



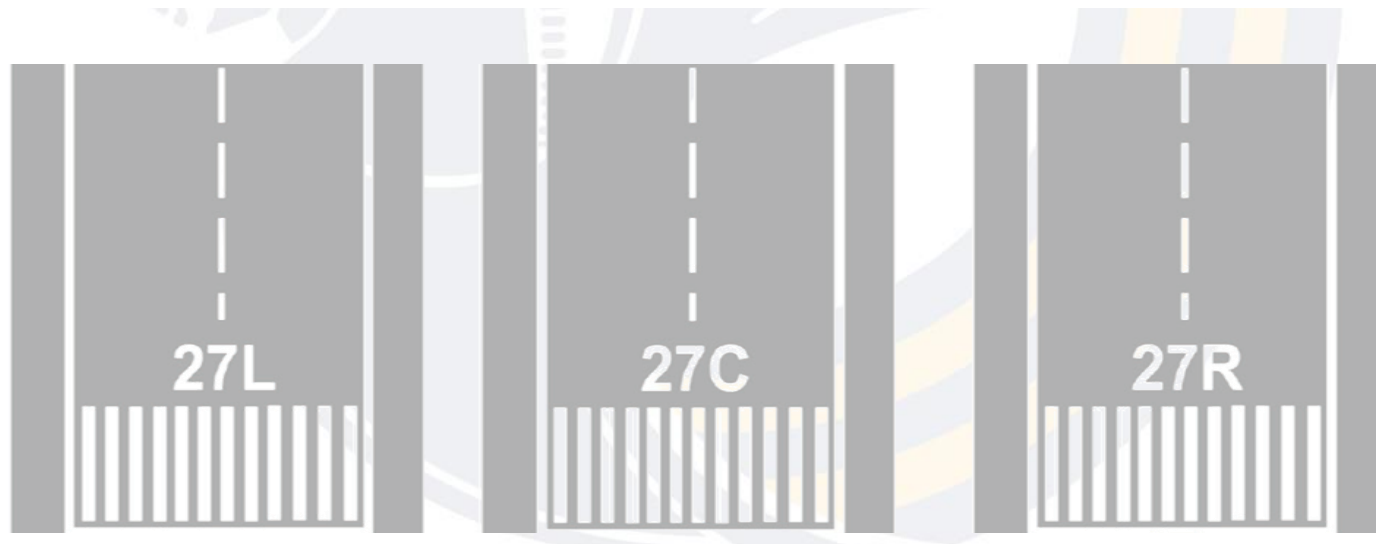
25- Which of the following group shows the correct designators for three parallel runways seen from the direction of the approach?

- A) 29, 29C, 29.
- B) 29R, 29C, 29L.
- C) 29L, 29, 29R.
- D) 29L, 29C, 29R.



25- Which of the following group shows the correct designators for three parallel runways seen from the direction of the approach?

- A) 29, 29C, 29.
- B) 29R, 29C, 29L.
- C) 29L, 29, 29R.
- D) 29L, 29C, 29R.





28- Taxiway markings and aircraft stand markings are:

- A) White.
- B) Grey.
- C) Yellow.
- D) Red.

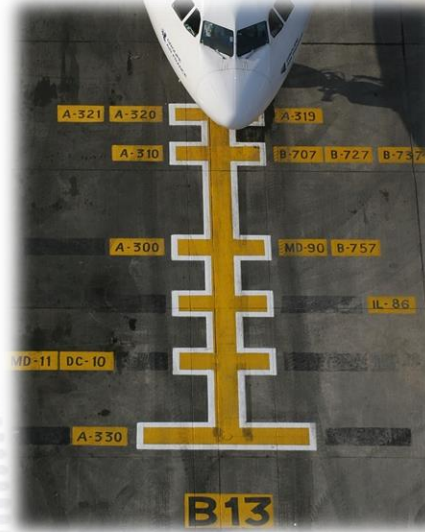
27- When taxiing on a surface with white markings, you are rolling on a:

- A) Movement area.
- B) Taxiway.
- C) Clearway.
- D) Runway.



28- Taxiway markings and aircraft stand markings are:

- A) White.
- B) Grey.
- C) Yellow.
- D) Red.



27- When taxiing on a surface with white markings, you are rolling on a:

- A) Movement area.
- B) Taxiway.
- C) Clearway.
- D) Runway.





Module objective

This module learns us about type of runway, length, width, and marker in civil aviation and gets good foundation of definitions that used for identification a runway



90 min





Aeroplane reference field length

The **minimum** field length required for **take-off** at **maximum certificated take-off mass**, **sea level**, **standard atmospheric conditions**, **still air** and **zero runway slope**, as shown in the appropriate **aeroplane flight manual** prescribed by the certifying authority or equivalent data from the aeroplane **manufacturer**.

- Field length means **balanced field length** for aeroplanes, if applicable, or take-off distance in other cases.
- The **balanced field length** is the shortest field length at which a **balanced field takeoff** can be performed.
- A **balanced field takeoff** is a condition where the accelerate-stop distance required (ASDR) is equal to the takeoff distance required (TODR).

Aeroplane reference field length must be corrected as follows:

- 1) 7% for each 300m AMSL, then
- 2) 1% for each 1° Above 15°C, then
- 3) 10% for each 1% of slope.



Aerodrome Reference Code

CODE ELEMENT 1		CODE ELEMENT 2		
Code number	Aeroplane reference field length	Code letter	Wing span	Outer main gear wheel span ^a
(1)	(2)	(3)	(4)	(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.

AIP, AD, OIXX, 2.12
OIII, OIIE, OISS, OIMM: 4E

Doc 9157
part 1



Aerodrome Reference Code

Element 1 is a number based on the:

- **aeroplane reference field length** and

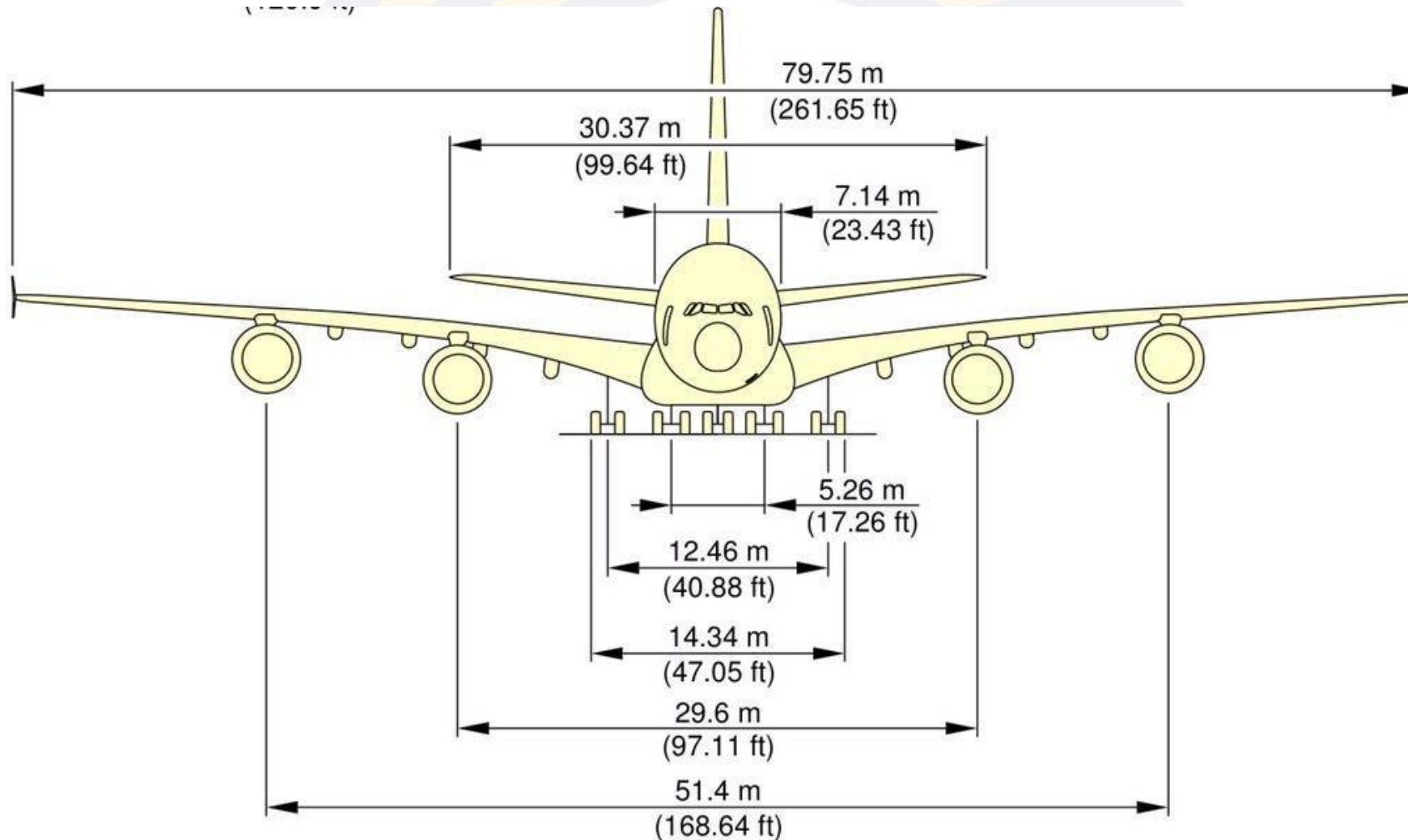
element 2 is a letter based on the aeroplane:

- **wing span** and
- the **outer main gear wheel span**.

AEROPLANE TYPE	REF CODE	ARFL (m)	Wingspan (m)	OMGWS (m)
Lear Jet 55	3A	1292	13.4	2.5
Fokker F28-2000	3B	1646	23.6	5.8
Fokker:F27-500	3C	1670	29.0	7.9
Airbus A300 B2	3D	1676	44.8	10.9
Boeing: B737-200	4C	2295	28.4	6.4
B737-300	4C	2749	28.9	6.4
B737-400	4C	2499	28.9	6.4
Boeing: B707-300	4D	3088	44.4	7.9
B757-200	4D	2057	38.0	8.7
B767-200ER	4D	2743	47.6	10.8
Boeing: B747-300	4E	3292	59.6	12.4
B747-400	4E	3383	64.9	12.4
B777-200	4E	2500	60.9	12.8



Outer main gear wheel span (OMGWS). The distance between the *outside edges* of the main gear wheels.





Marker. An object displayed above ground level in order to indicate an **obstacle** or delineate a **boundary**.

Marking. A symbol or group of symbols displayed on the **surface** of the movement area in order to convey aeronautical information.

Sign.

a) Fixed message sign. A sign presenting only one message.

b) Variable message sign. A sign capable of presenting several predetermined messages or no message, as applicable.







Non-instrument runway. A runway intended for the operation of aircraft using **visual approach procedures** or an instrument approach procedure to a point beyond which the approach may continue in **visual meteorological conditions**.

19.31 Visual Runway. A non-instrument (visual) runway is used where **take-off and landing criteria are determined visually**. The criteria are usually defined by reference to **ground visibility or RVR, cloud ceiling and day/night** considerations.



Instrument runway. One of the following types of runways intended for the operation of aircraft using instrument approach procedures:

a) Non-precision approach runway. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation **type A** and a **visibility not less than 1 000 m**.

b) Precision approach runway, category I. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation **type B** with a decision height (**DH**) not lower than 60 m (**200 ft**) and either a **visibility** not less than **800 m** or a **RVR** not less than **550 m**.

c) Precision approach runway, category II. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation **type B** with a decision height (**DH**) lower than 60 m (**200 ft**) but not lower than 30 m (**100 ft**) and a **RVR** not less than **300 m**.

d) Precision approach runway, category III. A runway served by visual aids and non-visual aid(s) intended for landing operations following an instrument approach operation **type B** to and along the surface of the runway and:

A — intended for operations with a decision height (**DH**) lower than 30 m (**100 ft**), or **no** decision height and a **RVR** not less than **175 m**.

B — intended for operations with a decision height (**DH**) lower than 15 m (**50 ft**), or **no** decision height and a **RVR** less than **175 m** but not less than **50 m**.

C — intended for operations with **no** decision height (**DH**) and **no RVR** limitations.



Annex 6 Amend 44, 5/11/2020

a) Type A: a **MDH** or **DH** at or above 75 m (250 ft); and

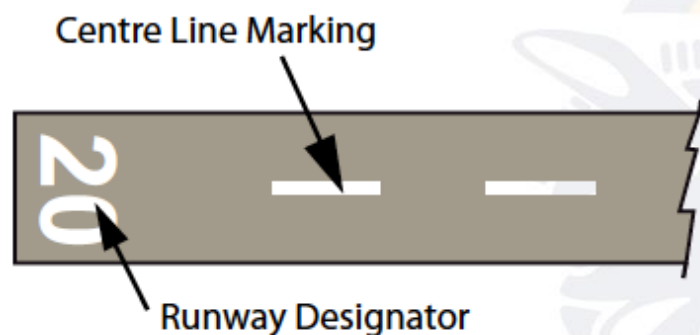
b) Type B: a DH below 75 m (250 ft).

Type B instrument approach operations are categorized as:

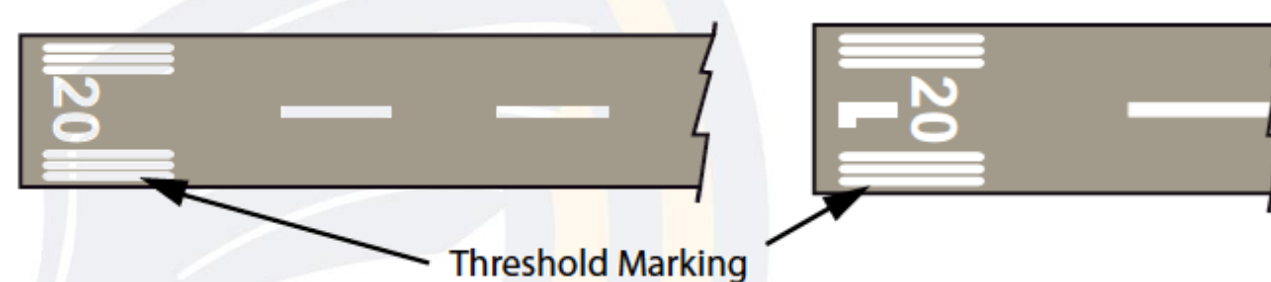
- 1) **Category I (CAT I):** a **DH** not lower than 60 m (**200 ft**) and with either a **visibility** not less than **800 m** or a RVR not less than **550 m**;
- 2) **Category II (CAT II):** a **DH** lower than 60 m (**200 ft**) but not lower than 30 m (**100 ft**) and a **RVR** not less than **300 m**; and
- 3) **Category III (CAT III):** a DH lower than 30 m (**100 ft**) or **no** DH and a **RVR** less than **300 m** or **no** RVR limitations.



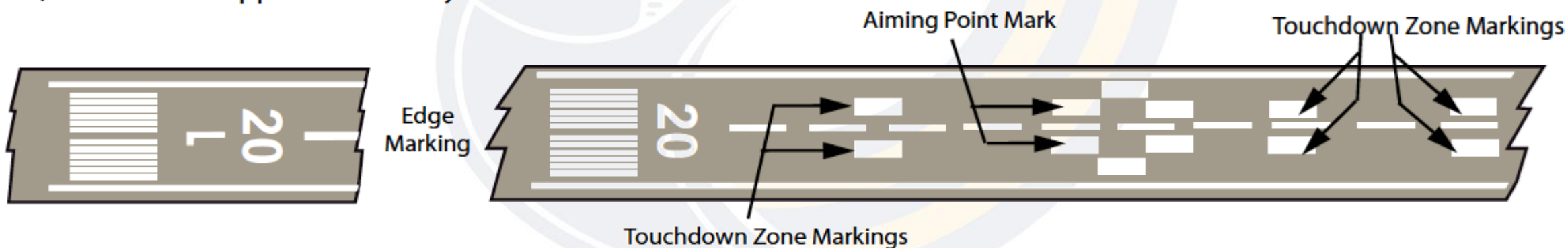
a) Visual Runways - LDA < 1200m



b) Non Precision Approach Runways, Visual Runways of LDA > 1200m and where Threshold requires emphasis



c) Precision Approach Runways





Application

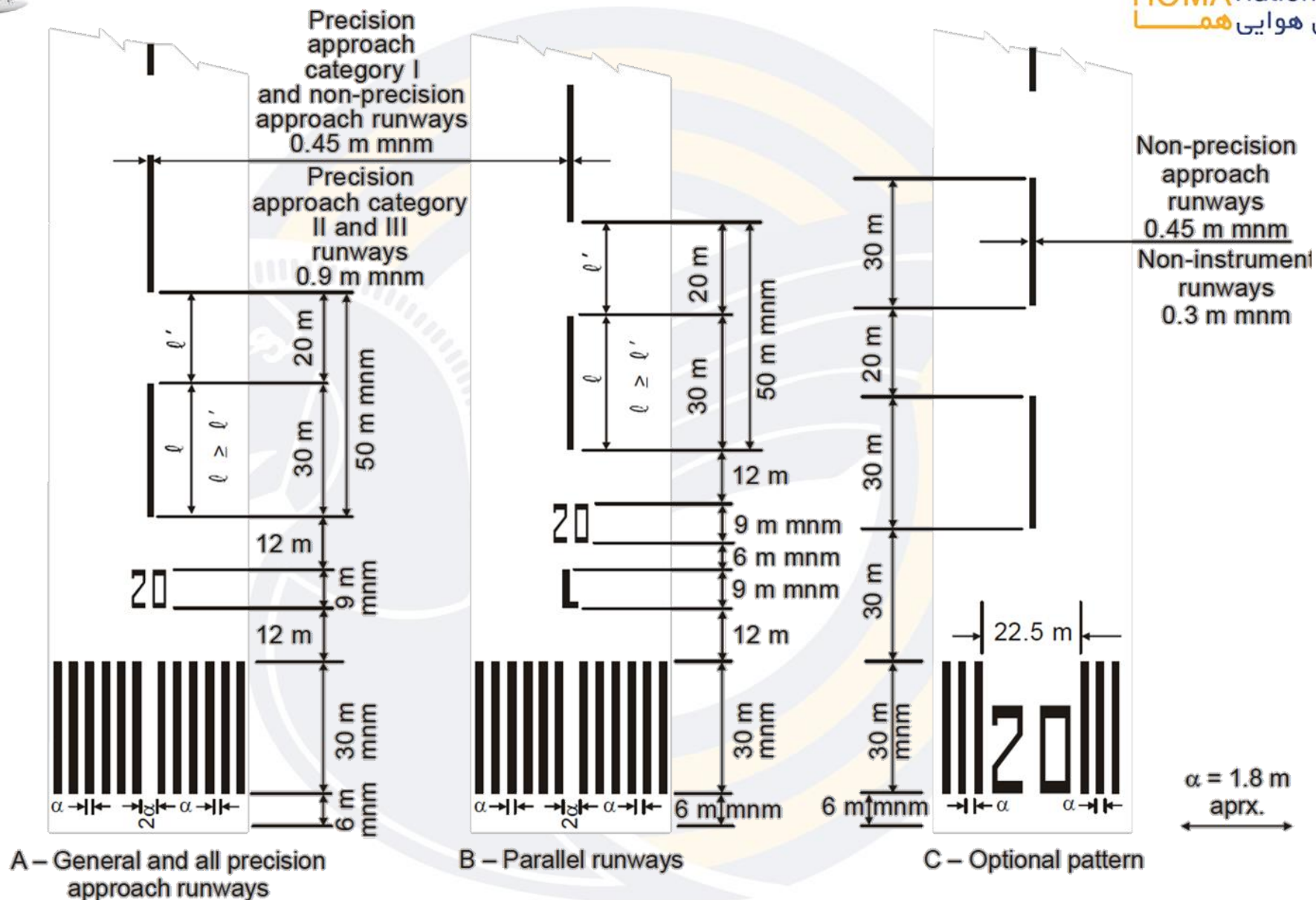
5.2.3.1 A runway centre line marking **shall** be provided on a **paved** runway. **[NOT INSTRUMENT]**

Characteristics

5.2.3.3 A runway centre line marking shall consist of a line of **uniformly spaced stripes** and **gaps**.

The **length of a stripe plus a gap** shall be not **less than 50 m or more than 75 m**.

The length of each **stripe** shall be at least equal to the length of the **gap** **or** 30 m, whichever is **greater**.





5.2.4 Threshold marking

5.2.4.5 A runway threshold marking shall consist of a pattern of longitudinal stripes of uniform dimensions disposed symmetrically about the centre line of a runway for a **runway width** of 45 m.

The number of stripes shall be in **accordance with the runway width** as follows:

Runway width	Number of stripes	Stripe length
18 meters	4	24 meters
23 meters	6	24 meters
30 meters	8	30 meters
45 meters	12	30 meters
60 meters	16	30 meters





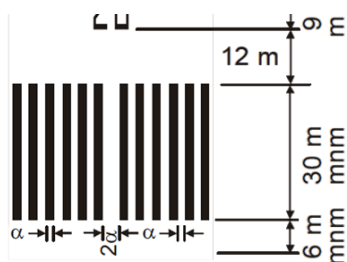
5.2.4.1 A threshold marking shall be provided at the threshold of a

1) **paved instrument runway**, and

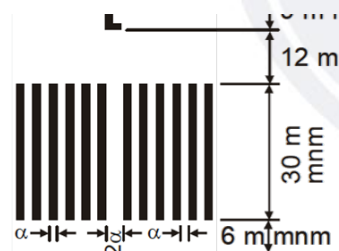
2) of a **paved non-instrument runway** where the code number is **3** or **4** and the runway is intended for use by **international commercial** air transport.

5.2.4.4 The stripes of the threshold marking shall **commence 6 m from the threshold**.

Code element 1	
Code number	Aeroplane reference field length
1	Less than 800 m
2	800 m up to but not including 1 200 m
3	1 200 m up to but not including 1 800 m
4	1 800 m and over



A – General and all precision approach runways



B – Parallel runways



C – Optional pattern

The stripes shall be continued across the runway. The stripes shall be at least 30 m long and approximately 1.80 m wide with spacings of approximately 1.80 m between



20.16 Transverse Stripe. Where a threshold is displaced from the extremity of a runway (the end of the concrete) or where the end is not at right angles to the runway centre line, a transverse stripe should be added to the threshold marking.

Transverse
Stripe →





5.2.5 Aiming point marking

Application

5.2.5.1 An aiming point marking shall be provided at each approach end of a **paved instrument** runway where the code number is **2**, **3** or **4**.

Location and dimensions (1)	Landing distance available			
	Less than 800 m (2)	800 m up to but not including 1 200 m (3)	1 200 m up to but not including 2 400 m (4)	2 400 m and above (5)
Distance from threshold to beginning of marking	150 m	250 m	300 m	400 m
Length of stripe ^a	30–45 m	30–45 m	45–60 m	45–60 m
Width of stripe	4 m	6 m	6–10 m ^b	6–10 m ^b
Lateral spacing between inner sides of stripes	6 m ^c	9 m ^c	18–22.5 m	18–22.5 m



This runway is 12 000 ft
(3637 m) long and 300 ft

60

wide

RAF Brize Norton
January 2006

UK CAA aiming
point marking





Aiming Point Marking Location	
Landing Distance Available (LDA)	Threshold to Beginning of Marking
Less than 800 m	150 m
800 m up to but not including 1200 m	250 m
1200 m up to but not including 2400 m	300 m
2400 m or more	400 m





5.2.6 Touchdown zone marking

Application

5.2.6.1 A touchdown zone marking shall be provided in the touchdown zone of a **paved precision** approach runway where the code number is **2, 3 or 4**.

<i>Landing distance available or the distance between thresholds</i>	<i>Pair(s) of markings</i>
less than 900 m	1
900 m up to but not including 1 200 m	2
1 200 m up to but not including 1 500 m	3
1 500 m up to but not including 2 400 m	4
2 400 m or more	6

Example:

What shall be the length of touchdown zone if RWY length is 2355 m? **$4 \times 150 = 600$**

Example:

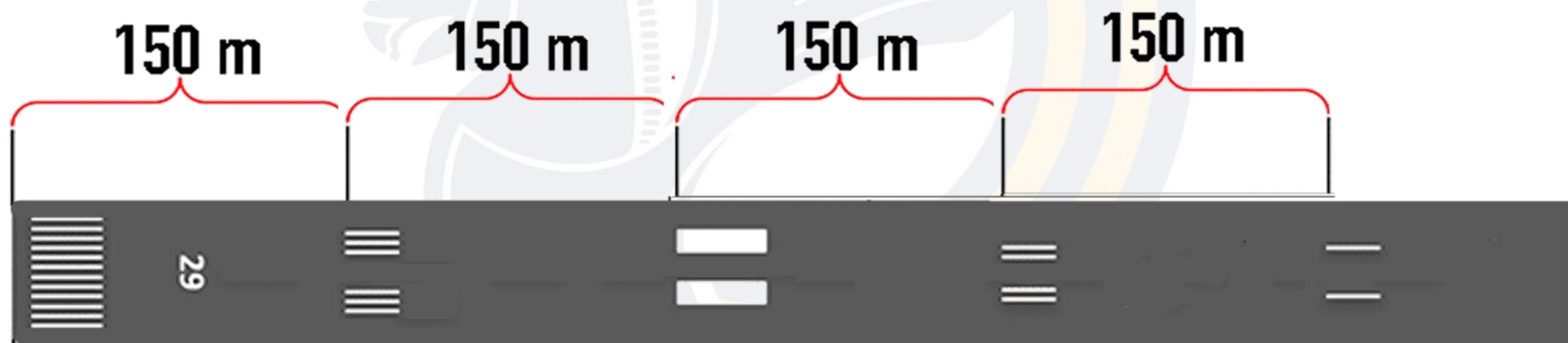
What shall be the length of touchdown zone if RWY length is 3050 m? **$6 \times 150 = 900$**

The pairs of markings shall be provided at longitudinal spacings of **150 m** beginning from the threshold.



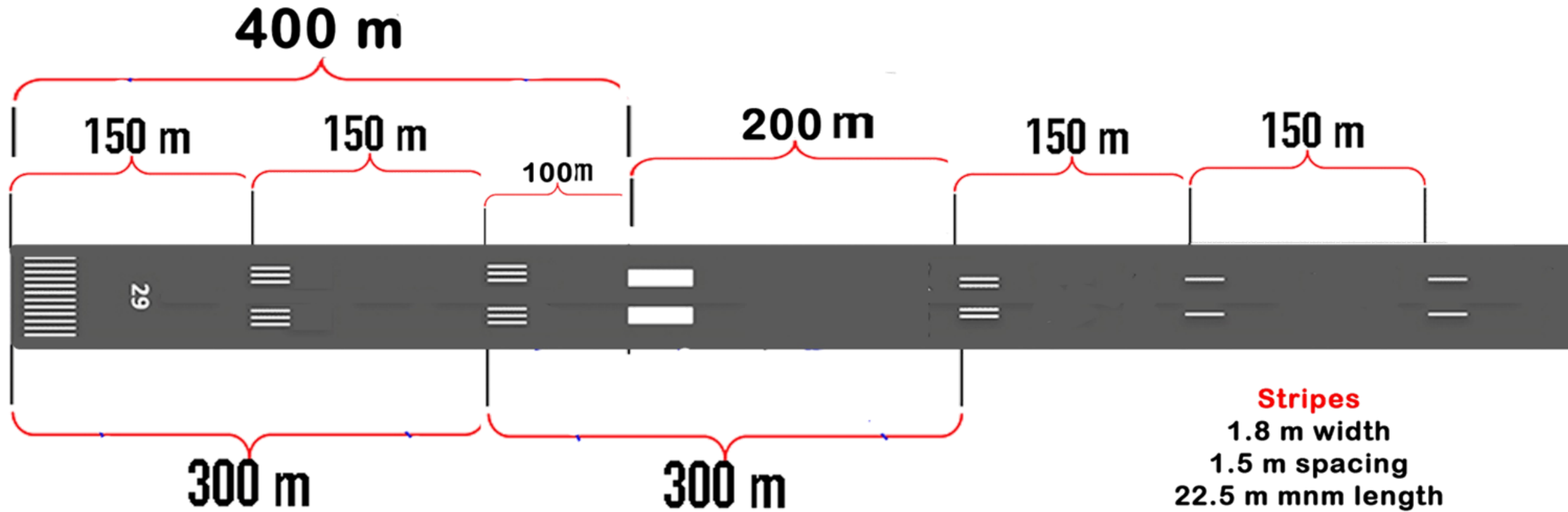
Touchdown zone and aiming point marking

4 pairs



Touchdown zone and aiming point marking

6 pairs







© Daniel Werner

Figure 20.6 Pattern "A", basic plain markings



Figure 20.7 Pattern "B", distance coded



5.2.10 Runway-holding position marking

5.2.10.2 At an intersection of a taxiway and a **non-instrument, non-precision approach** or **take-off** runway, the runway holding position marking shall be as shown in Figure 5-6, pattern **A**.

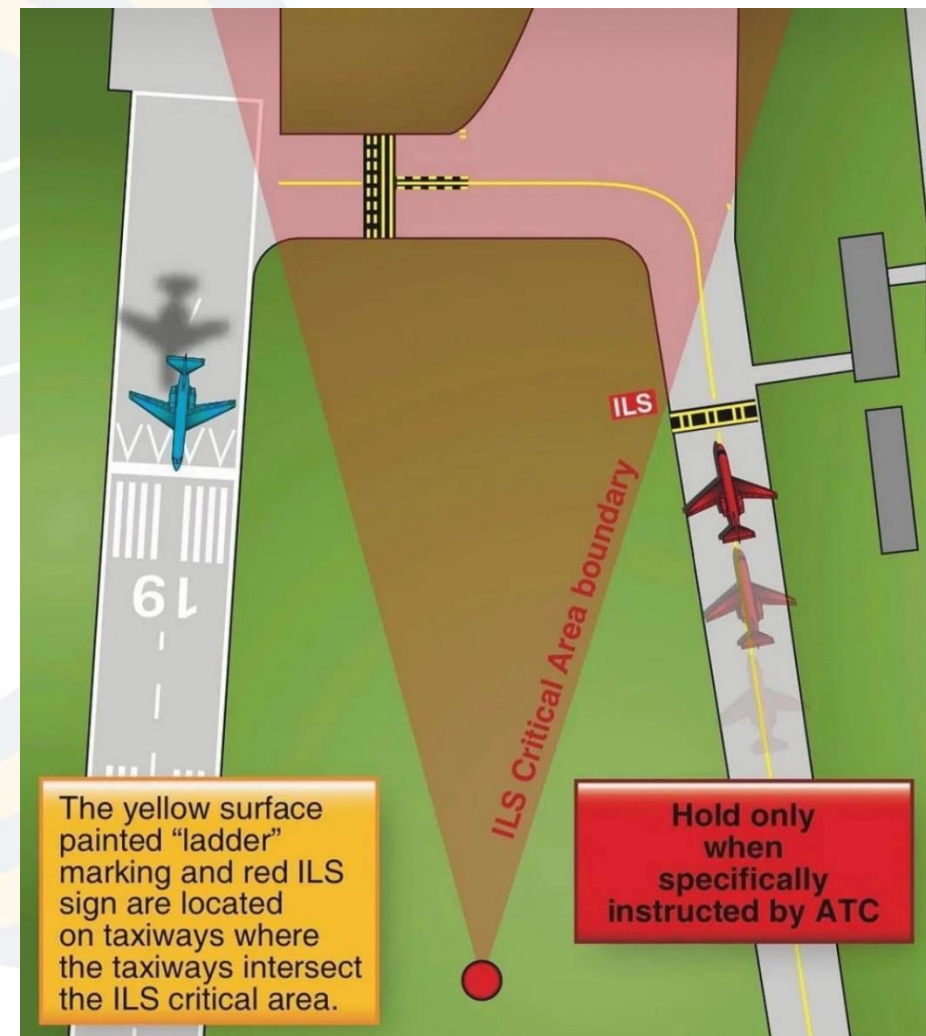




5.2.10 Runway-holding position marking

5.2.10.3 Where a **single** runway-holding position is provided at an intersection of a taxiway and a precision approach **category I, II or III** runway, the runway-holding position marking shall be as shown in Figure 5-6, pattern **A**.

Where **two or three** runway-holding positions are provided at such an intersection, the runway-holding position marking **closer (closest)** to the runway shall be as shown in Figure 5-6, pattern **A** and the markings **farther** from the runway shall be as shown in Figure 5-6, pattern **B**.



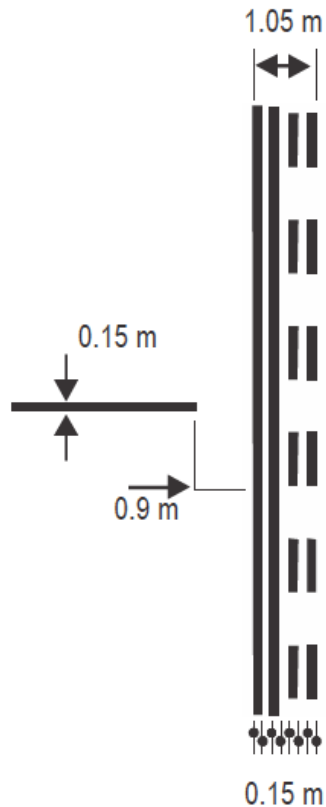


Runway-holding position markings

Note.— Patterns A1 and B1 are no longer valid after 2026.

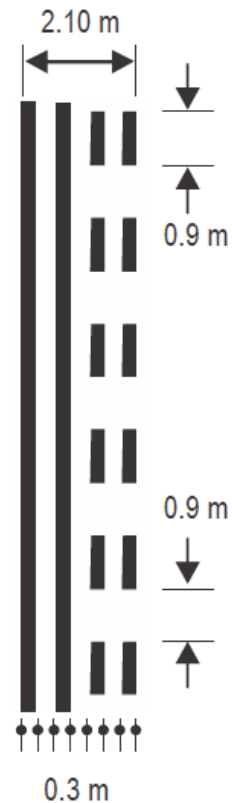
PATTERN A1:

4 lines and
3 spaces at
0.15 m each



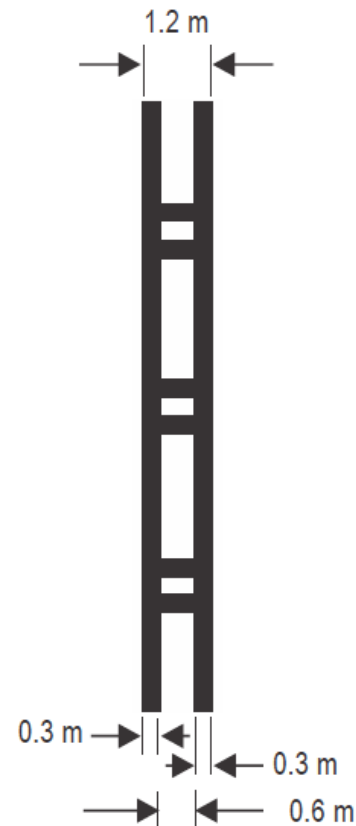
PATTERN A2:

4 lines and
3 spaces at
0.3 m each



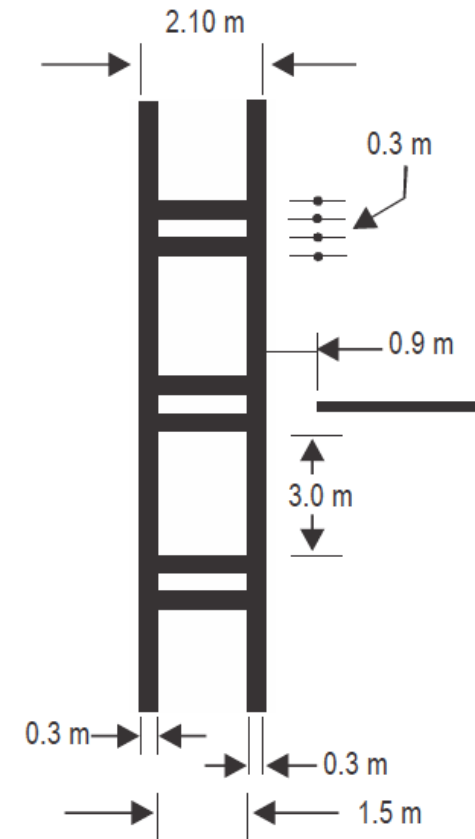
PATTERN B1:

2 lines at
0.3 m each
1 space at 0.6 m



PATTERN B2:

2 lines at
0.3 m each
1 space at 1.5 m



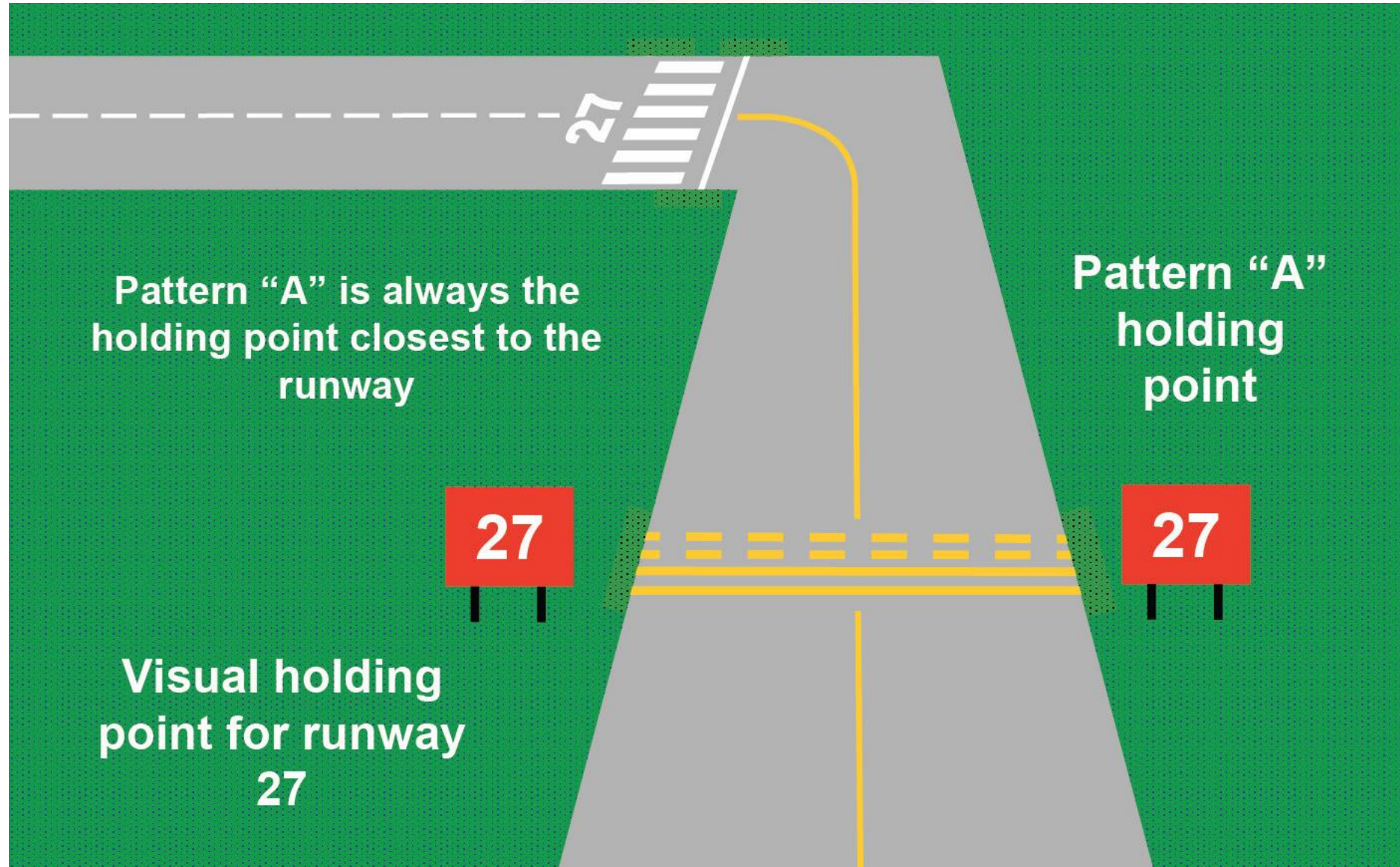


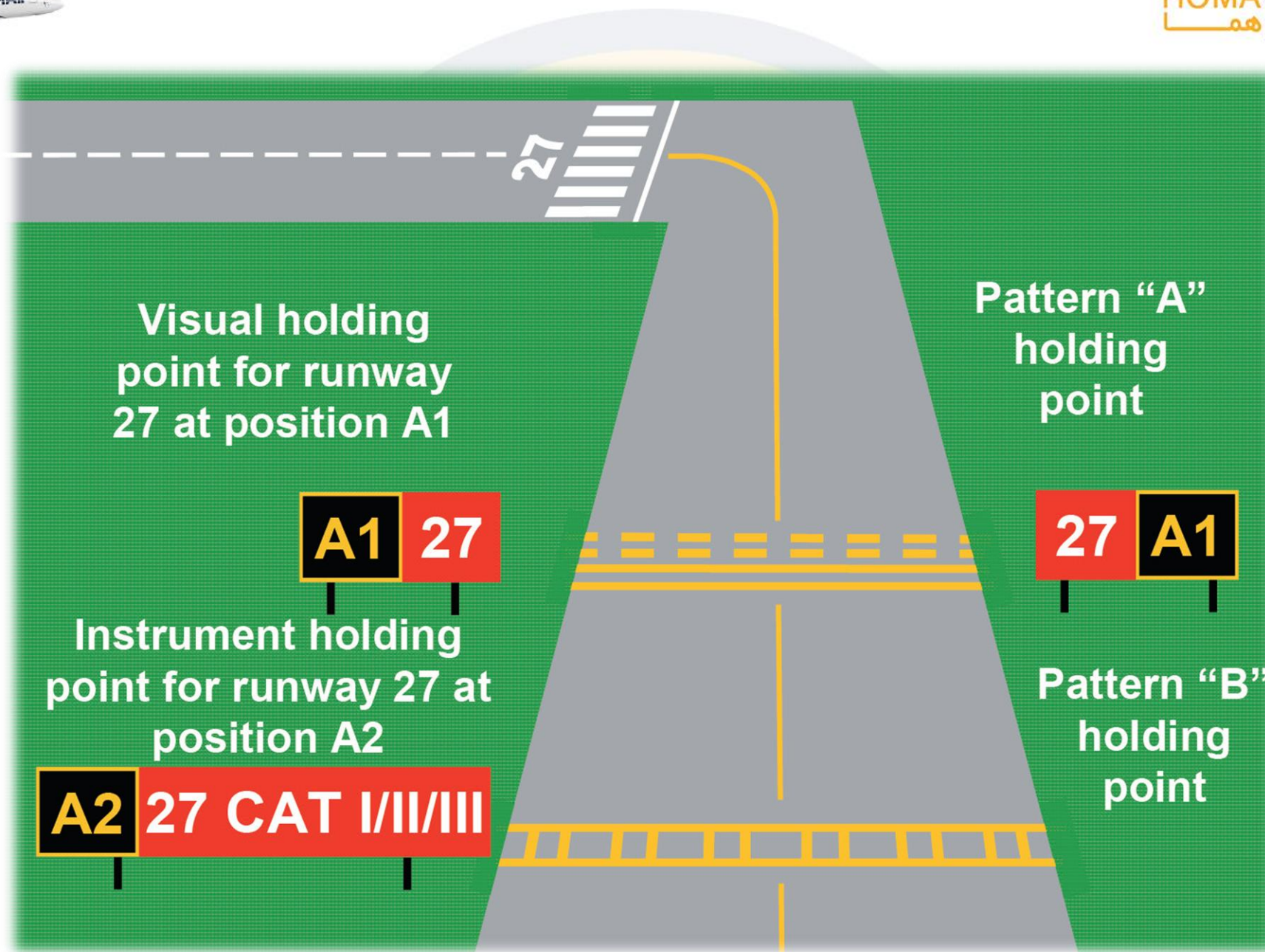


Taxi-Holding
Position

Taxiway
edge

Taxiway
Centreline







Runway Holding Point Positions (Distance from Centre Line of Runway)

Type of Runway	Runway code number			
	1	2	3	4
Take-off	30 m	40 m	75 m	75 m
Non-instrument (Visual)	30 m	40 m	75 m	75 m
Non-precision Instrument	40 m	40 m	75 m	75 m
Precision CAT I	60 m(b)	60 m(b)	90 m(a,b)	90 m(a,b,c)
Precision CAT II/III	-	-	90 m(a,b)	90 m(a,b,c)

Notes:

- May be increased if holding elevation lower than runway
- May be increased to avoid interference with radio navigation aids
- For code F this should be 107.5 m



1- Based on what criteria(s), the aerodrome reference code shall be determined?

- A) Wingspan.
- B) Outer main gear wheel span.
- C) Aeroplane reference field length.
- D) All answers are correct.

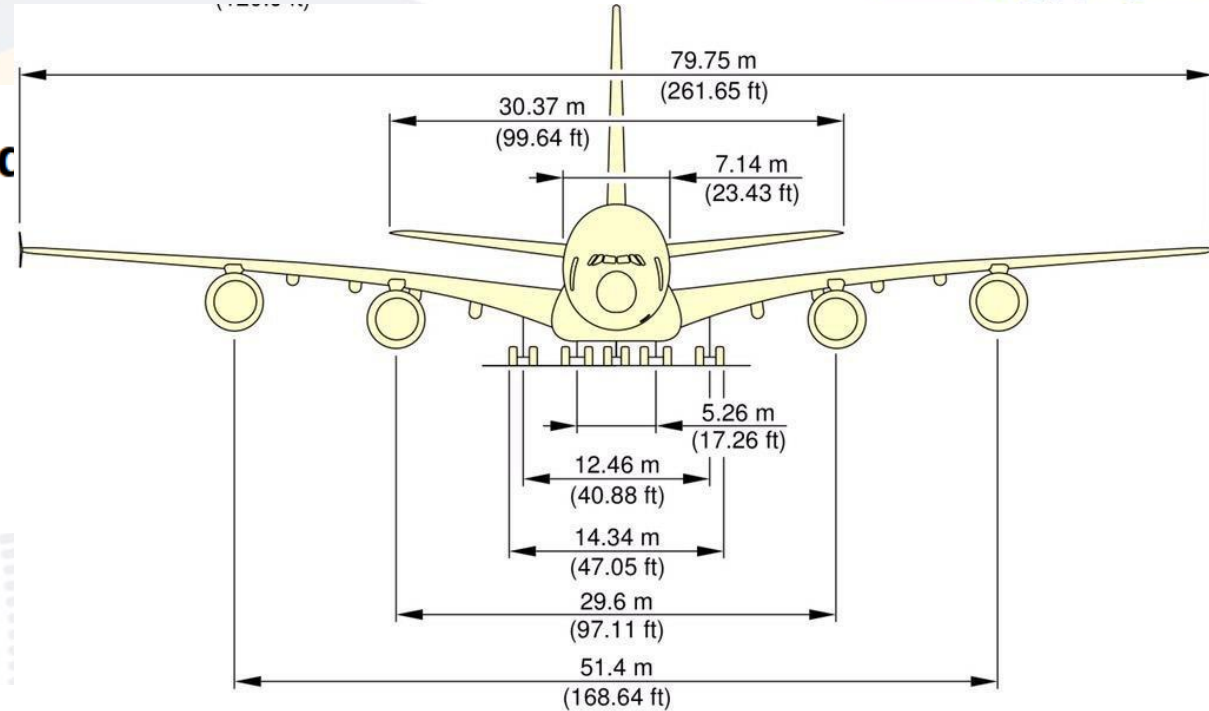
3- What shall be the minimum and maximum length of runway center line strip marking plus a gap in (m)?

- A) 50-60.
- B) 50-75.
- C) 60-80.
- D) 40-60.



1- Based on what criteria(s), the aeroc

- A) Wingspan.
- B) Outer main gear wheel span.
- C) Aeroplane reference field length.
- D) All answers are correct.



3- What shall be the minimum and maximum length of runway center line strip marking plus a gap in (m)?

- A) 50-60.
- B) 50-75.
- C) 60-80.
- D) 40-60.

The **length of a stripe plus a gap** shall be not **less than 50 m or more than 75 m**.



4- When the aiming point marking shall be provided at 400M from threshold, provided the RWY length is:

- A) 900 m.
- B) 2000 m.
- C) 3000 m.
- D) All answers are correct.

5- What shall be the length of touchdown zone if RWY length is 2355 m?

- A) 400 m.
- B) 500 m.
- C) 600 m.
- D) 700 m.



4- When the aiming point marking shall be provided at 400M from threshold, provided the RWY length is:

- A) 900 m.
- B) 2000 m.
- C) 3000 m.
- D) All answers are correct.

Aiming Point Marking Location	
Landing Distance Available (LDA)	Threshold to Beginning of Marking
Less than 800 m	150 m
800 m up to but not including 1200 m	250 m
1200 m up to but not including 2400 m	300 m
2400 m or more	400 m

5- What shall be the length of touchdown zone if RWY length is 2355 m?

- A) 400 m.
- B) 500 m.
- C) 600 m.
- D) 700 m.

<i>Landing distance available or the distance between thresholds</i>	<i>Pair(s) of markings</i>
less than 900 m	1
900 m up to but not including 1 200 m	2
1 200 m up to but not including 1 500 m	3
1 500 m up to but not including 2 400 m	4
2 400 m or more	6



14- When the aiming point marking shall be provided at 300 M from threshold, RWY Length is:

- A) 4000 m
- B) 3000 m
- C) 1000 m
- D) 2000 m

Aiming Point Marking Location	
Landing Distance Available (LDA)	Threshold to Beginning of Marking
Less than 800 m	150 m
800 m up to but not including 1200 m	250 m
1200 m up to but not including 2400 m	300 m
2400 m or more	400 m

15- What shall be the length of touchdown zone if RWY length is 3050 m?

- A) 900 m
- B) 800 m
- C) 700 m
- D) 600 m

<i>Landing distance available or the distance between thresholds</i>	<i>Pair(s) of markings</i>
less than 900 m	1
900 m up to but not including 1 200 m	2
1 200 m up to but not including 1 500 m	3
1 500 m up to but not including 2 400 m	4
2 400 m or more	6



Simple approach lighting system

5.3.4.4 The lights forming the centre line shall be placed at longitudinal **intervals of 60 m**, except that, when it is desired to improve the guidance, an interval of **30 m may be used**.

5.3.4.7 The lights of a simple approach lighting system shall be **fixed lights** and the colour of the lights shall be such as to ensure that the system is readily distinguishable from other aeronautical ground lights, and from extraneous lighting if present.

Each centre line light shall consist of either:

- a) a **single source**; or
- b) a **barrette at least 3 m** in length.

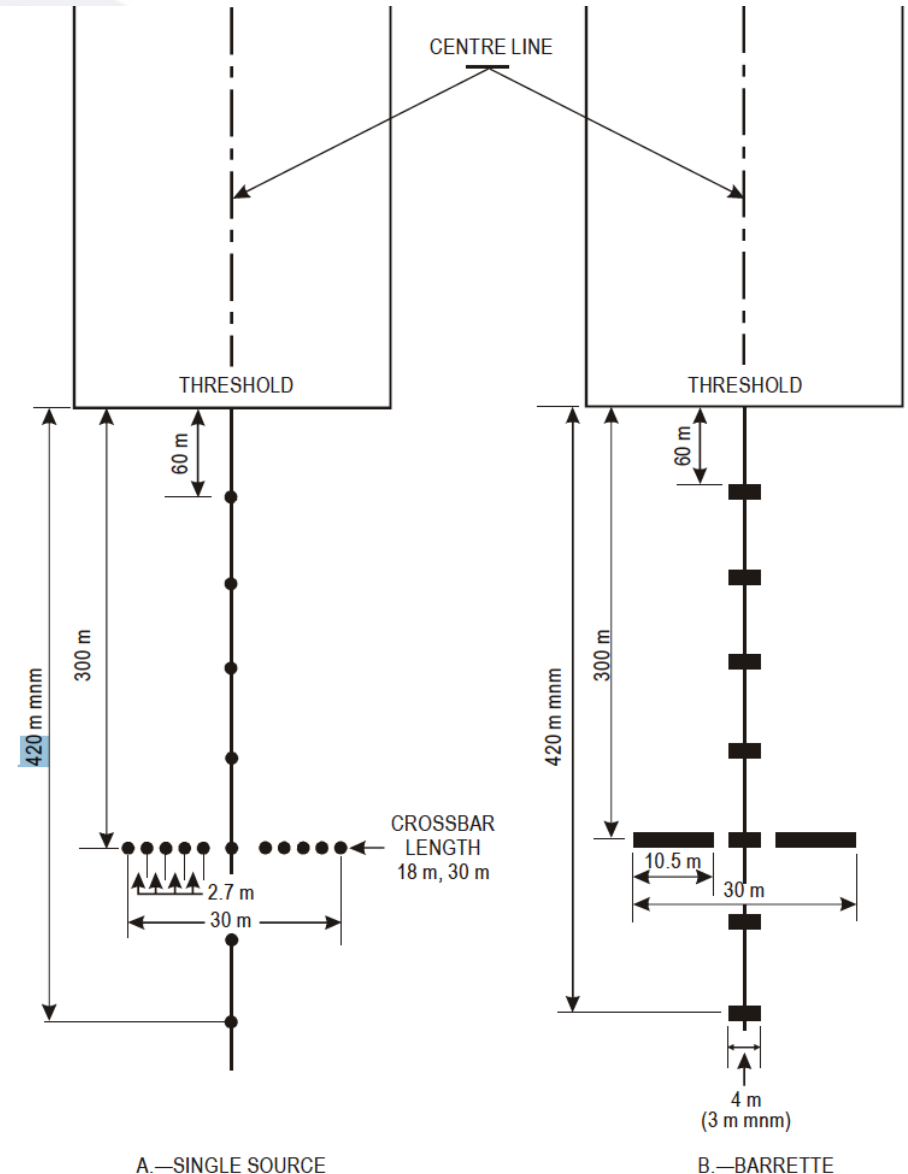




Simple approach lighting system

Location

5.3.4.2 A **simple approach lighting system** shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of **not less than 420 m** **from the threshold** with a row of lights forming a **crossbar 18 m or 30 m** in length at a distance of **300 m from the threshold**.





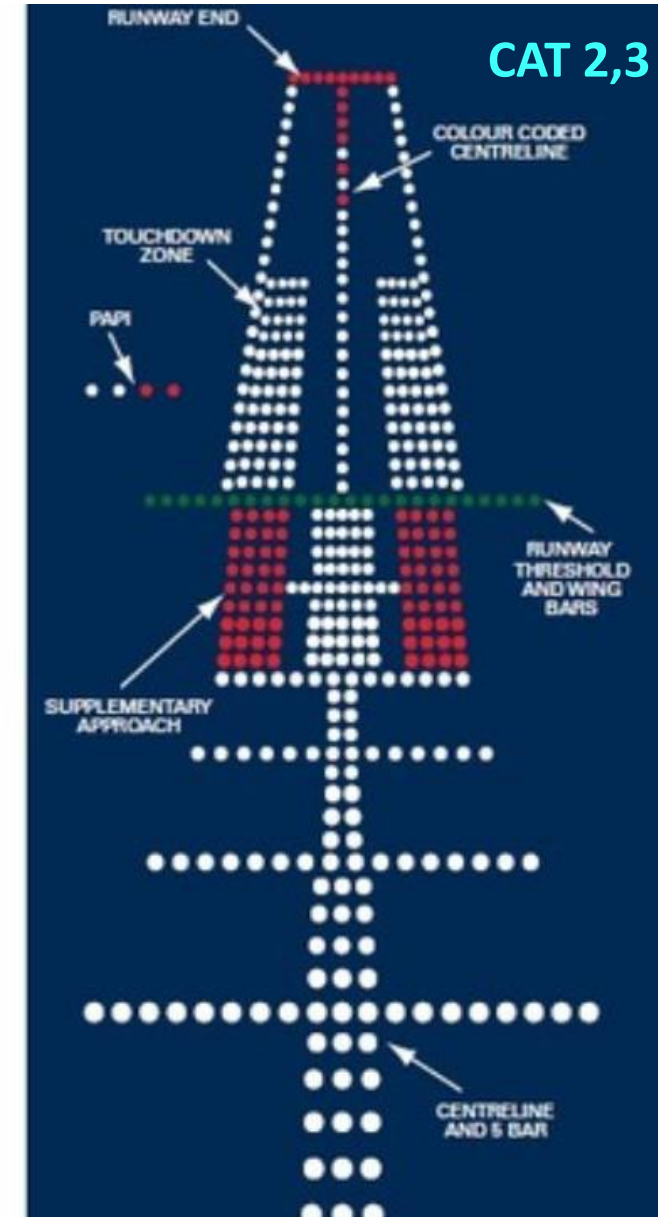
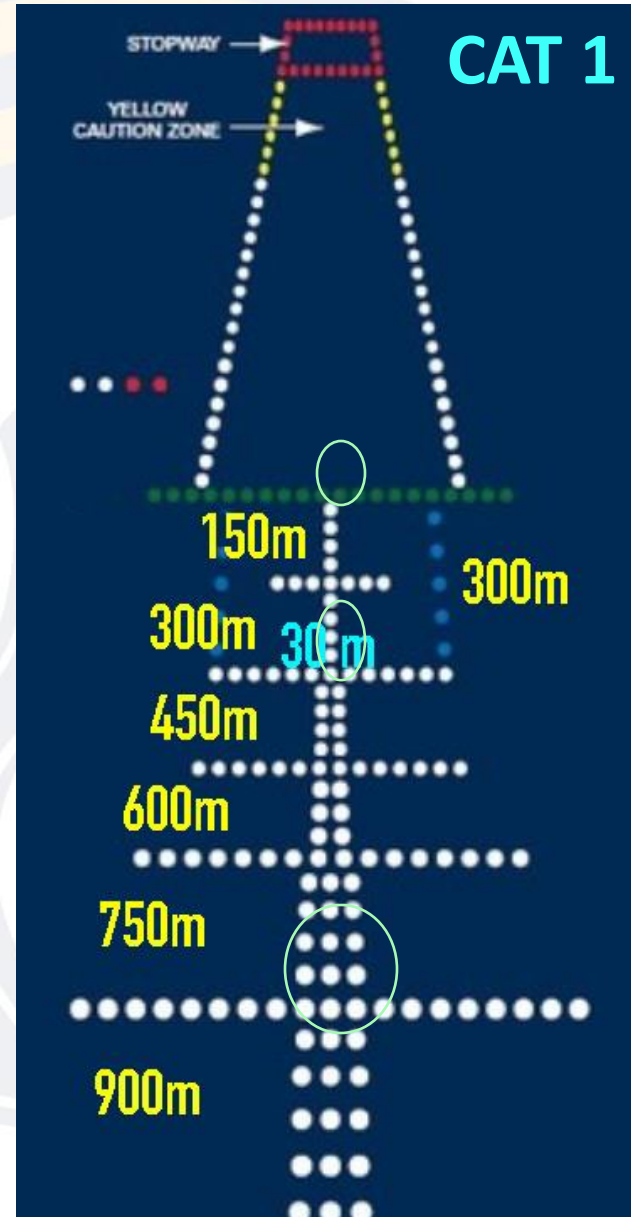


Precision approach category I lighting system

5.3.4.10 A precision approach **category I lighting system** shall consist of a row of lights on the extended centre line of the runway extending, wherever possible, over a distance of **900 m** from the runway threshold with a row of lights forming a **crossbar 30 m in length at a distance of 300 m from the runway threshold**.

5.3.4.19 Calvert System

If the **centre line consists of lights**, additional crossbars of lights to the crossbar provided at **300 m** from the threshold shall be provided at **150 m**, **450 m**, **600 m** and **750 m** (i.e. **5 crossbars**) from the threshold.





Centerline lights





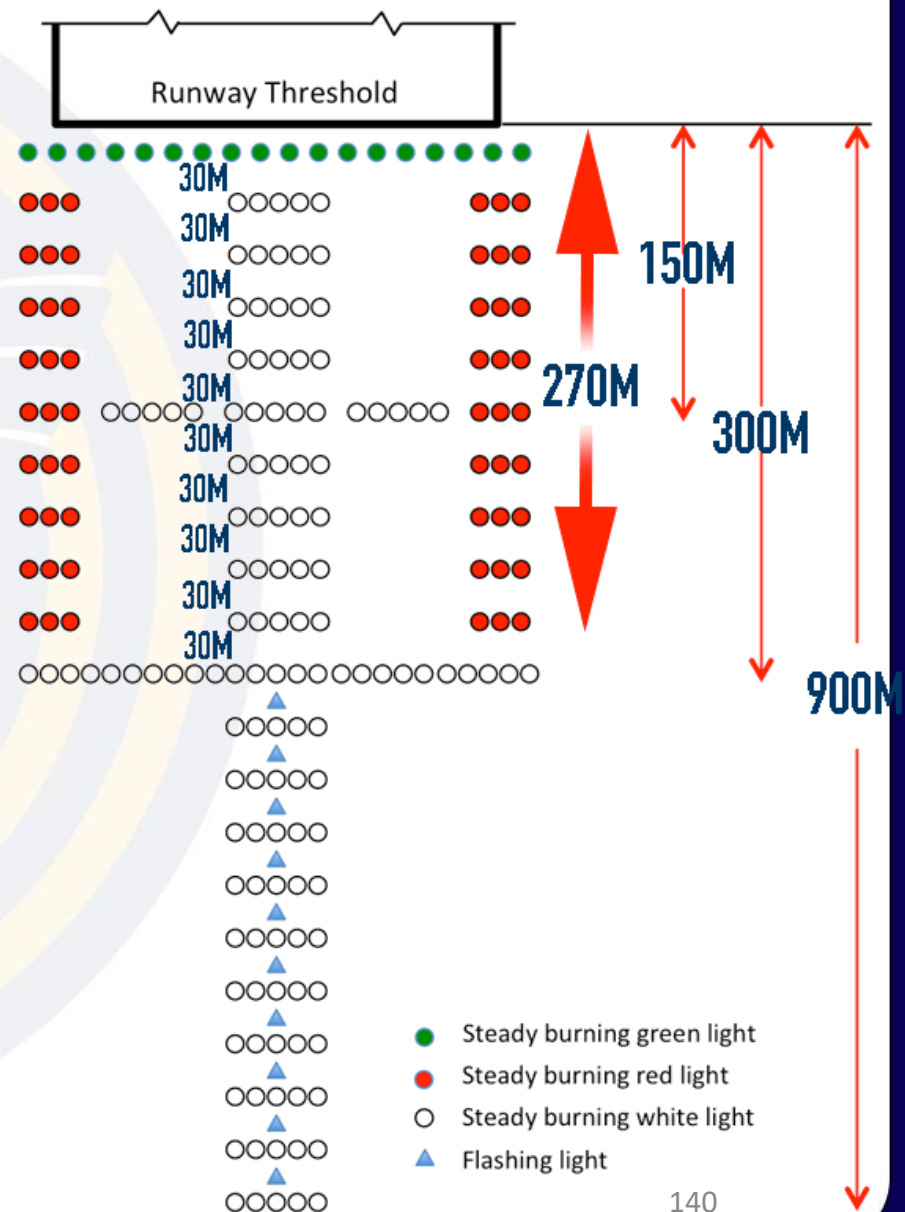
Precision approach category II and III lighting system

5.3.4.22 The approach lighting system shall consist of a row of lights on the extended centre line of the runway, extending, wherever possible, **over a distance of 900 m** from the runway threshold.

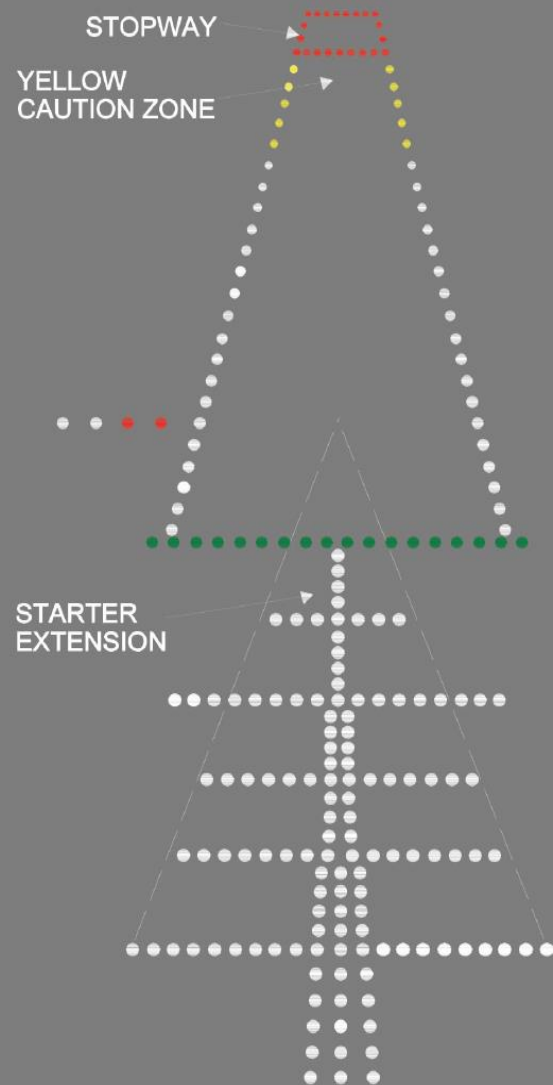
In addition, the system shall have **two side rows of lights**, extending **270 m from the threshold**, and two crossbars, one at **150 m** and one at **300 m** from the threshold.

5.3.4.23 The lights forming the centre line shall be placed at longitudinal intervals of 30 m with the innermost lights located 30 m from the threshold.

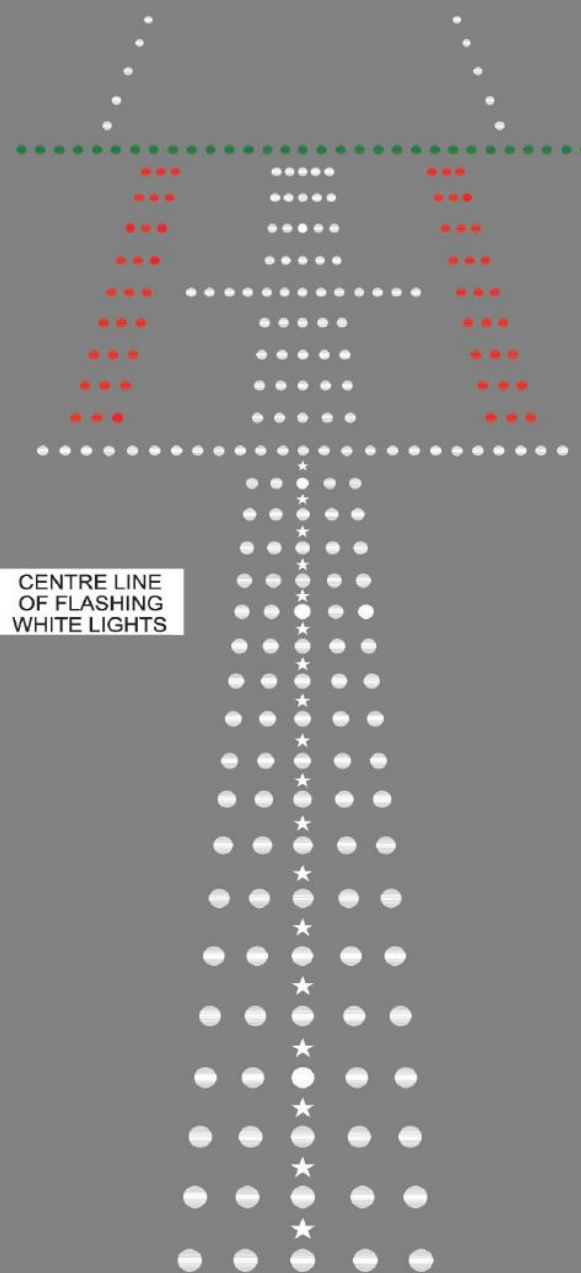
5.3.12.1 **Runway centre line lights** shall be provided on a precision approach runway **category II or III**.



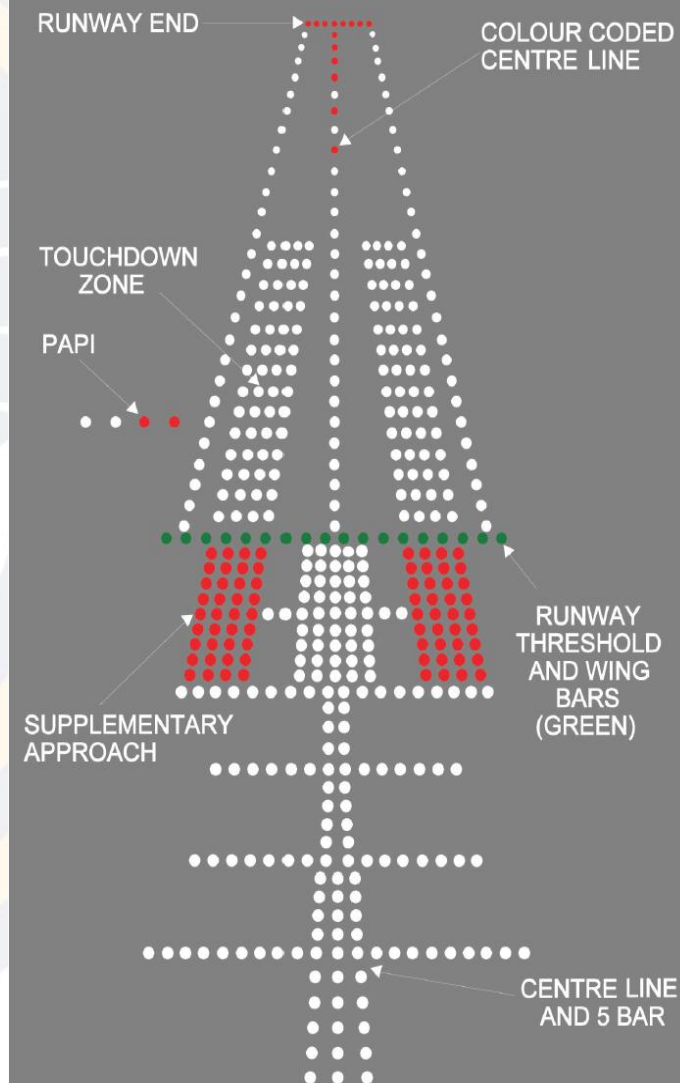
APPROACH AND RUNWAY
LIGHTING TYPICAL
CAT I SYSTEM SHOWING TAKE-OFF
STARTER EXTENSION AND
STOPWAY LIGHTING
(CALVERT SYSTEM)



ICAO CAT II / III APPROACH
LIGHTING SYSTEM



APPROACH AND RUNWAY
LIGHTING TYPICAL
CAT II OR CAT III SYSTEM





7- What is the minimum length of simple approach lighting system?

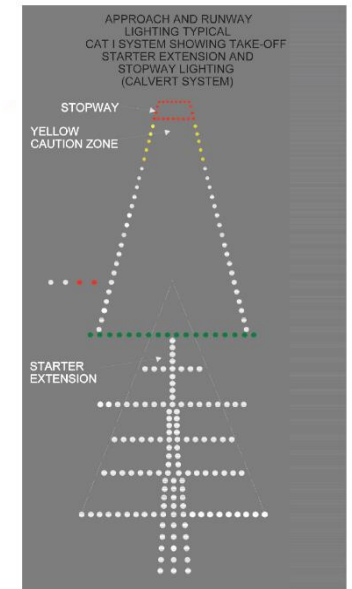
- A) 400 m.
- B) 420 m.
- C) 300 m.
- D) 150 m.

Location

5.3.4.2 A **simple approach lighting system** shall consist of a row of lights on the extended centre line of the runway extending, whenever possible, over a distance of **not less than 420 m from the threshold** with a row of lights forming a **crossbar 18 m or 30 m** in length at a distance of **300 m from the threshold**.

8- How many cross bar shall be provided for precision approach CAT I (single source)?

- A) 2
- B) 3
- C) 4
- D) 5



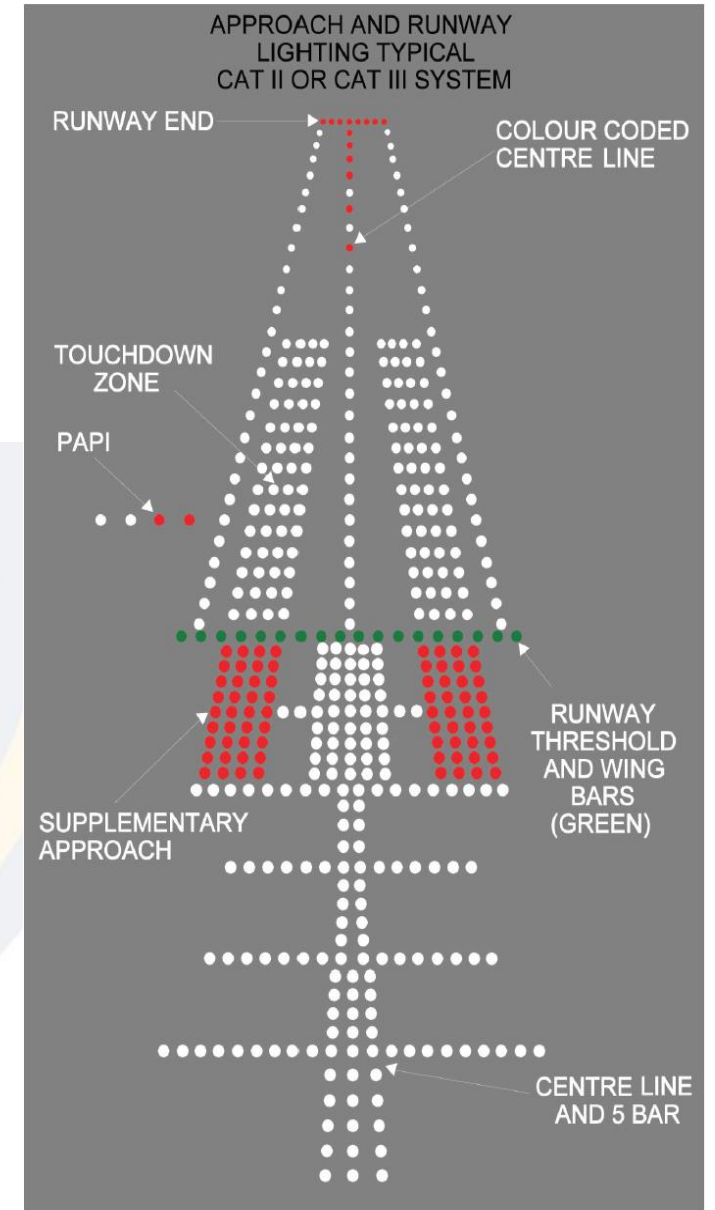


9- Which of the following RWY shall have center line lights?

- A) CAT I
- B) CAT II
- C) CAT III
- D) B and C are correct

13- What factor shall be considered to provide threshold marking?

- A) RWY length
- B) RWY width
- C) Both A and B are correct
- D) None





Runway touchdown zone lights

5.3.13.1 Touchdown zone (TDZ) lights shall be provided in the touchdown zone of a precision approach runway **category II or III**.

5.3.13.2 Touchdown zone lights shall extend from the threshold for a longitudinal distance of **900 m**.

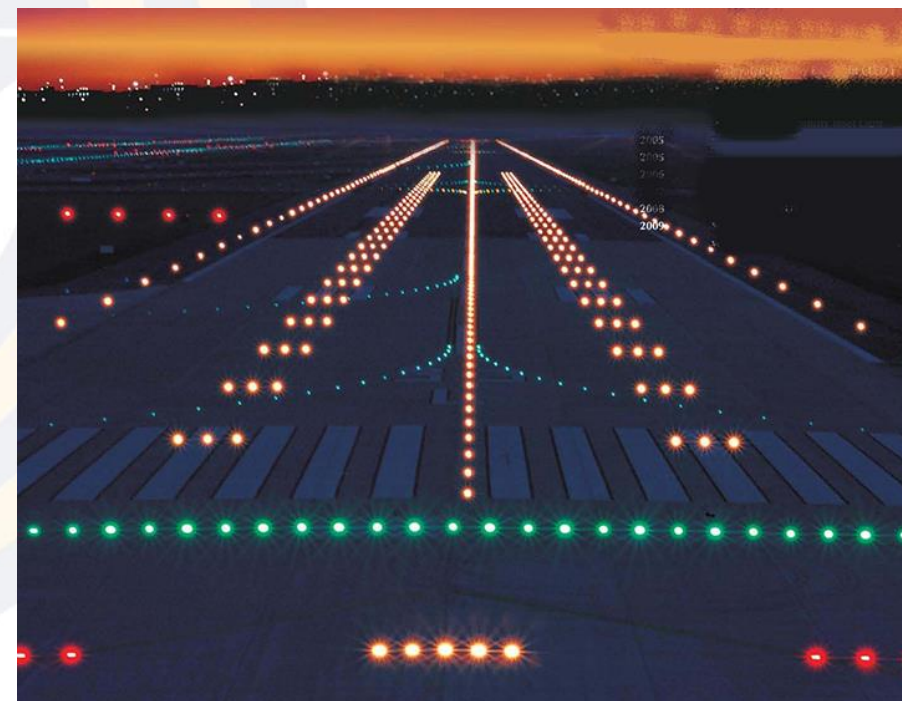
on runways **less than 1 800 m** in length, the system shall be shortened so that it does **not extend beyond the midpoint** of the runway.

The **lateral spacing** between the innermost lights of a pair of barrettes shall be **equal to the lateral spacing selected for the touchdown zone marking**.

The **longitudinal spacing** between pairs of barrettes shall be **either 30 m or 60 m**.

5.3.13.3 A barrette shall be composed of **at least three lights** with a spacing between the lights of **not more than 1.5 m**.

5.3.13.5 Touchdown zone lights shall be fixed unidirectional lights showing variable white.





Runway edge lights

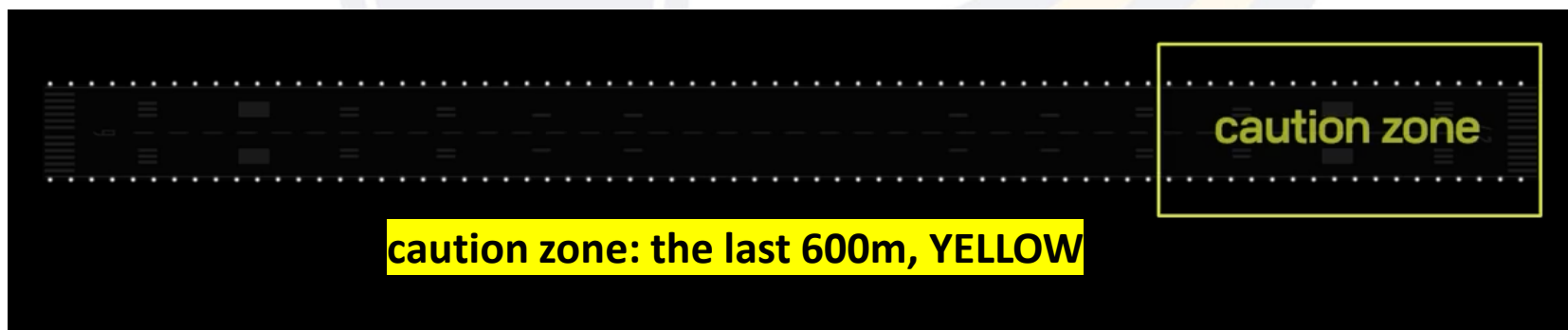
5.3.9.1 Runway edge lights shall be provided for:

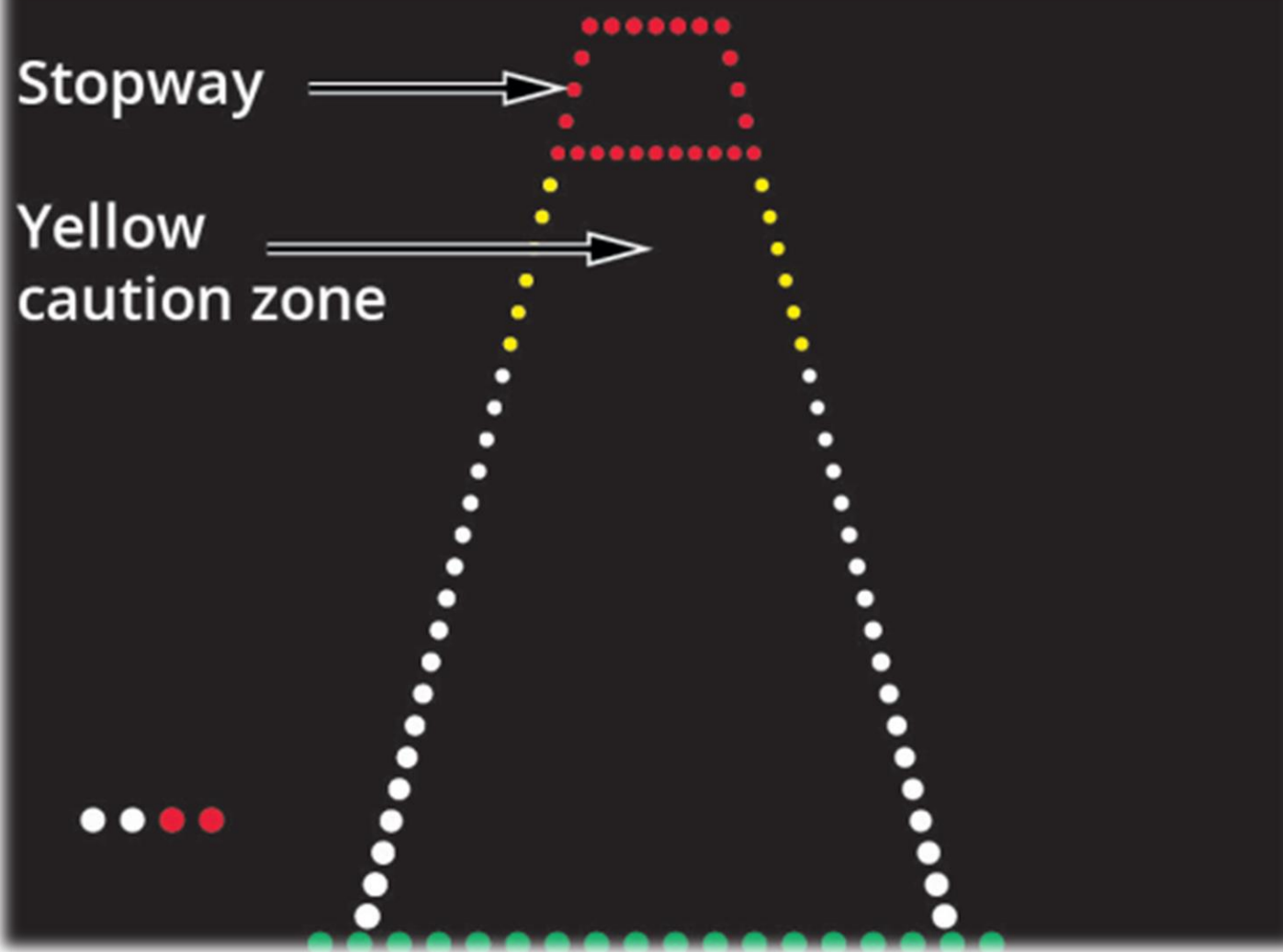
- a runway intended for use at **night** or
- for a **precision approach** runway intended for use by **day or night**.

5.3.9.3 Runway edge lights shall be placed along the **full length of the runway** and shall be in **two parallel rows** equidistant from the centre line.

5.3.9.4 Runway edge lights shall be placed along the edges of the area declared for use as the runway or outside the edges of the area at a distance of **not more than 3 m**.

5.3.9.6 The lights shall be uniformly spaced in rows at intervals of **not more than 60 m** for an **instrument** runway, and at intervals of **not more than 100 m** for a non-instrument runway.

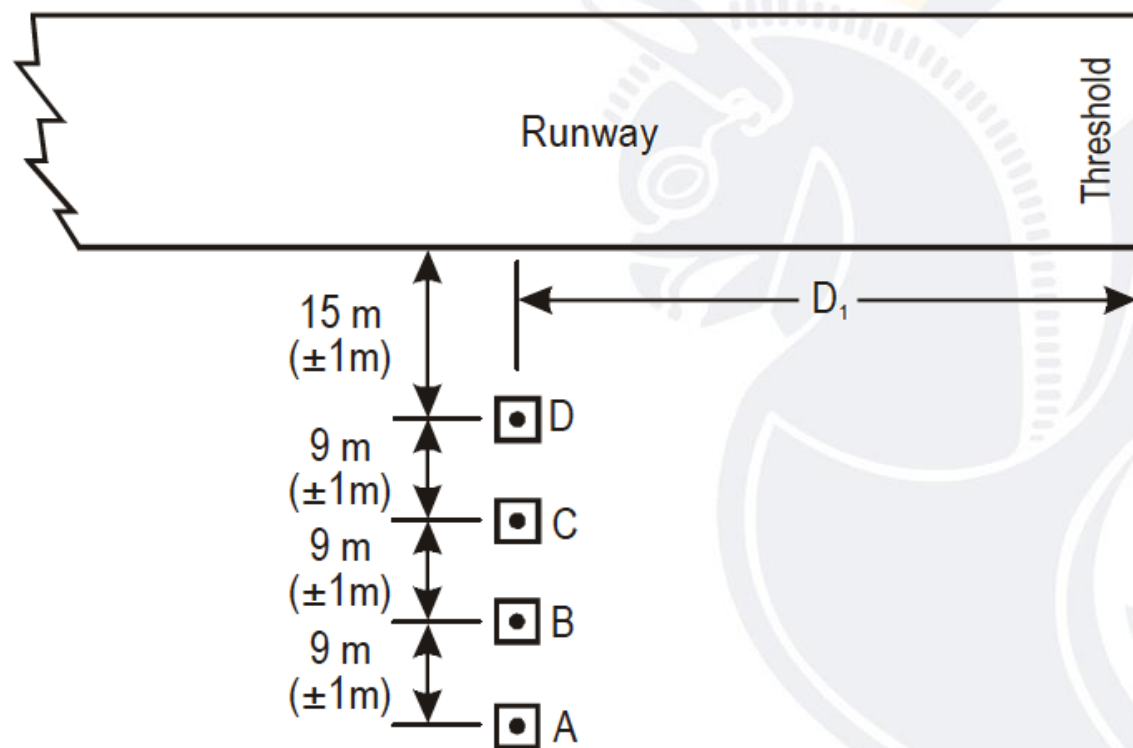




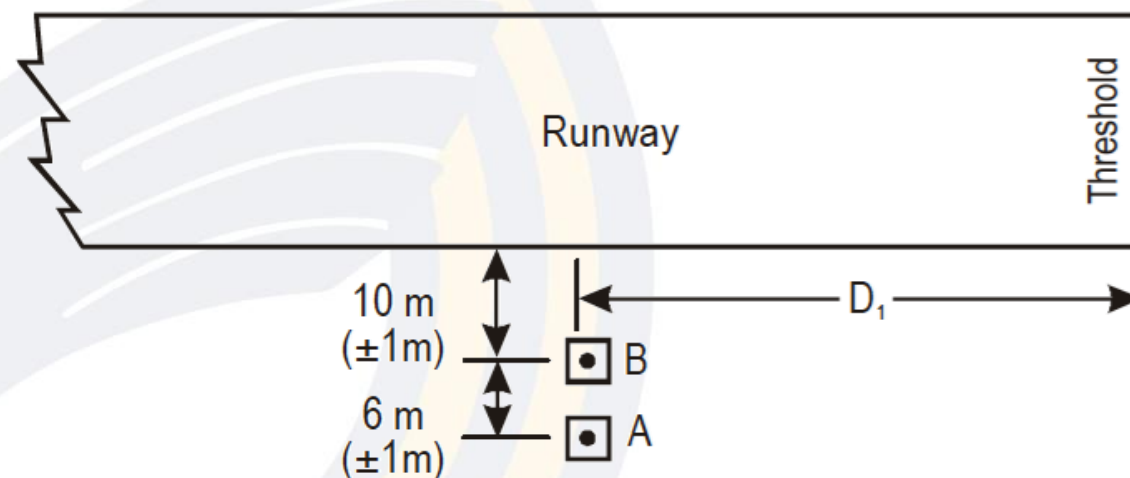




PAPI: Precision approach path indicator



Typical PAPI wing bar



Typical APAPI wing bar



VASIS

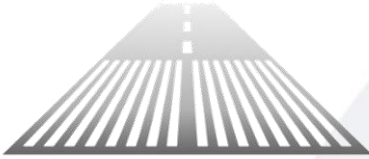


PAPI





1. Too high



PAPI



a b c d

VASI



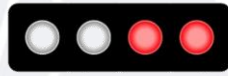
2. Slightly high



a b c d



3. On glide slope



a b c d



4. Slightly low



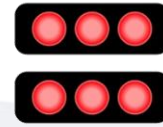
a b c d



5. Too low

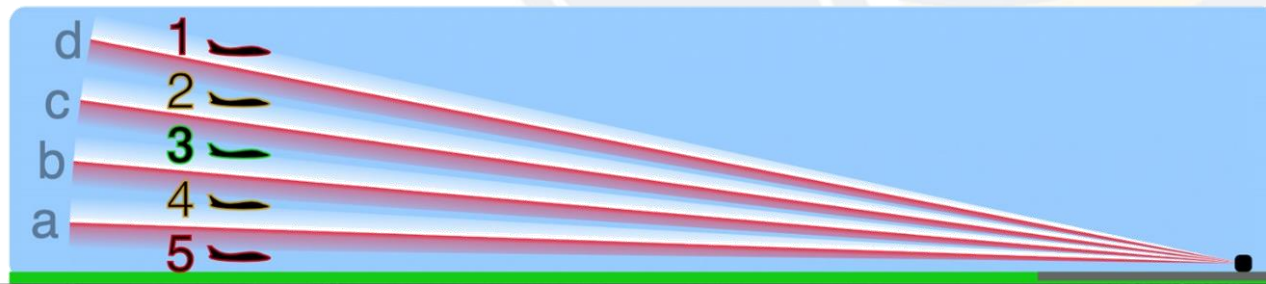


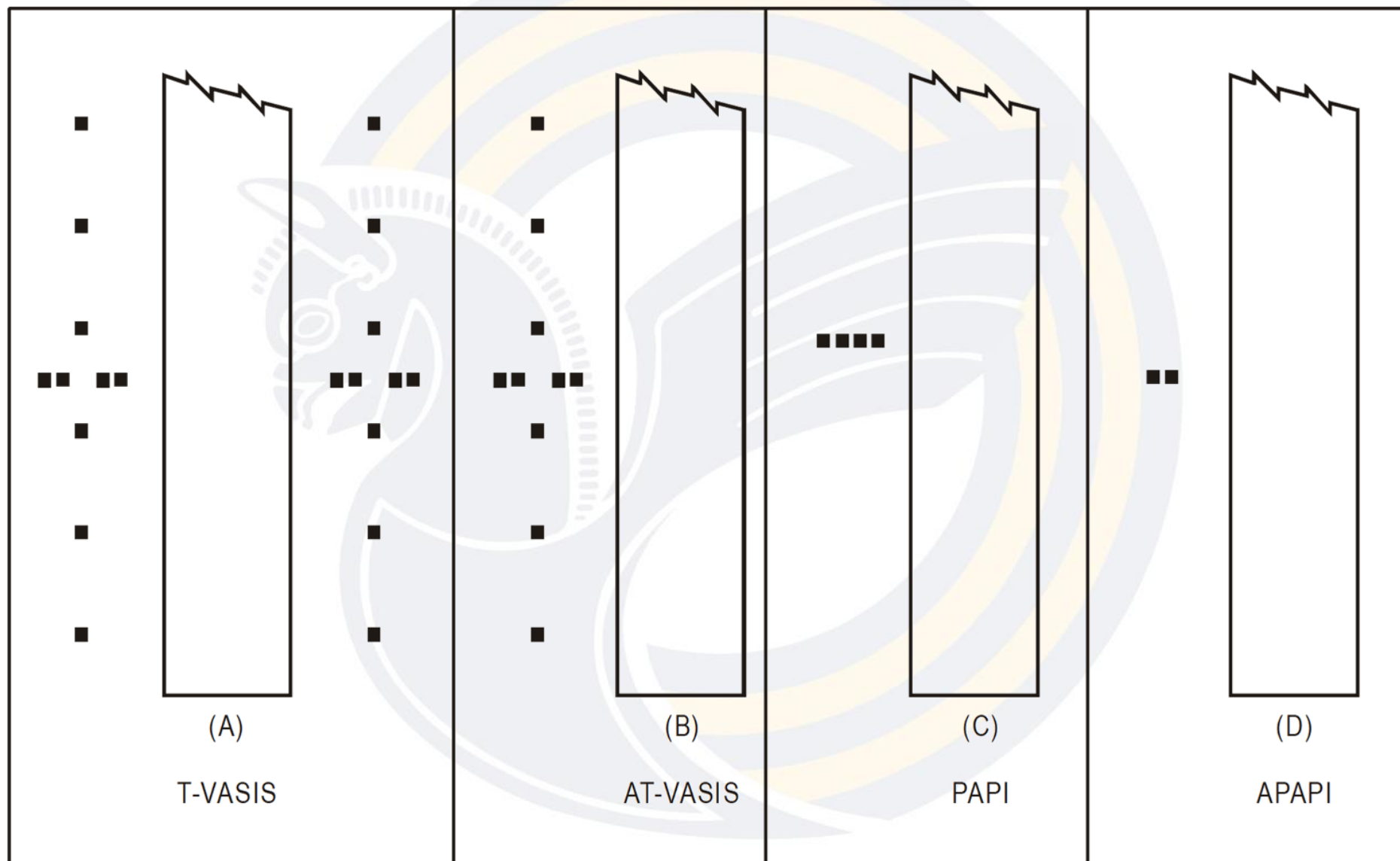
a b c d



PAPI/VASI

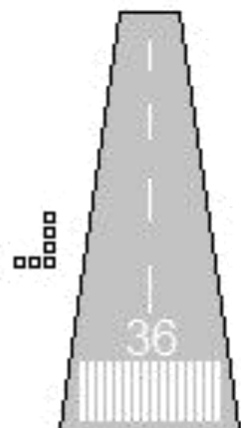
Precision approach path indicator
Visual approach slope indicator







T-VASIS



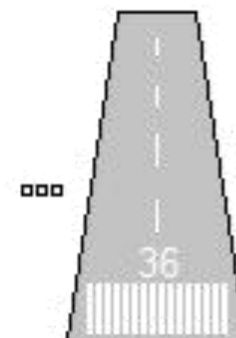
very high



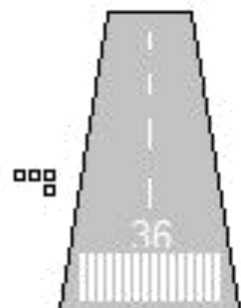
high



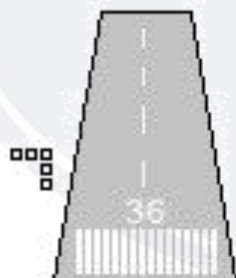
slightly high



on glide path



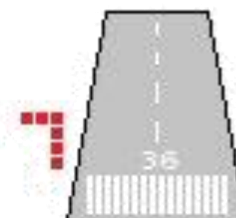
slightly low



low



very low



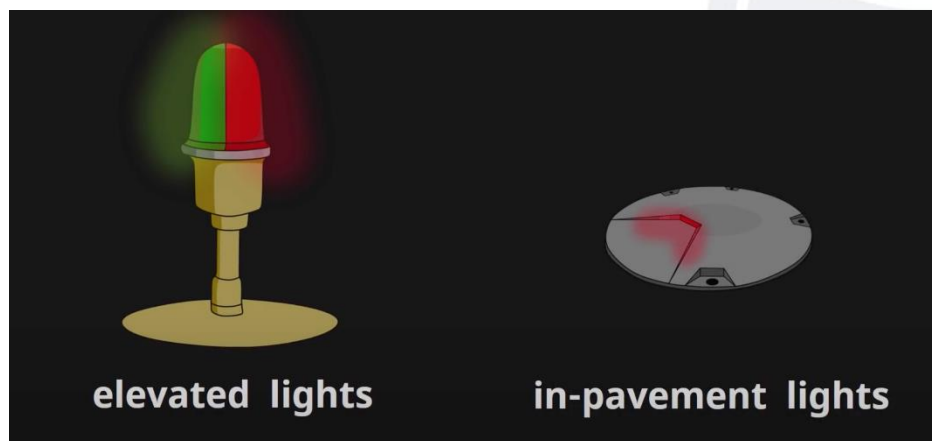
well below
glide path



5.3.9 Runway edge lights

5.3.9.7 Runway edge lights shall be fixed lights showing variable white, except that:

- a) in the case of a displaced threshold, the lights between the beginning of the runway and the displaced threshold shall show red in the approach direction; and
- b) a section of the lights 600 m or one-third of the runway length, whichever is the less, at the remote end of the runway from the end at which the take-off run is started, may show yellow.

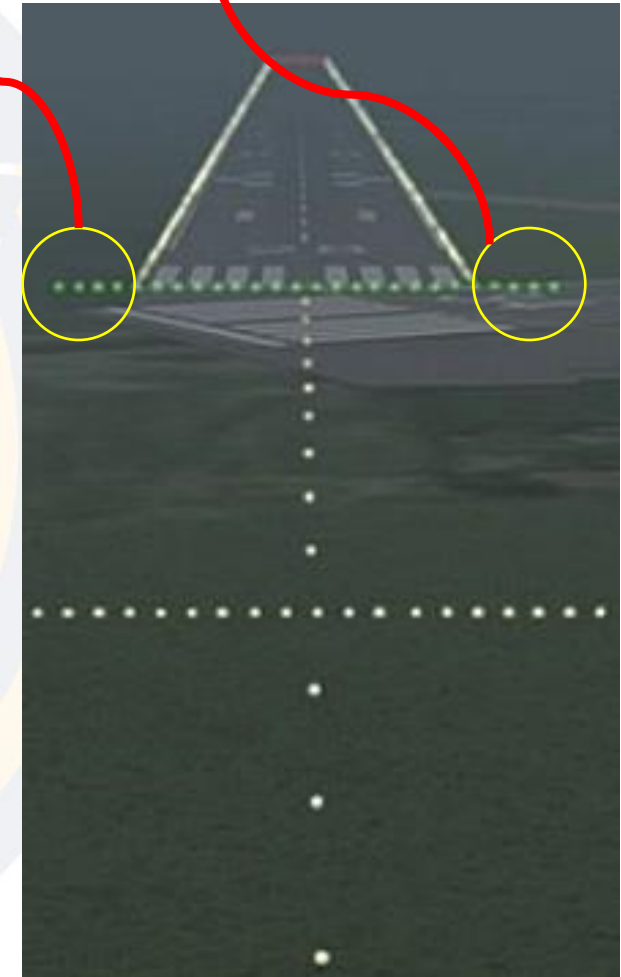


5.3.10 Runway threshold and wing bar lights

5.3.10.8 **Wing bar lights** shall be symmetrically disposed about the runway centre line at the threshold in two groups, i.e. wing bars.

Each wing bar shall be formed by at least **five lights** extending at least **10 m outward** from, and at right angles to, the line of the **runway edge lights**, with the innermost light of each wing bar in the line of the runway edge lights.

5.3.10.9 **Runway threshold and wing bar lights** shall be **fixed unidirectional** lights showing **green** in the direction of approach to the runway.



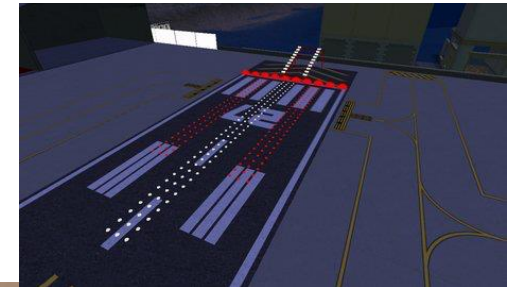


5.3.11 Runway end lights

5.3.11.1 Runway **end lights** shall be provided for a runway equipped with runway **edge lights**.

5.3.11.2 Runway end lights shall be placed on a line at right angles to the runway axis **as near to the end of the runway as possible** and, in any case, **not more than 3 m outside** the end.

5.3.11.4 Runway **end** lights shall be **fixed unidirectional** lights showing **red** in the direction of the runway.

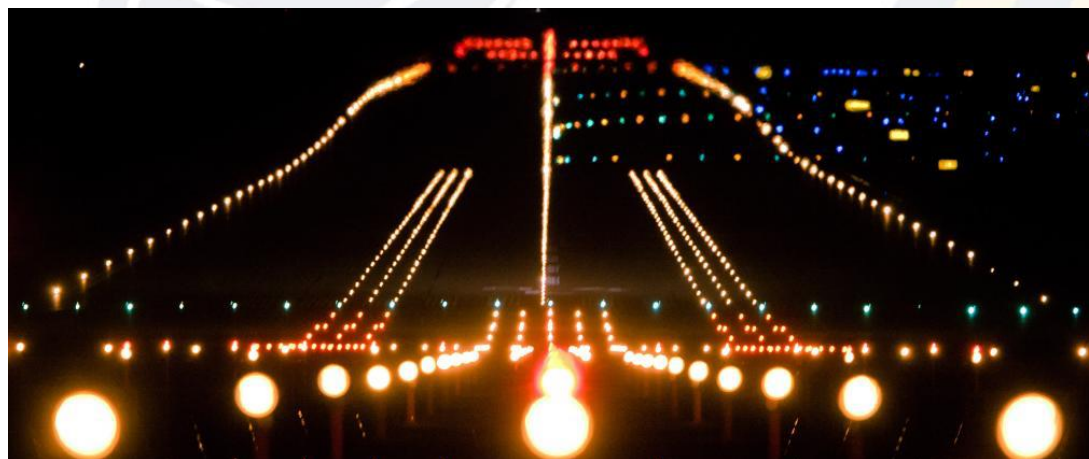




5.3.12 Runway centre line lights

5.3.12.3 Runway centre line lights shall be provided on a runway intended to be used for **take-off** with an operating minimum below an **RVR of the order of 400 m**.

5.3.12.5 Runway centre line lights shall be located along the centre line of the runway, except that the lights may be **uniformly offset** to the same side of the runway centre line by **not more than 60 cm** where it is not practicable to locate them along the centre line. The lights shall be located from the threshold to the end at longitudinal **spacing of approximately 15 m**.



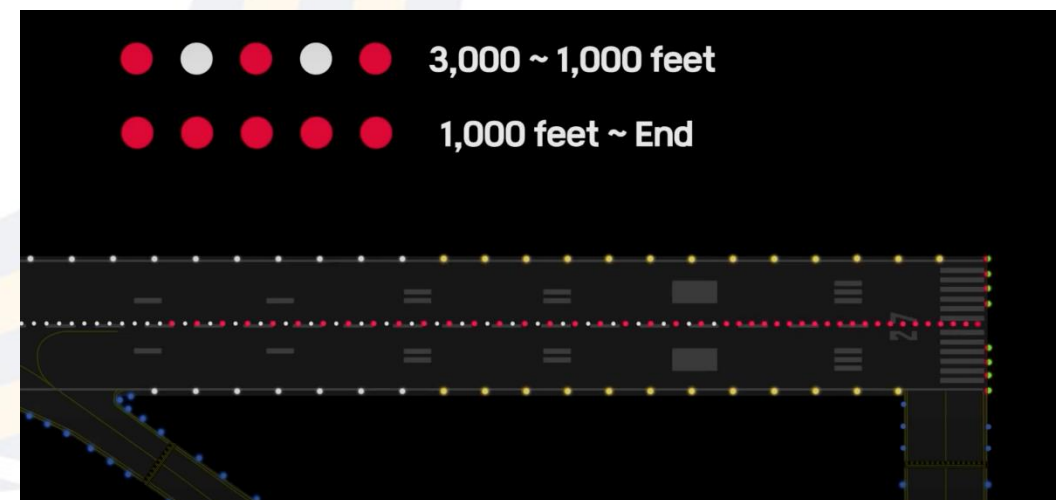
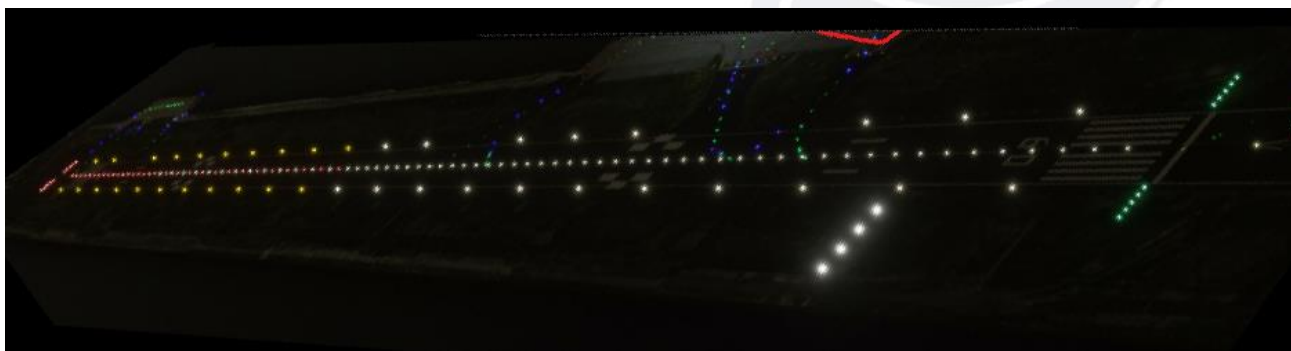


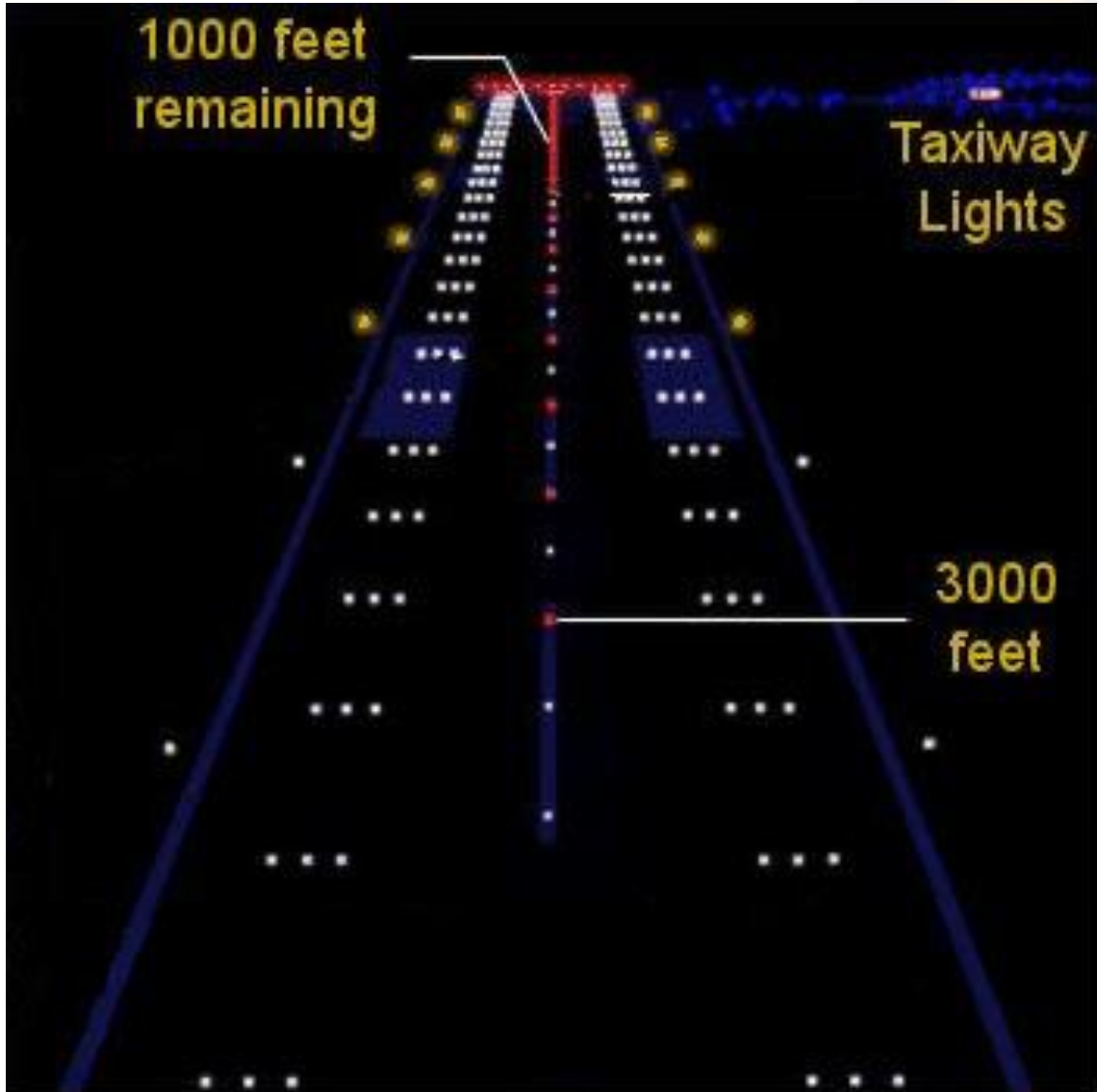
5.3.12 Runway centre line lights

5.3.12.7 **Runway centre line lights** shall be **fixed** lights showing:

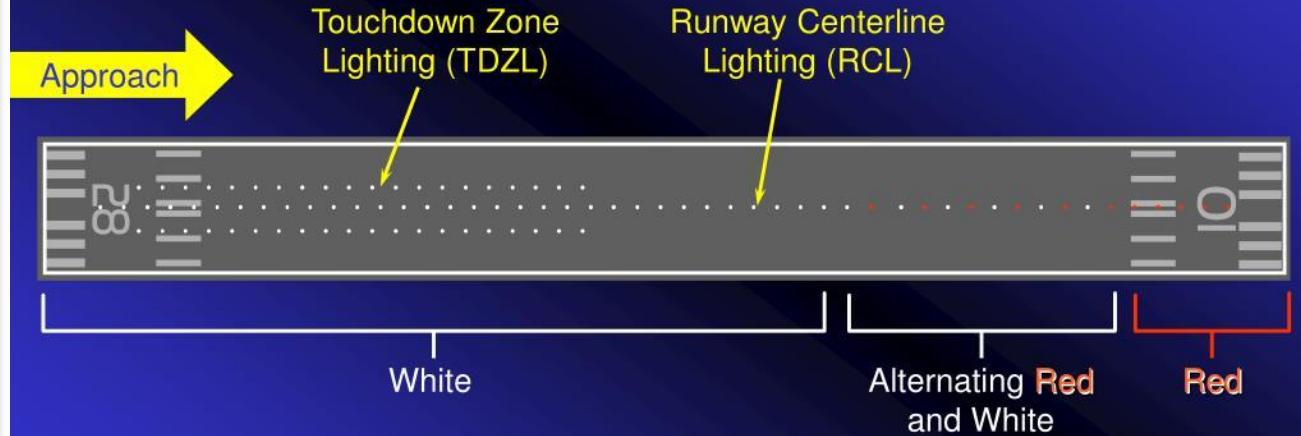
- **variable white** from the threshold to the point **900 m** from the runway end;
- alternate **red and variable white** from **900 m to 300 m** from the runway end; and
- **red from 300 m to the runway end**,

except that for runways less than 1 800 m in length, the alternate red and variable white lights shall extend from the midpoint of the runway usable for landing to 300 m from the runway end.





IN-RUNWAY LIGHTING

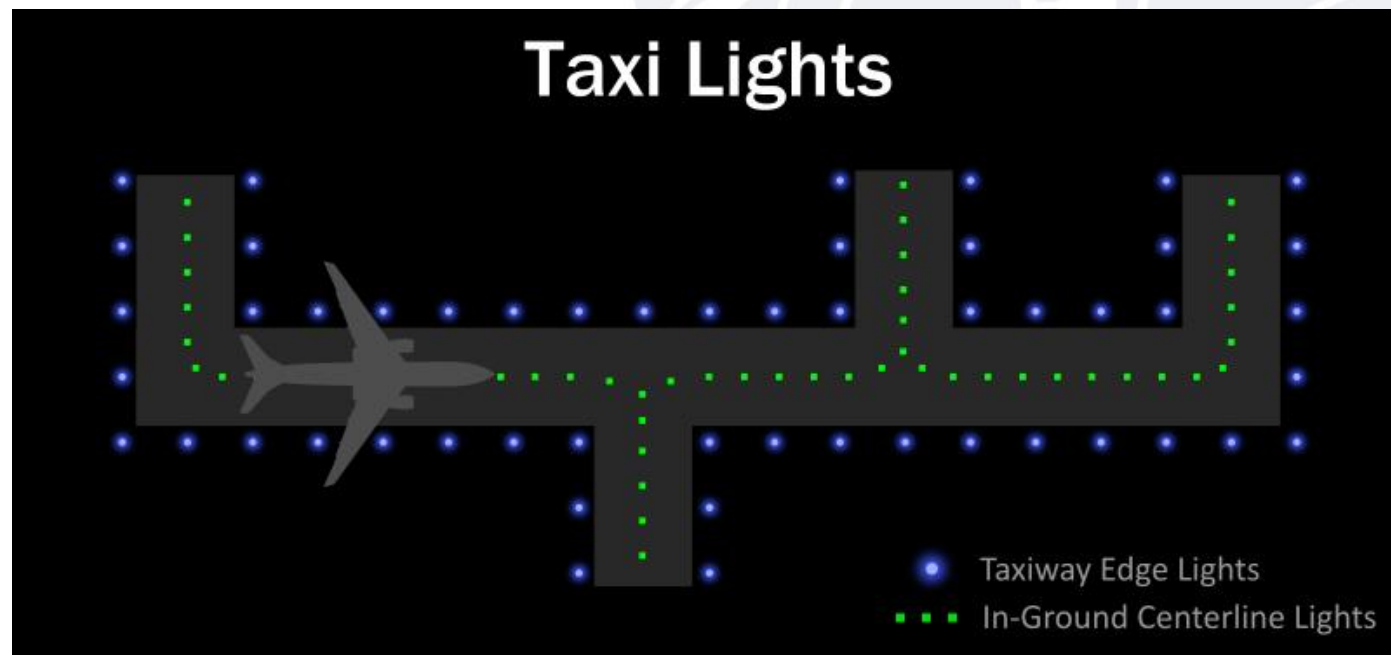




5.3.18 Taxiway edge lights

5.3.18.1 Taxiway edge lights shall be provided at the **edges of a runway turn pad, holding bay, de-icing/anti-icing facility, apron**, etc., intended for use at night and on a **taxiway not provided with taxiway centre line lights** and intended for use at **night**.

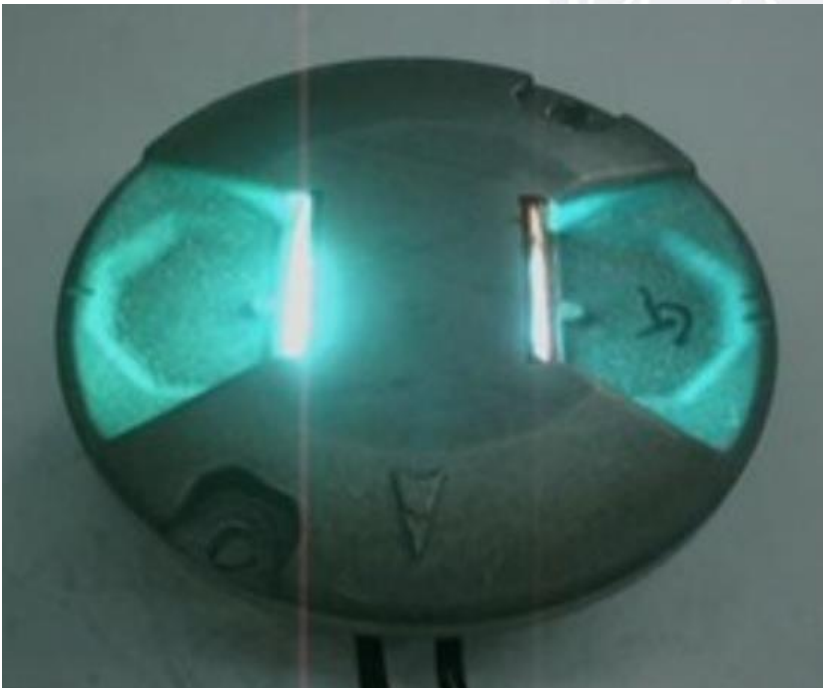
5.3.18.7 **Taxiway edge lights** shall be **fixed lights** showing **blue**.





5.3.17 Taxiway centre line lights

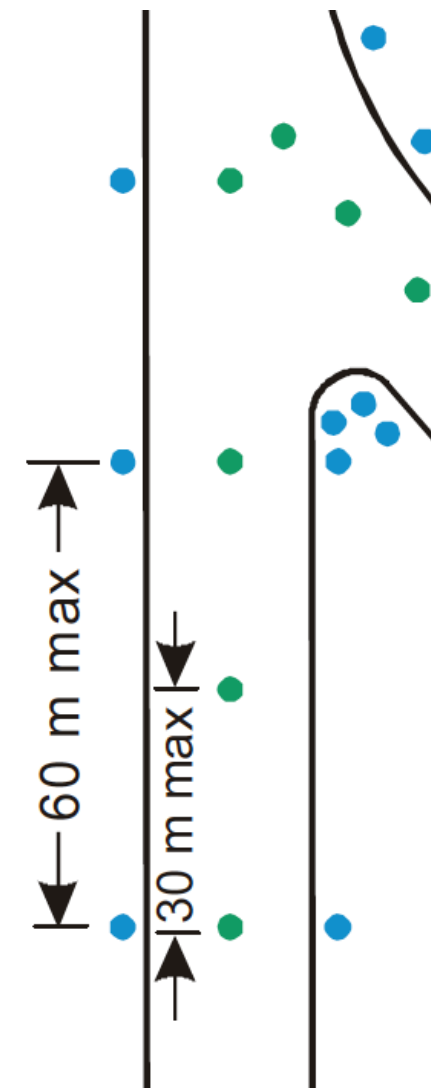
5.3.17.6 **Taxiway centre line lights** on a taxiway shall be **fixed lights showing green** with beam dimensions such that the light is visible only from aeroplanes on or in the vicinity of the taxiway.

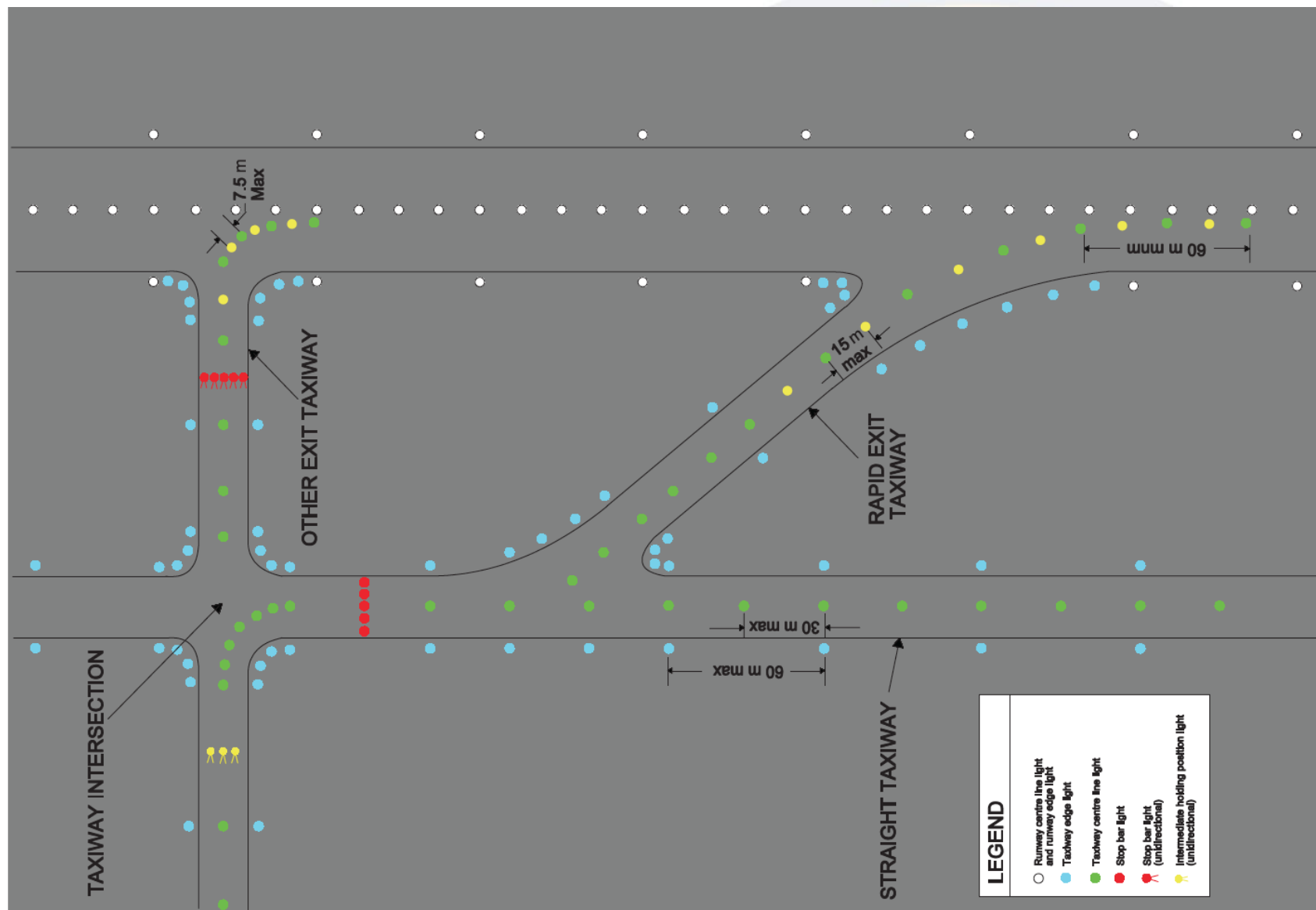




5.3.17 Taxiway centre line lights

5.3.17.1 Taxiway centre line lights shall be provided on an exit taxiway, taxiway, de-icing/anti-icing facility and apron intended for use in runway visual range conditions less than a value of 350 m in such a manner as to provide continuous guidance between the runway centre line and aircraft stands, except that *these lights need not be provided where the traffic density is light and taxiway edge lights and centre line marking provide adequate guidance.*





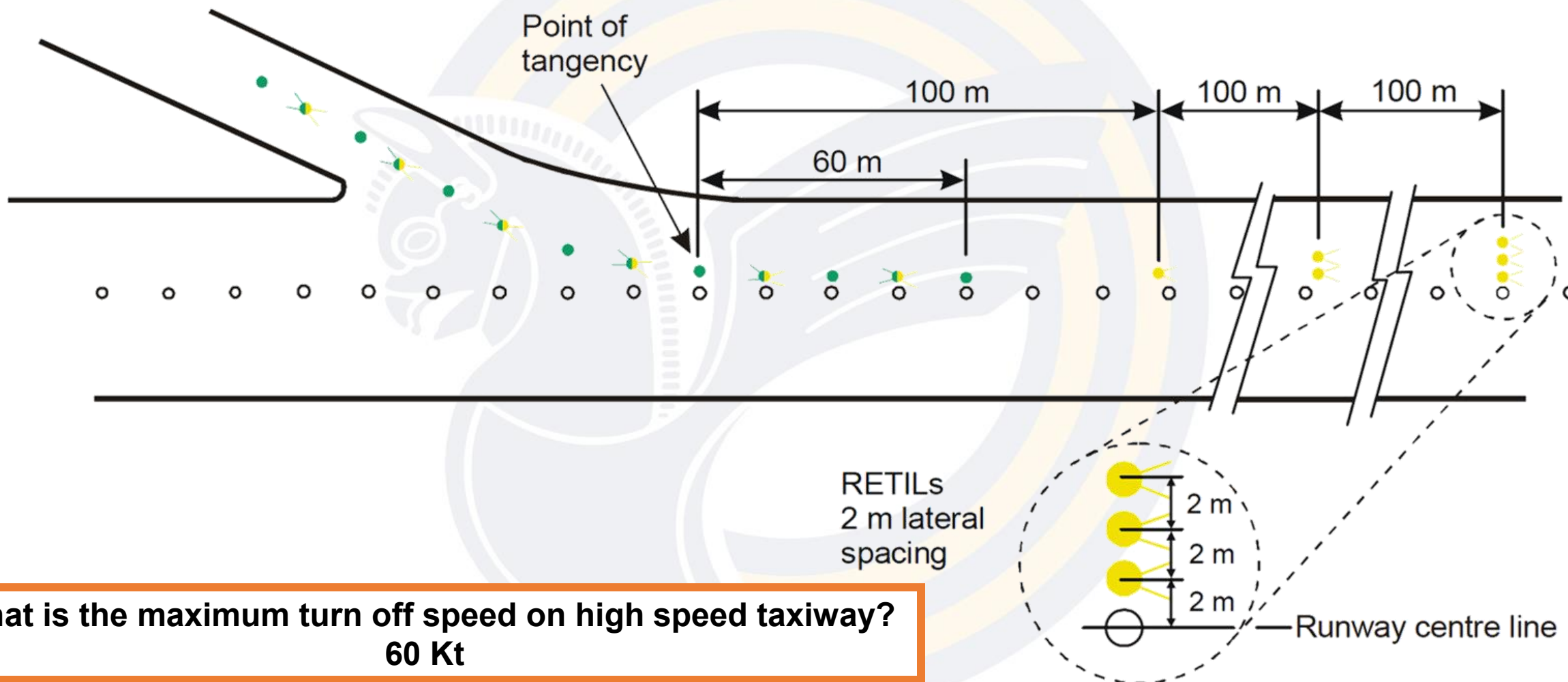
LEGEND

- Runway centre line light and runway edge light
- Taxiway edge light
- Taxiway centre line light
- Stop bar light
- Stop bar light (unidirectional)
- Intermediate holding position light (unidirectional)

LEGEND	
○	Runway centre line light and runway edge light
●	Taxiway edge light
●	Taxiway centre line light
●	Stop bar light
●	Stop bar light (unidirectional)
●	Intermediate holding position light (unidirectional)



5.3.15 Rapid exit taxiway indicator lights

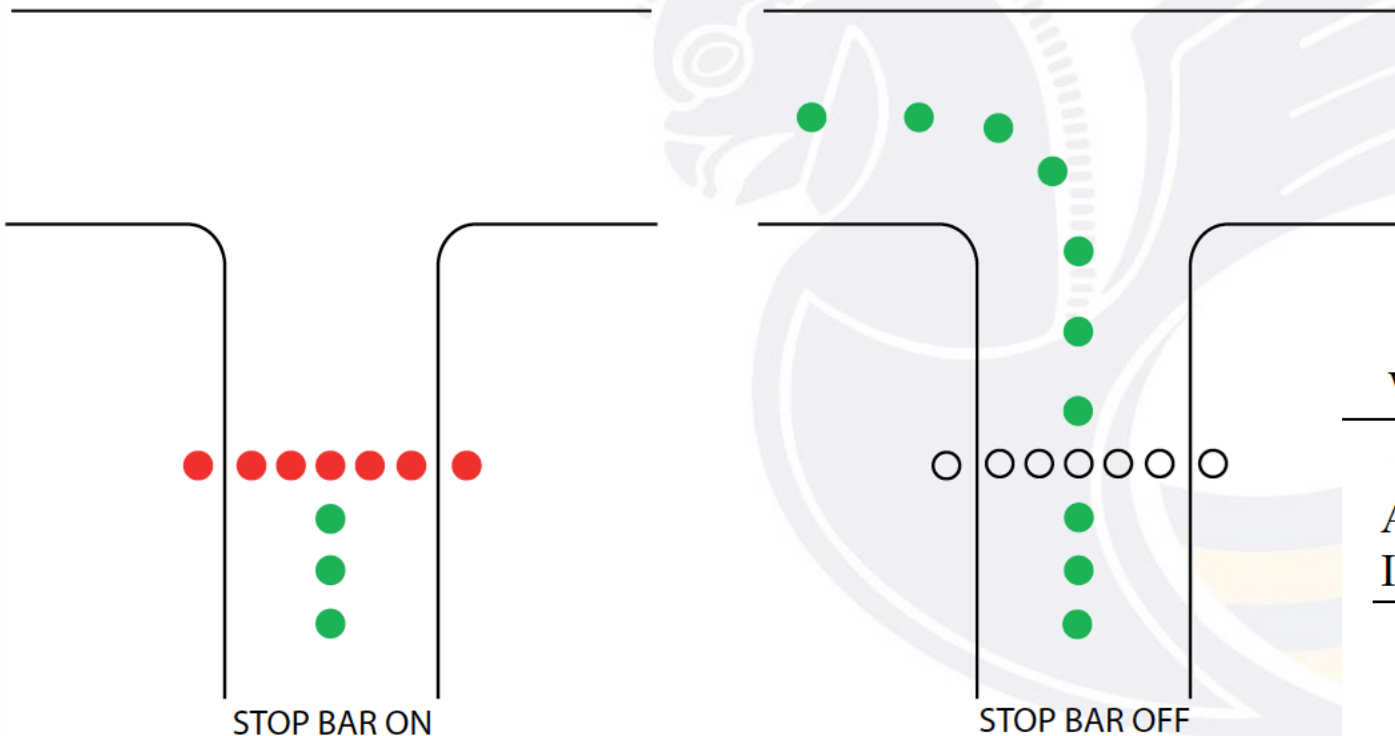


What is the maximum turn off speed on high speed taxiway?
60 Kt



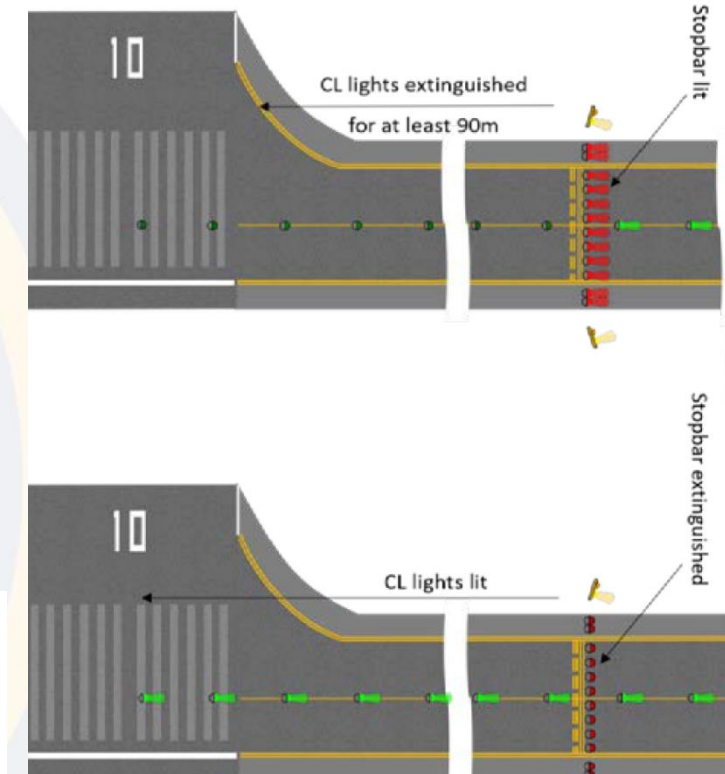
Stop Bars and Lead-on Lights (CAP 637)

Lighted Stop Bars and Lead-on Lights are provided at those aerodromes authorised for low visibility operations.



AD 1.1-5
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ISLAMIC REPUBLIC OF IRAN

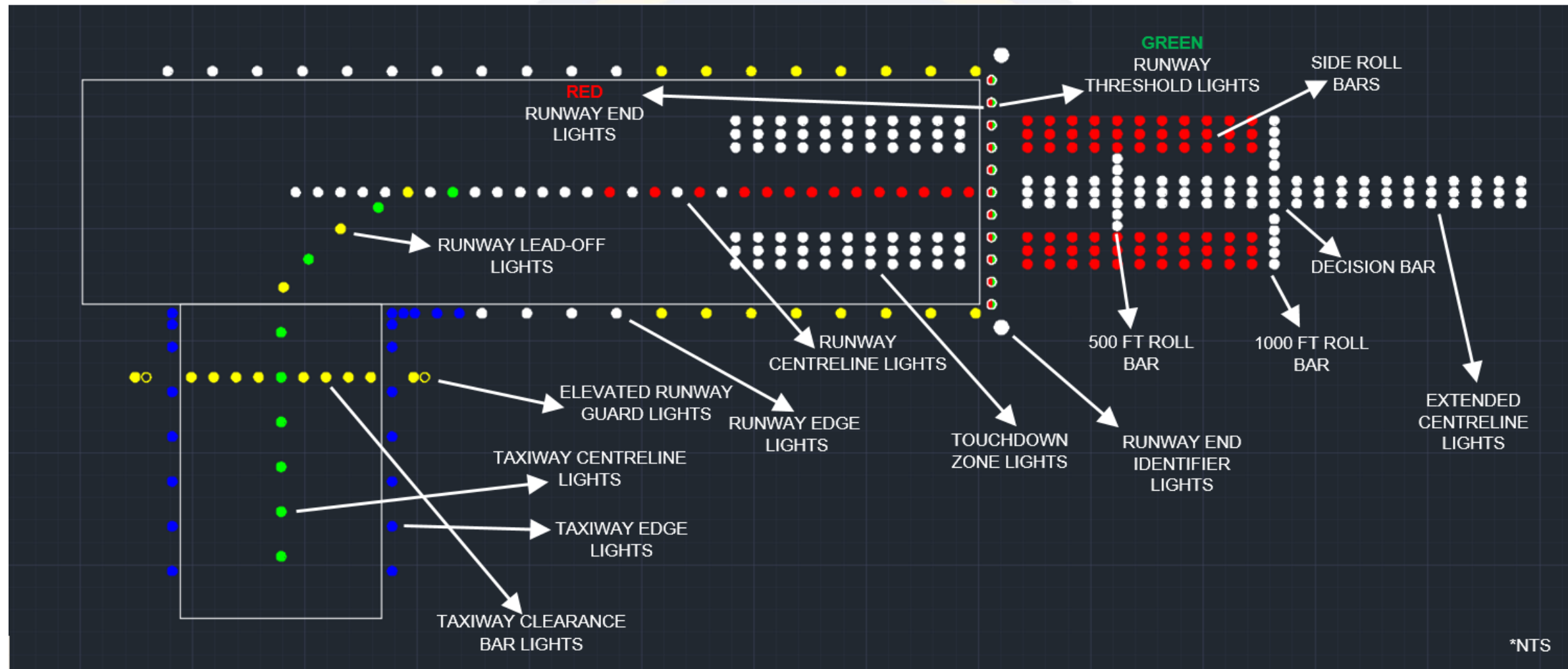


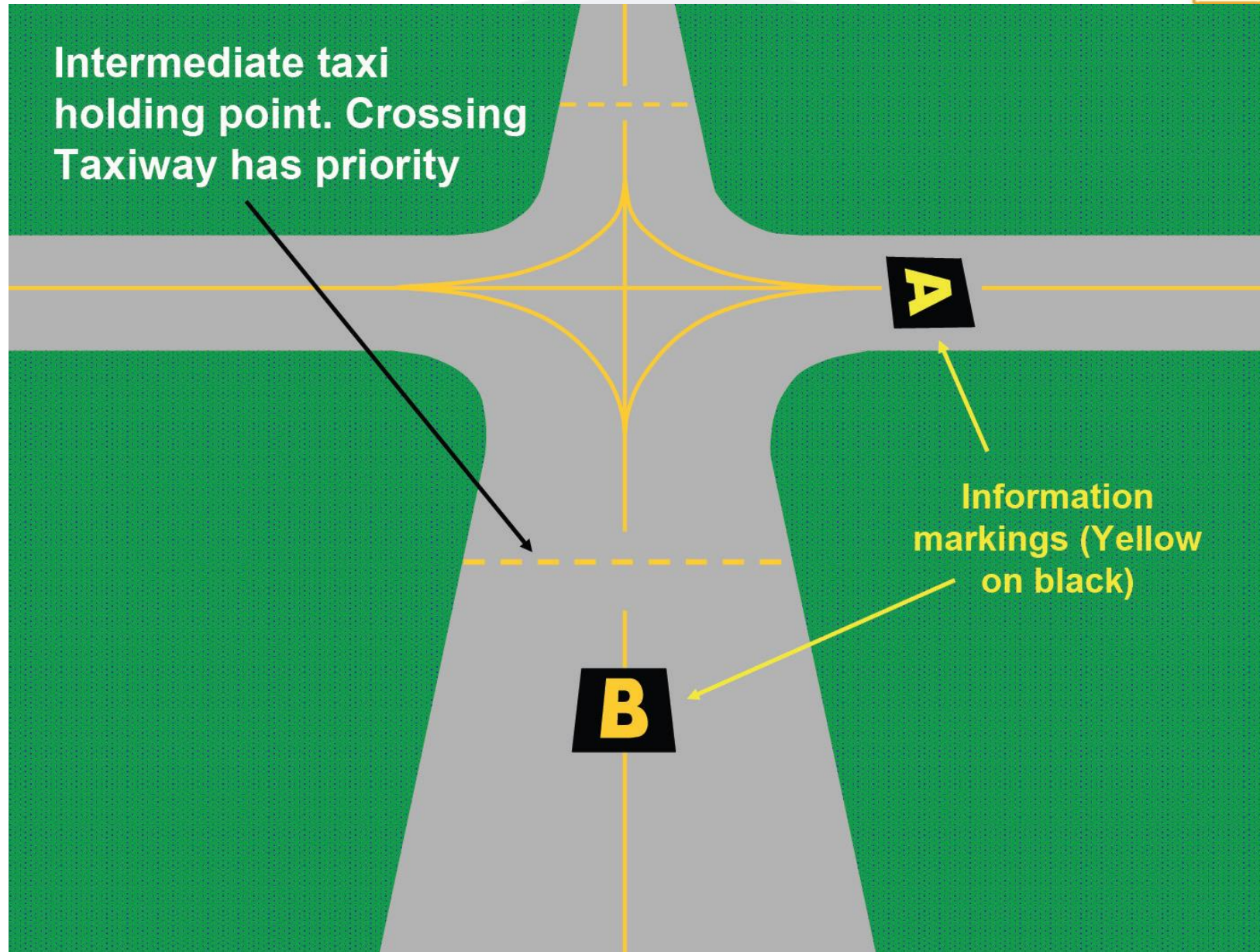
5. Low Visibility Procedures (LVP)



RUNWAY LIGHTING









5.1.3 Signalling lamp

Application

5.1.3.1 A signalling lamp **shall be provided** at a **controlled aerodrome** in the aerodrome control **tower**.

Characteristics

5.1.3.2 Recommendation.— A signalling lamp should be capable of producing **red**, **green** and **white** signals, and of:

- a) being aimed manually at any target as required;
- b) giving a signal in any one colour followed by a signal in either of the two other colours; and
- c) transmitting a message in any one of the three colours by Morse Code up to a speed of at least **four words per minute**.

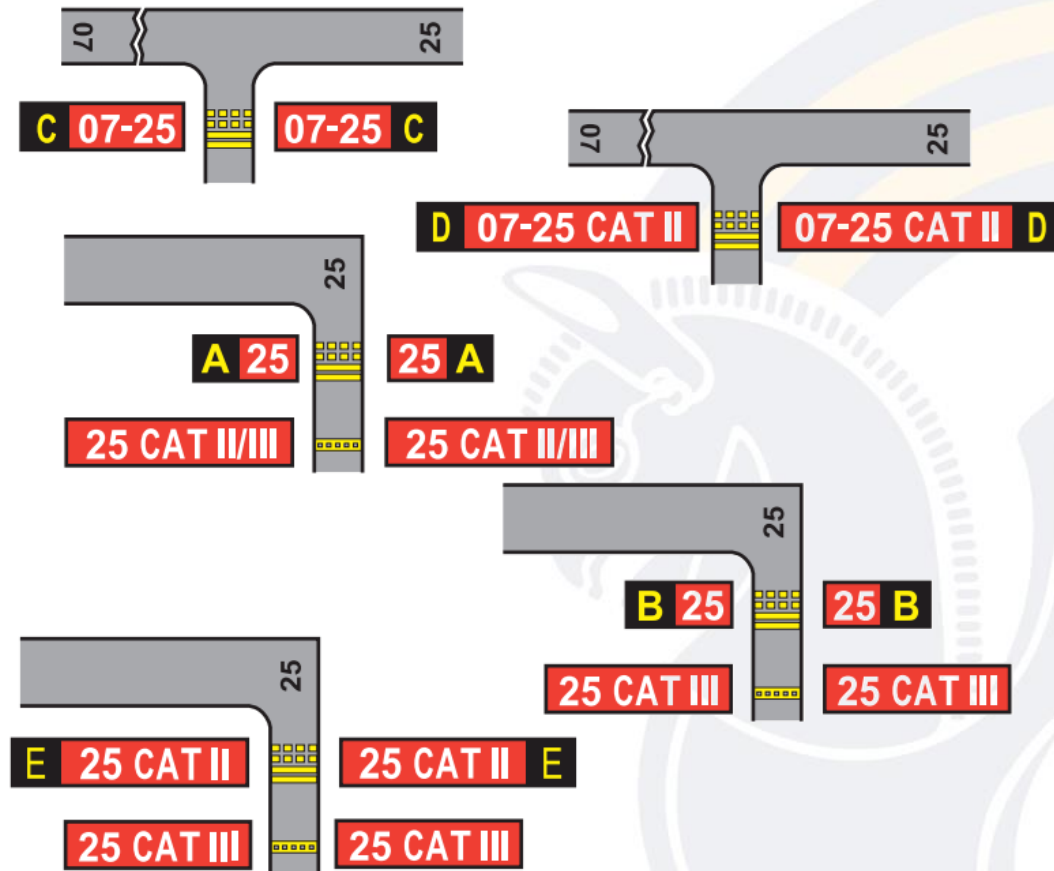


Serial No. 123456789





APPENDIX 4. REQUIREMENTS CONCERNING DESIGN OF TAXIING GUIDANCE SIGNS



LEFT SIDE

B 25-07
LOCATION/RUNWAY DESIGNATION

B2
RUNWAY-HOLDING POSITION

A 25
LOCATION/RUNWAY DESIGNATION

RIGHT SIDE

25-07 B
RUNWAY DESIGNATION/LOCATION

25 CAT II
RUNWAY DESIGNATION/
CATEGORY II HOLDING POSITION

25 A
RUNWAY DESIGNATION/LOCATION



NO ENTRY

red for mandatory instruction signs



LEFT SIDE

RIGHT SIDE



DIRECTION/LOCATION/DIRECTION



LOCATION/DIRECTION



LOCATION/RUNWAY VACATED



DESTINATION



RUNWAY VACATED/LOCATION



RUNWAY EXIT



RUNWAY EXIT



LOCATION



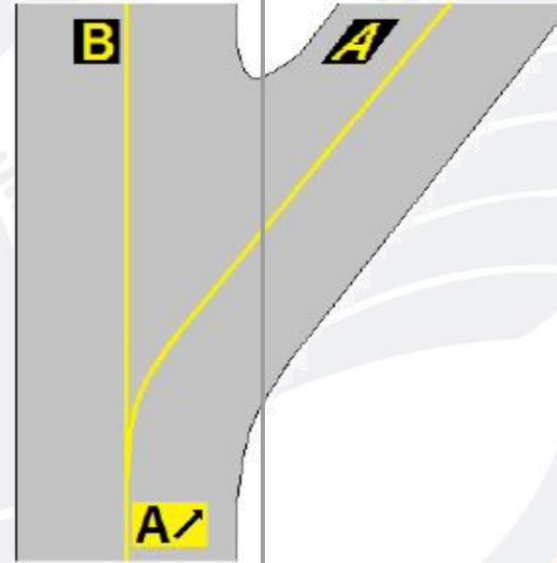
DIRECTION/LOCATION/DIRECTION/DIRECTION



DIRECTION/DIRECTION/DIRECTION/LOCATION/DIRECTION/DIRECTION/DIRECTION



INTERSECTION TAKE-OFF



APPENDIX 4. REQUIREMENTS CONCERNING DESIGN OF TAXIING GUIDANCE SIGNS

yellow for information, direction and destination signs



	Indicates you are on taxiway “A”, holding short of runway 27.
	Indicates you are on taxiway “B” holding short at an intersection of runway 09-27. Where the threshold of runway 27 is on your left, and 09 on your right.
	Indicates the CAT II/III holding point for runway 27.
	Indicates a holding position protecting a priority route.
	No entry sign.



A

Indicating you are on Taxiway A

B→

Indicating Taxiway B is the next right

27→

Indicating Runway 27 is on the right

27 - 09→

Indicating reciprocal Runways 27/09 are on the right

27 • 24→

Indicating two different Runways 27 and 24 are on the right

2500 m→

Indicating the TORA from this intersection is 2500 m



Taxiway designator



Specific location



Taxiway ending



Taxiway end



Runway location sign



Runway exit



Runway vacated



Direction signs





Combination Signs



Instrument holding point for
Runway 27 at position A2



Intersection of taxiway A with taxiway B
(A continues straight ahead)



Runway vacated on taxiway A (on the
other side of this sign would be the
holding point sign)



Taxiway entrance and holding point to
two runways



LEFT SIDE

RIGHT SIDE

B 25-07

LOCATION/RUNWAY DESIGNATION

25-07 **B**

RUNWAY DESIGNATION/LOCATION

B2

RUNWAY-HOLDING POSITION

25 CAT II

RUNWAY DESIGNATION/
CATEGORY II HOLDING POSITION

A 25

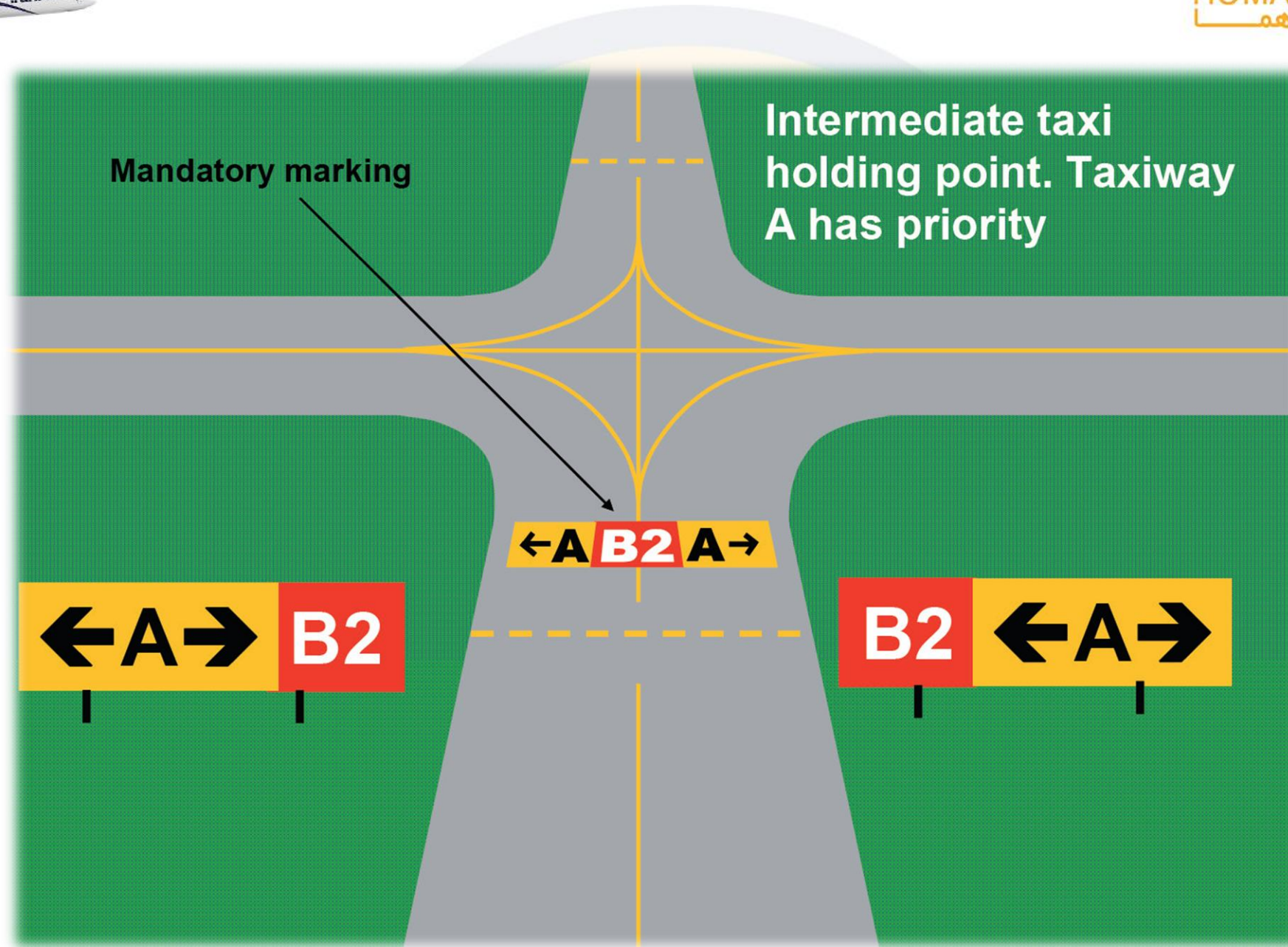
LOCATION/RUNWAY DESIGNATION

25 **A**

RUNWAY DESIGNATION/LOCATION



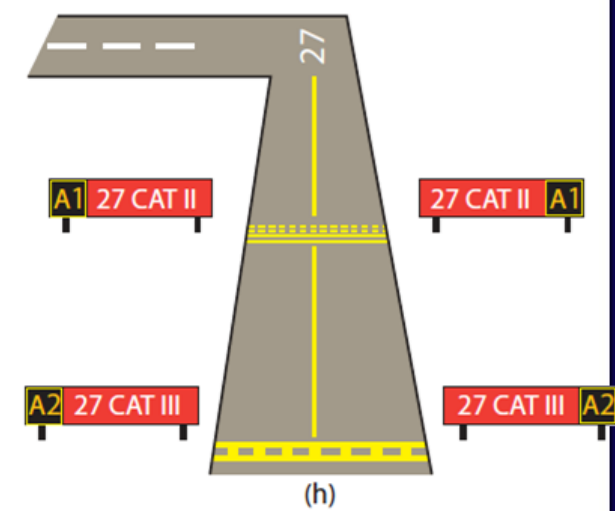
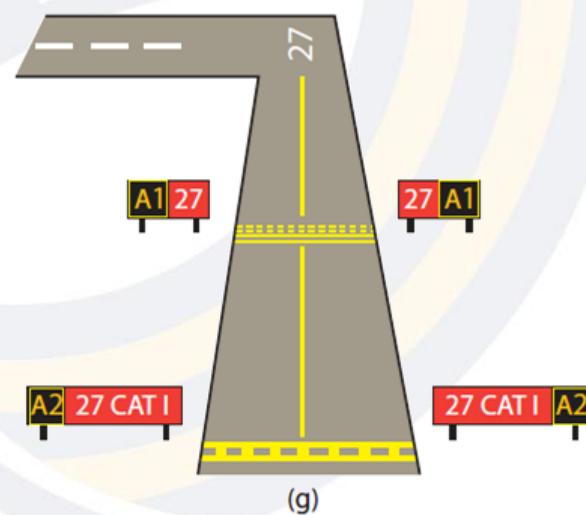
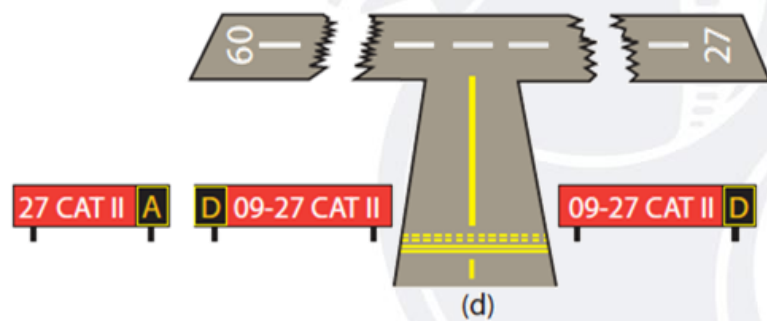
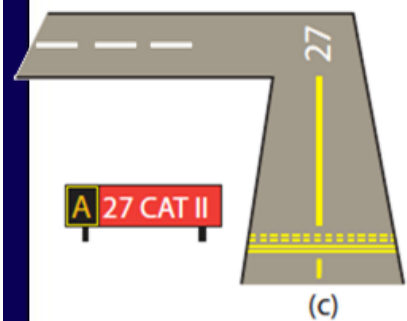
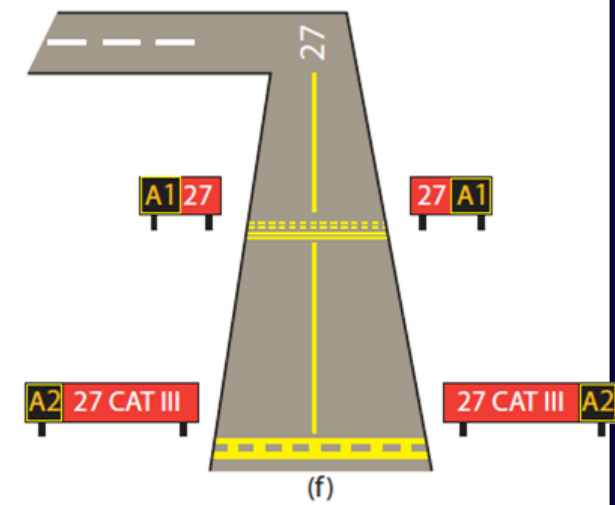
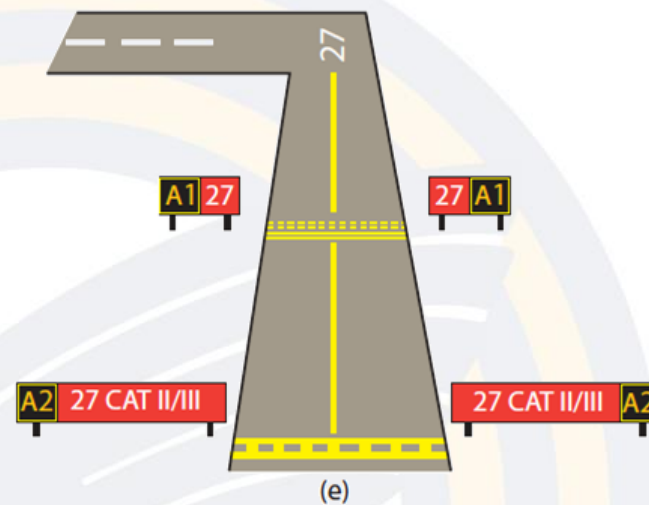
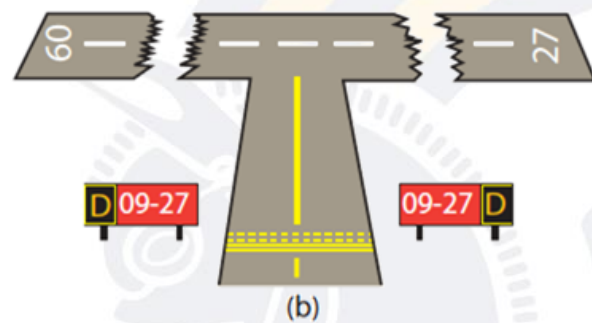
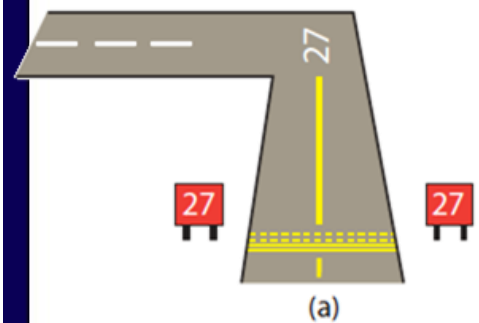
NO ENTRY







CAP 637





7.1 Closed runways and taxiways, or parts thereof

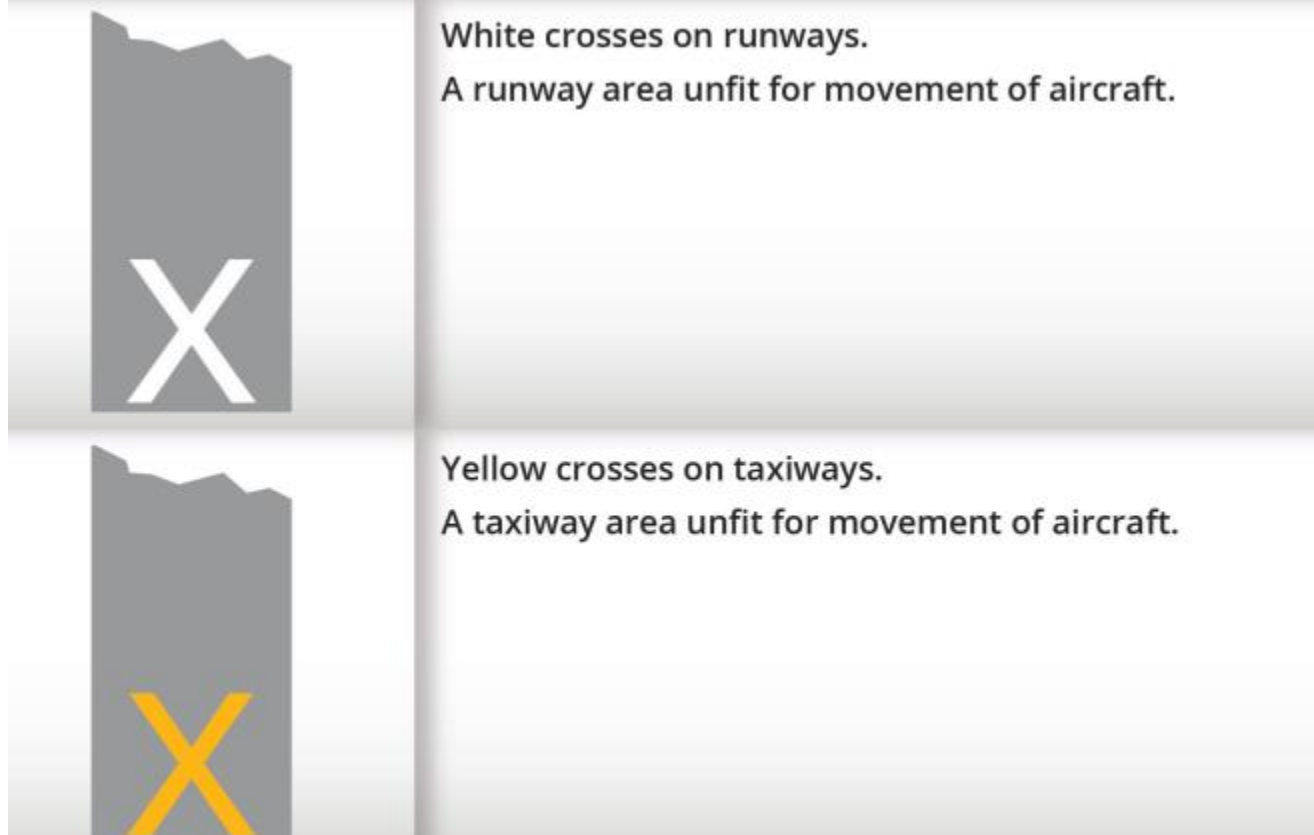
7.1.1 A closed marking shall be displayed on a runway or taxiway or portion thereof which is permanently closed to the use of all aircraft.



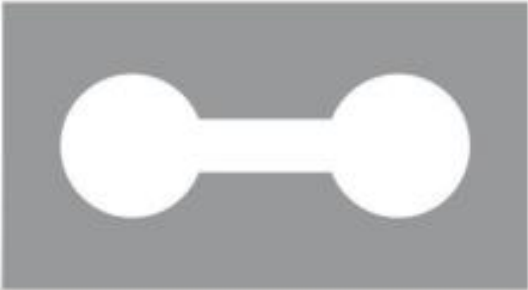
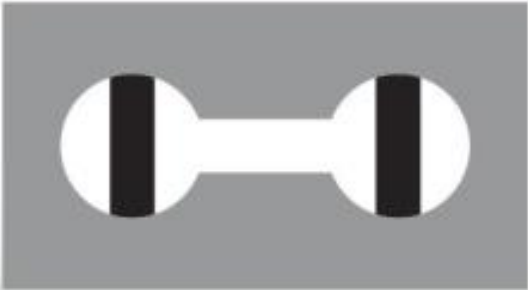


7.1 Closed runways and taxiways, or parts thereof

7.1.1 A closed marking shall be displayed on a runway or taxiway or portion thereof which is permanently closed to the use of all aircraft.





Signal	Description and Meaning
	A horizontal white or orange 'T'. Takeoffs and landings are in the direction of the shaft of the 'T' as indicated by the arrow.
	A horizontal white dumb-bell. Aircraft must land, take off and taxi on runways and taxiways only.
	A horizontal white dumb-bell with black stripes. Takeoffs and landings are to be on a runway, but other movement on the ground is not confined to runways and taxiways.



A horizontal right-hand arrow of conspicuous colour.
This may also be displayed at the end of the runway,
or strip, in use.

A right-hand circuit is in force.



The letter 'C' in black against a yellow background.
The location of the air traffic services reporting office.
It is where pilots visiting an aerodrome should report.



A set of two digits, displayed vertically at or near the
control tower for aircraft on the manoeuvring area.
The direction for takeoff, expressed in units of 10°
magnetic to the nearest 10° .



A horizontal white double cross.
Sailplane (glider) flying is in progress.

e.
must
g.

period.



The letter 'C' in black against a yellow background.
The location of the air traffic services reporting office.
It is where pilots visiting an aerodrome should report.



A set of two digits, displayed vertically at or near the control tower for aircraft on the manoeuvring area.
The direction for takeoff, expressed in units of 10° magnetic to the nearest 10° .



6.2.2 Mobile objects

6.2.2.1 All mobile objects to be marked shall be **coloured** or display **flags**.

6.2.2.2 When mobile objects are marked by colour, a **single conspicuous colour, preferably red or yellowish green** for **emergency vehicles** and **yellow** for **service vehicles**, should be used.





Aerodrome traffic density.



Runway surface condition(s). A description of the condition(s) of the runway surface used in the **runway condition report** which establishes the basis for the determination of the **runway condition code** for aeroplane performance purposes.

a) Dry runway . A runway is considered dry if its surface is **free of visible moisture** and not **contaminated** within the area intended to be used.

b) Wet runway . The runway surface is covered by any visible dampness or water **up to and including 3 mm deep** within the intended area of use.

c) Slippery wet runway . A wet runway where the surface **friction** characteristics of a significant portion of the runway have been determined to be **degraded**.

d) Contaminated runway . A runway is contaminated when a significant portion of the runway surface area (whether in isolated areas or not) within the length and width being used is covered by one or more of the substances listed in the **runway surface condition descriptors**.



	<u>Aircraft performance calculation</u>	<u>Situational awareness</u>
Nature of Information	Mandatory	Optional
Content	i. Aerodrome location indicator; ii. Date and time of assessment; iii. Lower runway designation number; iv. RWYCC for each runway third; v. Percent coverage contaminant for each runway third; vi. Depth of loose contaminant for each runway third; vii. Condition description for each runway third; and viii. Width of runway to which the RWYCCs apply if less than published width.	i. Reduced runway length; ii. Drifting snow on the runway; iii. Loose sand on the runway; iv. Chemical treatment on the runway; v. Snowbanks on the runway; vi. Snowbanks on the taxiway; vii. Snowbanks adjacent to the runway; viii. Taxiway conditions; ix. Apron conditions; x. State-approved, and published use of, measured friction coefficient; and xi. Plain language remarks.
Example	ESSA 02170055 09L 3/3/3 100/100/100 06/06/06 WET SNOW/WET SNOW/WET SNOW	RWY 09L SNOWBANK R20 FM CL . RWY09R ADJ SNOWBANKS.TWY B POOR. APRON NORTH POOR
Use	For calculating Aircraft Performance.	Planning flights and preparing for departure, approach, and taxi operations.



Runway Condition Assessment Matrix (RCAM)

Runway condition assessment matrix (RCAM)			
Assessment criteria		Downgrade assessment criteria	
Runway condition code	Runway surface description	Aeroplane deceleration or directional control observation	Pilot report of runway braking action
6	• DRY	---	---
5	• FROST • WET (The runway surface is covered by any visible dampness or water up to and including 3 mm depth) <i>Up to and including 3 mm depth:</i> • SLUSH • DRY SNOW • WET SNOW	Braking deceleration is normal for the wheel braking effort applied AND directional control is normal.	GOOD
4	<i>-15°C and Lower outside air temperature:</i> • COMPACTED SNOW	Braking deceleration OR directional control is between Good and Medium.	GOOD TO MEDIUM



Runway Condition Assessment Matrix (RCAM)

3	• WET ("slippery wet" runway) • DRY SNOW or WET SNOW (any depth) ON TOP OF COMPACTED SNOW More than 3 mm depth: • DRY SNOW • WET SNOW Higher than -15°C outside air temperature¹: • COMPACTED SNOW	Braking deceleration is noticeably reduced for the wheel braking effort applied OR directional control is noticeably reduced.	MEDIUM
2	More than 3 mm depth of water or slush: • STANDING WATER • SLUSH	Braking deceleration OR directional control is between Medium and Poor.	MEDIUM TO POOR
1	• ICE ²	Braking deceleration is significantly reduced for the wheel braking effort applied OR directional control is significantly reduced.	POOR
0	• WET ICE ² • WATER ON TOP OF COMPACTED SNOW ² • DRY SNOW or WET SNOW ON TOP OF ICE ²	Braking deceleration is minimal to non-existent for the wheel braking effort applied OR directional control is uncertain.	LESS THAN POOR



e) Runway surface condition descriptors. One of the following elements on the surface of the runway:

- **i) Compacted snow .** Snow that has been compacted into a **solid mass** such that aeroplane tires, at operating pressures and loadings, will run on the surface without significant **further compaction** or **rutting of the surface**.





e) Runway surface condition descriptors. One of the following elements on the surface of the runway:

- **ii) Dry snow.** Snow from which a **snowball** cannot readily be made.





e) Runway surface condition descriptors. One of the following elements on the surface of the runway:

- **iii) Frost .** Frost consists of **ice crystals** formed from airborne moisture on a surface whose **temperature is below freezing**. Frost differs from ice in that the frost crystals grow independently and therefore have a more **granular texture**.



e) Runway surface condition descriptors. One of the following elements on the surface of the runway:

- **iv) Ice .** Water that has frozen or compacted snow that has transitioned into ice, in **cold and dry** conditions.





e) Runway surface condition descriptors.

One of the following elements on the surface of the runway:

- **v) Slush** . Snow that is so **water-saturated** that water will **drain** from it when a handful is picked up or will **splatter if stepped** on forcefully.





e) Runway surface condition descriptors. One of the following elements on the surface of the runway:

- **vi) Standing water .** Water of depth greater than 3 mm.

Note.— **Running** water of depth greater than 3 mm is reported as standing water by convention.





e) Runway surface condition descriptors. One of the following elements on the surface of the runway:

- **vii) Wet ice .** Ice with water on top of it or ice that is melting.





e) Runway surface condition descriptors.

One of the following elements on the surface of the runway:

- **viii) Wet snow** . Snow that contains enough water content to be able to make a well-compacted, **solid snowball**, but water will **not squeeze out**.

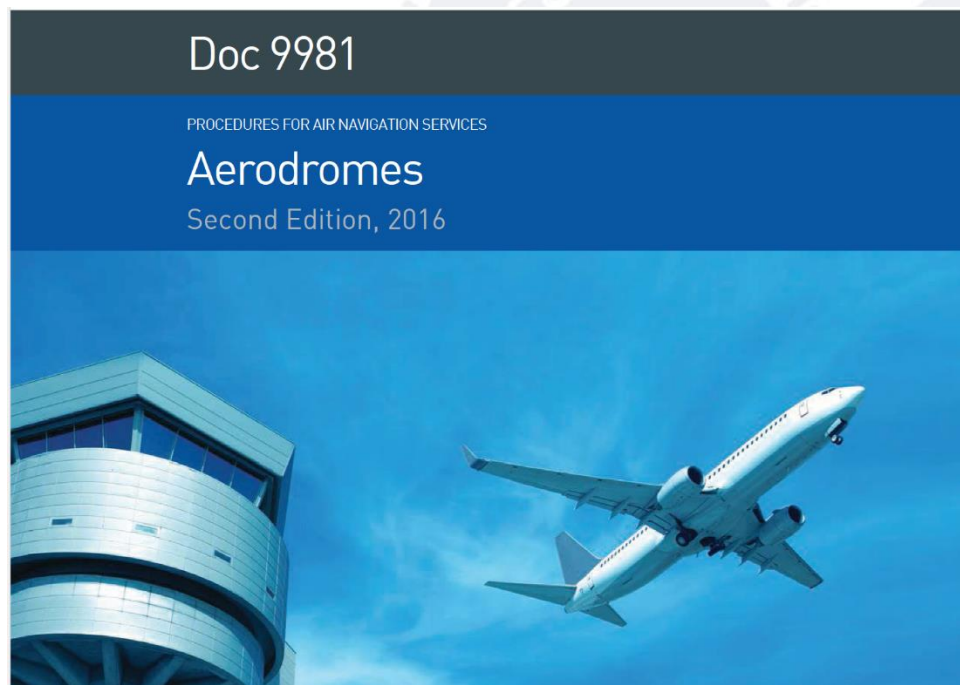




Runway condition code (RWYCC) for each runway third

Doc 9981

The codes are reported in a three-character group separated by a “/” for each third.



<i>Runway condition description</i>	<i>Runway condition code (RWYCC)</i>
DRY	6
FROST WET (the runway surface is covered by any visible dampness or water up to and including 3 mm deep) SLUSH (up to and including 3 mm depth) DRY SNOW (up to and including 3 mm depth) WET SNOW (up to and including 3 mm depth)	5
COMPACTED SNOW (Outside air temperature minus 15 degrees Celsius and below)	4
WET (“Slippery wet” runway) DRY SNOW (more than 3 mm depth) WET SNOW (more than 3 mm depth) DRY SNOW ON TOP OF COMPACTED SNOW (any depth) WET SNOW ON TOP OF COMPACTED SNOW (any depth) COMPACTED SNOW (outside air temperature above minus 15 degrees Celsius)	3
STANDING WATER (more than 3 mm depth) SLUSH (more than 3 mm depth)	2
ICE	1
WET ICE WATER ON TOP OF COMPACTED SNOW DRY SNOW OR WET SNOW ON TOP OF ICE	0 198



Width of Runways

Width of Runways						
Code number	Code letter					
	A	B	C	D	E	F
1(a)	18 m	18 m	23 m	-	-	-
2(a)	23 m	23 m	30 m	-	-	-
3	30 m	30 m	30 m	45 m	-	-
4	-	-	45 m	45 m	45 m	60 m
Note:(a): For a precision runway, w = 30 m where code is 1 and 2						



3.4 Runway strips

3.4.1 A **runway** and any associated **stop ways** shall be included in a strip.

Length of runway strips

3.4.2 A strip shall extend before the threshold and beyond the end of the runway or stopway for a distance of at least:

- **60 m** where the code number is 2, 3 or 4;
- **60 m** where the code number is 1 and the runway is an **instrument** one; and
- **30 m** where the code number is 1 and the runway is a **non-instrument** one.

Width of runway strips

3.4.3 A strip including a precision approach runway shall, wherever practicable, extend laterally to a distance of at least:

- **140 m** where the code number is 3 or 4; and
- **70 m** where the code number is 1 or 2;

on each side of the centre line of the runway and its extended centre line throughout the length of the strip.

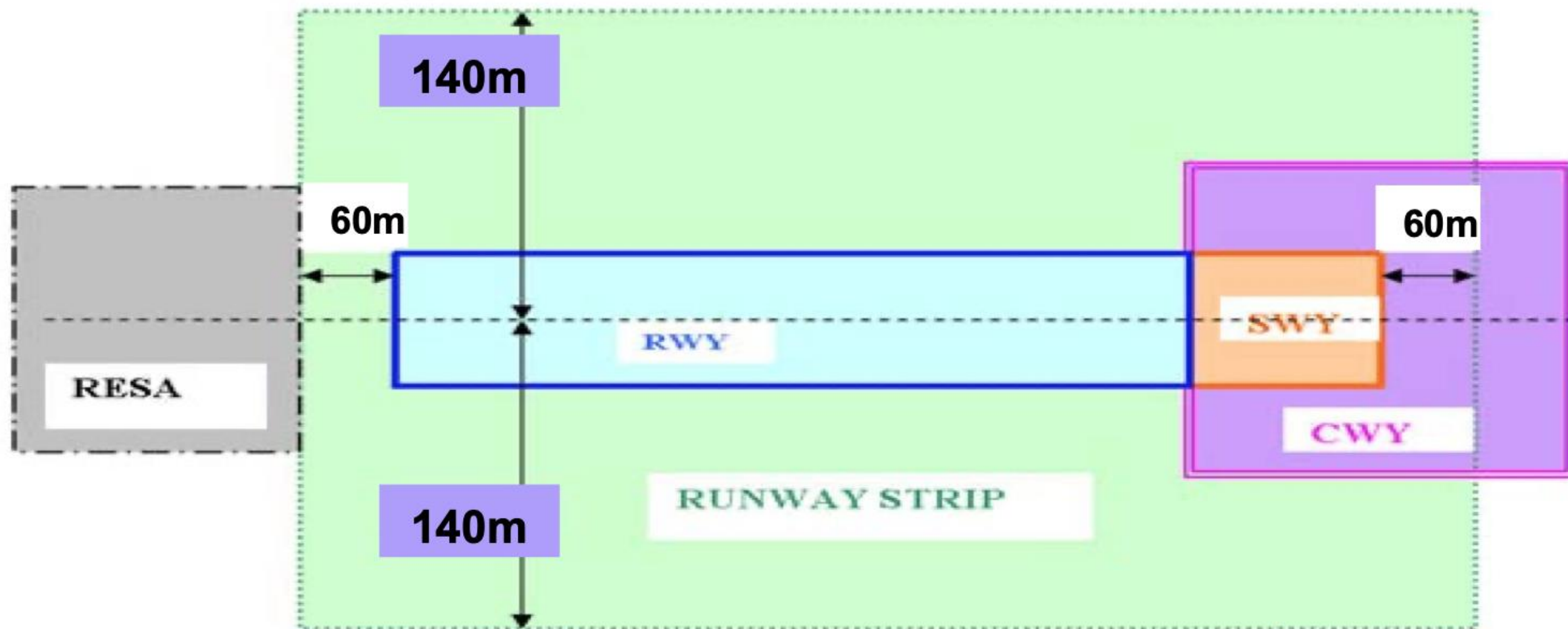


Width of Runway Strip

AIR LAW
ATPL GROUND TRAINING SERIES

A runway strip, wherever practicable, is to extend laterally on each side of the centre line of the runway and its extended centre line, throughout the length of the runway strip, to a distance defined in the table below.

Width of Runway Strip				
Type of Runway	Runway code number			
	1	2	3	4
Precision	75 m	75 m	150 m	150 m
Non-precision	75 m	75 m	150 m	150 m
Non-instrument	30 m	40 m	75 m	75 m



Code 3 or 4 Aerodrome



3.5 Runway end safety areas

3.5.1 A **RESA** shall be provided at each end of a runway strip where:

- the code number is 3 or 4; and
- the code number is 1 or 2 and the runway is an instrument one.

3.5.3 A **RESA** shall extend from the end of a runway strip to a distance of at least 90 m where:

- the code number is 3 or 4 (**RECOMMENDED 240M**); and
- the code number is 1 or 2 and the runway is an instrument one (**RECOMMENDED 120M**).

3.5.5 The width of a runway end safety area shall be at least twice that of the associated runway.



OBSTACLES TO BE MADE FRANGIBLE

The following areas must be maintained free of all but **frangible** equipment and installations required for air navigation:

- a) that portion of the **runway strip** within:
 - 1) 75 m of the runway centre line where the code number is 3 or 4; or
 - 2) 45 m of the runway centre line where the code number is 1 or 2;
- b) **RESA**;
- c) **clearway**;
- d) **taxiway strip** ; and
- e) the area within 240 m of the end of the strip and within:
 - 1) 60 m of the extended centre line where the code number is 3 or 4; or
 - 2) 45 m of the extended centre line where the code number is 1 or 2 of a precision approach runway Category I, II or III.



3.11 Taxiway strips

Definition. An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally **running off the taxiway**.

3.11.1 A taxiway, other than an aircraft stand taxilane, **shall** be included in a strip.



Taxiway,
other than
aircraft stand
taxilane,
centre line
to object
(metres)

Code
letter

Width of taxiway strips

(1) (11)

A	15.5
B	20
C	26
D	37
E	43.5
F	51



19.51 Width of Taxiways.

The straight portion of a taxiway should have a width of not less than that specified in the table below.

Taxiway Width	
Code Letter	
A	7.5 m
B	10.5 m
C	15 m if the taxiway is intended to be used by aeroplanes with a wheel base less than 18 m; otherwise 18 m
D	18 m if the taxiway is intended to be used by aeroplanes with an outer main gear span of less than 9 m; otherwise 23 m
E	23 m
F	25 m

AIR LAW
ATPL GROUND TRAINING SERIES

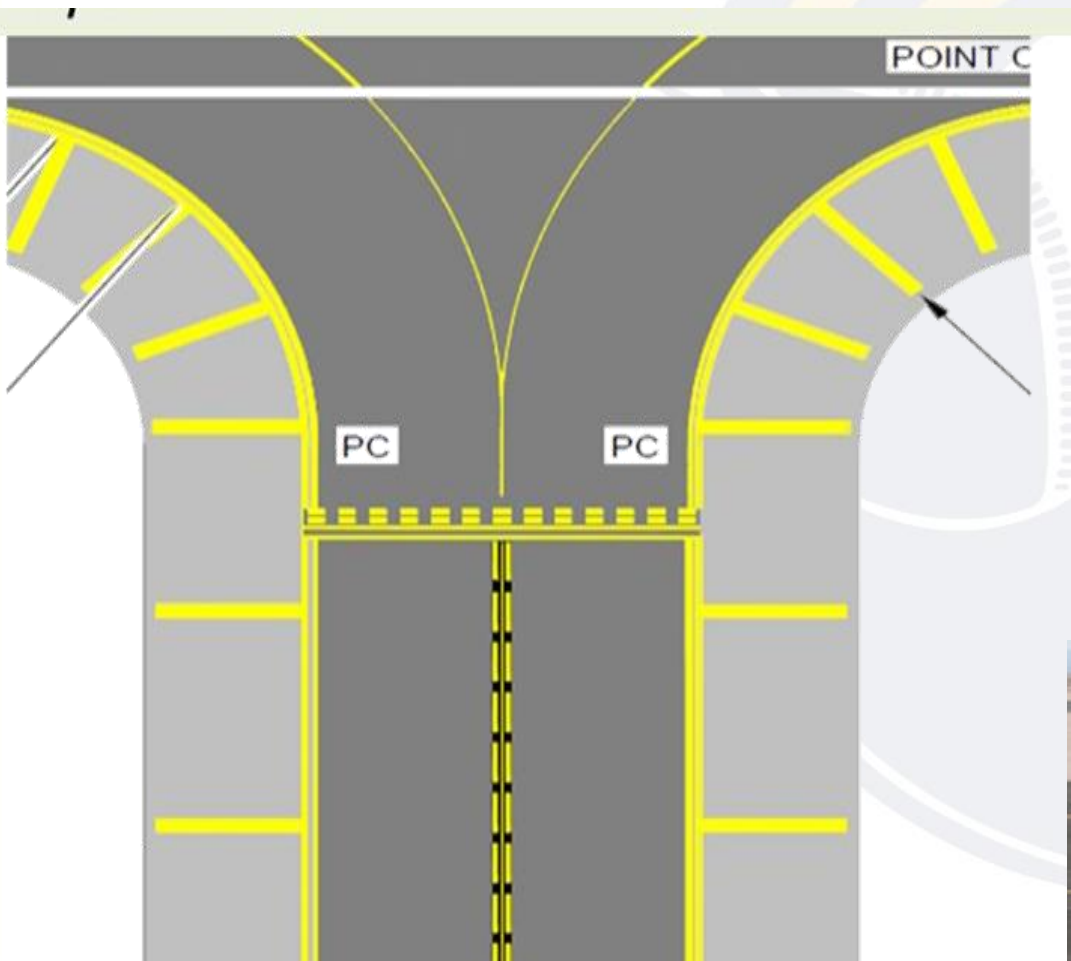


Transverse stripes (Doc. 9157 part 4)

2.2.1 Aprons and taxiways may be provided with shoulder stabilization, which has the appearance of pavement but which is not intended to support aircraft. Similarly, small areas within the apron area may have non-load bearing pavement that appears to be full strength.

2.2.2 The additional provision of transverse stripes on the non-load bearing surface has been found to be of assistance.

2.2.3 The transverse stripes should be placed perpendicular to the side stripe marking. The colour of the transverse stripes should be the same as that of the edge stripes, i.e. yellow.





Aerodrome traffic density.

a) **Light.** Where the number of movements in the **mean** busy **hour** is **not greater than 15** per **runway** or typically **less than 20 total aerodrome movements**.



b) **Medium.** Where the number of movements in the mean busy **hour** is of the order of **16 to 25 per runway** or typically **between 20 to 35 total aerodrome movements**.



c) **Heavy.** Where the number of movements in the mean busy **hour** is of the order of **26 or more per runway** or typically **more than 35 total aerodrome movements**.





Note 1.— The number of movements in the **mean busy hour** is the arithmetic mean over the **year** of the number of movements in the **daily busiest hour**.

Note 2.— **Either a take-off or a landing constitutes a movement.**



Simultaneous Operations

3.1.11 **Recommendation.**— Where parallel non-instrument runways are intended for simultaneous use, the minimum

- distance between their centre lines **should** be:
- — **210** m where the higher code number is **3 or 4**;
- — **150** m where the higher code number is **2**; and
- — **120** m where the higher code number is **1**.

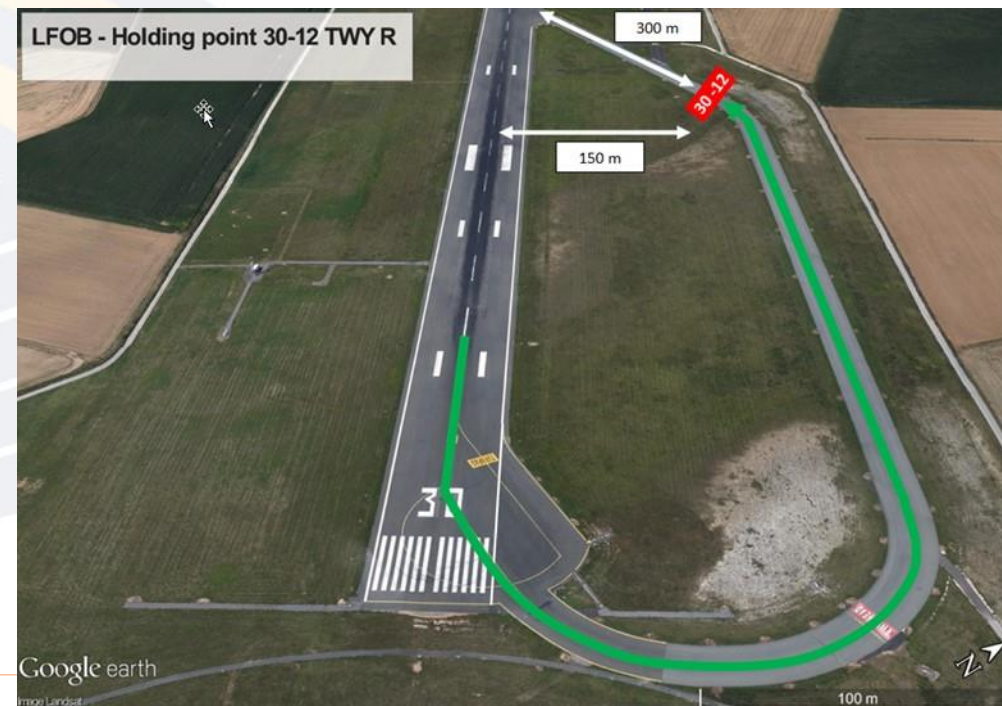
3.1.12 **Recommendation.**— Where parallel instrument runways are intended for simultaneous use, the minimum distance between their centre lines **should** be:

- — **1 035** m for independent parallel **approaches**;
- — **915** m for dependent parallel **approaches**;
- — **760** m for independent parallel **departures**;
- — **760** m for **segregated** parallel operations;



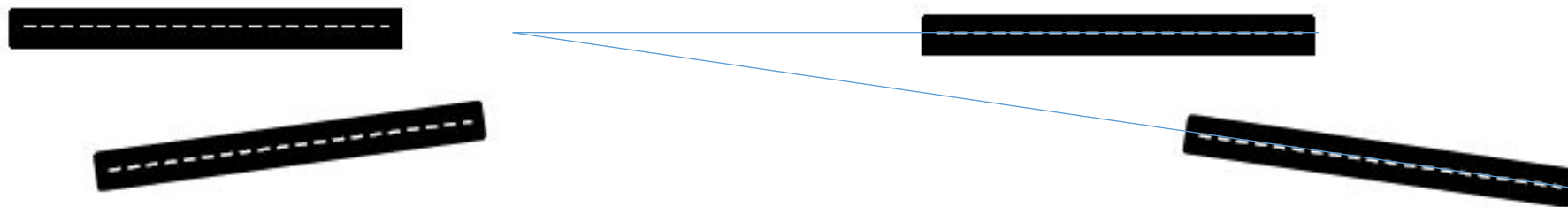
3.3 Runway turn pads

3.3.1 Where the end of a runway is not served by a taxiway or a **taxiway turnaround** and where the code letter is **D, E or F [Wingspan>36m]**, a runway turn pad **shall** be provided to facilitate a 180-degree turn of aeroplanes.





Near-parallel runways. Non-intersecting runways whose **extended centre lines** have an angle of convergence/divergence of **15 degrees or less**.





Simultaneous Operations

- **Dependent parallel approaches.** Simultaneous approaches to parallel or near-parallel instrument runways where **radar separation** minima between aircraft on adjacent extended runway centre lines **are prescribed**.
- **Independent parallel approaches.** Simultaneous approaches to parallel or near-parallel instrument runways where **radar separation** minima between aircraft on adjacent extended runway centre lines **are not prescribed**.
- **Independent parallel departures.** Simultaneous departures from parallel or near-parallel instrument runways.
- **Segregated parallel operations.** Simultaneous operations on parallel or near-parallel instrument runways in which one runway is used **exclusively for approaches** and the other runway is used **exclusively for departures**.



**YOUR WINGS ALREADY EXIST.
ALL YOU HAVE TO DO IS**

fly.