

# VISUAL AIDS WORKING GROUP UPDATES-23



## DP-01 Runway occupancy awareness lighting systems

(Presented by SASAKI Daisuke-JAPAN)

The systems illuminating the yellow lights indicate the runway is occupied!



# DP-02 Form and Proportions of Numbers and Letters for Runway Designation Markings - (Presented by Malaysia)

The visual guidance on the format and dimensions for runway designation is specified in Figure 5-3, but it does not provide sufficient clarification on how to address cases involving runway designations number greater than "11" or combinations of numbers with 3.0 metre width (e.g., 33, 03). Clarification is required in such cases.

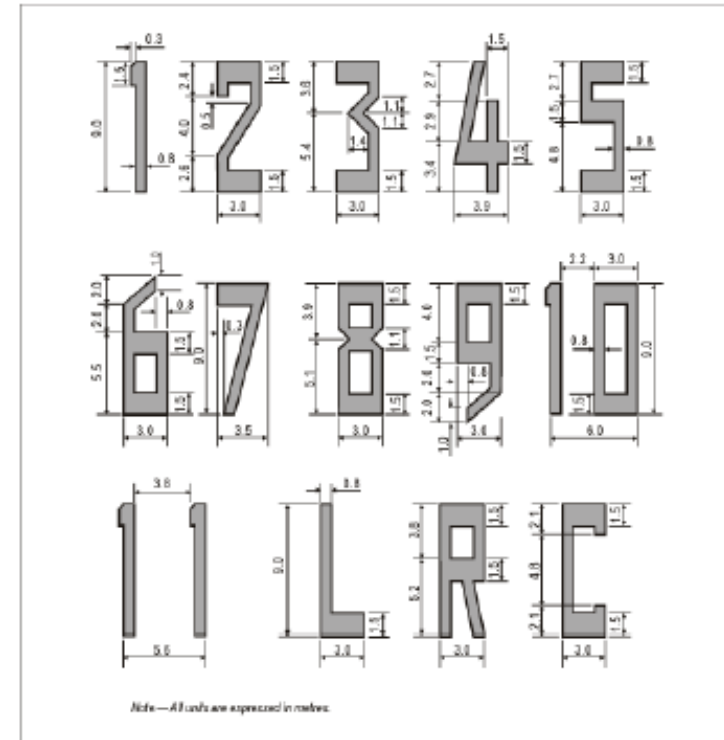


Figure 5-3. Form and proportions of numbers and letters for runway designation markings

## Recommendation:

1. Propose to provide additional visual guidance on the format and dimensions of runway designation involving numbers greater than '11' and combination of numbers with 3.0 metre width.
2. Propose to set the gap dimension for the combination of numbers with a 3.0-metre width be standardized to 2.2 metres.

TOLERANCE IN AERODROME PHYSICAL CHARACTERISTICS AND ADDRESSING INCONSISTENCIES IN ICAO ANNEX 14 VOLUME I (Presented by Malaysia)

<p><b>Aerodrome Design Manual, Doc 9157 Part 4 - Visual Aids, Appendix 3 (19) (d)</b></p>	<p><b>FAA Advisory Circular AC 150/5370-10H</b></p>																
<p>Ensure that the edges of the markings do not vary from a straight line more than 12 mm in 15 m and that the tolerance for the dimensions is <b>±5 per cent.</b></p>	<p><b>Marking Dimension and Spacing Tolerance</b></p> <table border="1" data-bbox="1862 435 2499 1142"> <thead> <tr> <th data-bbox="1862 435 1956 561">No.</th> <th data-bbox="1956 435 2280 561">Dimension and Spacing</th> <th data-bbox="2280 435 2499 561">Tolerance</th> </tr> </thead> <tbody> <tr> <td data-bbox="1862 561 1956 682">1</td> <td data-bbox="1956 561 2280 682">36 inch (910 mm) or less</td> <td data-bbox="2280 561 2499 682">±1/2 inch (12 mm)</td> </tr> <tr> <td data-bbox="1862 682 1956 849">2</td> <td data-bbox="1956 682 2280 849">Greater than 36 inch to 6 feet (910 mm to 1.85 m)</td> <td data-bbox="2280 682 2499 849">±1 inch (25 mm)</td> </tr> <tr> <td data-bbox="1862 849 1956 1016">3</td> <td data-bbox="1956 849 2280 1016">Greater than 6 feet to 60 feet (1.85 m to 18.3 m)</td> <td data-bbox="2280 849 2499 1016">±2 inch (50 mm)</td> </tr> <tr> <td data-bbox="1862 1016 1956 1142">4</td> <td data-bbox="1956 1016 2280 1142">Greater than 60 feet (18.3 m)</td> <td data-bbox="2280 1016 2499 1142">±3 inch (76 mm)</td> </tr> </tbody> </table>		No.	Dimension and Spacing	Tolerance	1	36 inch (910 mm) or less	±1/2 inch (12 mm)	2	Greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)	3	Greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)	4	Greater than 60 feet (18.3 m)	±3 inch (76 mm)
No.	Dimension and Spacing	Tolerance															
1	36 inch (910 mm) or less	±1/2 inch (12 mm)															
2	Greater than 36 inch to 6 feet (910 mm to 1.85 m)	±1 inch (25 mm)															
3	Greater than 6 feet to 60 feet (1.85 m to 18.3 m)	±2 inch (50 mm)															
4	Greater than 60 feet (18.3 m)	±3 inch (76 mm)															

2.3 This paper recommends the adoption of a ±5 percent tolerance in the application of markings in the movement area, as outlined in the Aerodrome Design Manual, Doc 9157 Part 4, to ensure uniformity and consistency in runway and taxiway markings, thereby enhancing safety, operational efficiency and regulatory compliance at aerodromes.

## TOLERANCE IN AERODROME PHYSICAL CHARACTERISTICS AND ADDRESSING INCONSISTENCIES IN ICAO ANNEX 14 VOLUME I (Presented by Malaysia)

### Aeronautical Ground Light

#### *Runway Edge Light*

2.4 Annex 14 Volume I Para 5.3.9.6 addresses the criteria for the installation of runway edge lights and specifies the necessary conditions whereby 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.

#### *Taxiway Edge Light (Straight Section)*

2.6 Annex 14, Volume I, Paragraph 5.3.18.3 recommends that taxiway edge lights on a straight section of a taxiway and on a runway **forming part of a standard taxi route should be spaced at uniform longitudinal intervals not exceeding 60m.**

2.8 This paper recommends **further study on the distance tolerance for runway and taxiway edge lights to ensure compliance with international standards, improve operational safety and optimize the effectiveness of lighting systems in guiding aircraft especially during low-visibility conditions.**

POTENTIAL MISINTERPRETATION ON THE TERMS “DEFINED RUNWAY AND TAXIWAY PAVEMENT EDGES TO THE NEAR SIDE OF SIGN” (Presented by Malaysia)

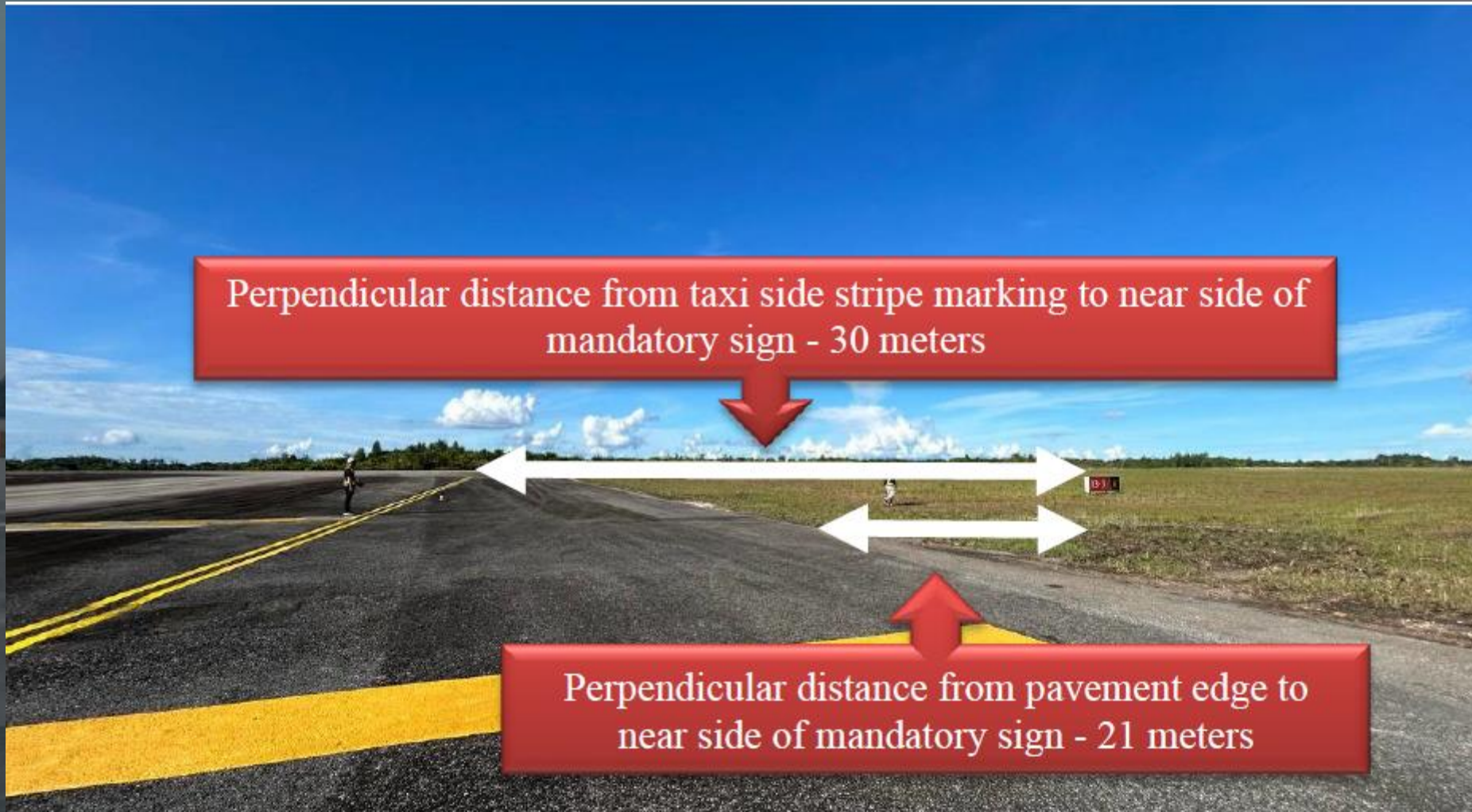
2.3 ICAO Annex 14 Volume I, Table 5-5 is as in the figure below:

**Table 5-5. Location distances for taxiing guidance signs including runway exit signs**

Code number	Legend	Sign height (mm)			Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
		Face (min.)	Installed (max.)			
1 or 2	200	300	700	5–11 m	3–10 m	
1 or 2	300	450	900	5–11 m	3–10 m	
3 or 4	300	450	900	11–21 m	8–15 m	
3 or 4	400	600	1 100	11–21 m	8–15 m	

DP-02- ATT C -

# POTENTIAL MISINTERPRETATION ON THE TERMS “DEFINED RUNWAY AND TAXIWAY PAVEMENT EDGES TO THE NEAR SIDE OF SIGN” (Presented by Malaysia)



DP-02- ATT D -

REVIEW ON OPTIONS OF STANDARDIZING THE APPROACH LIGHTING CIRCUIT DESIGN AGAINST THE SWITCH OVER TIME REQUIREMENTS TO ENSURE THE OPERATIONAL REQUIREMENTS ARE MET WITH RESPECT TO PRECISION APPROACH CAT II/III OPERATIONS  
(Presented by India)



Current provisions in ICAO Annex 14 Volume I show a discrepancy between paragraph 5.3.9.3 resp. 5.3.9.6 and the related Figure 5-26.

## **Runway edge lights**

### ***Location***

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. The lights on opposite sides of the runway axis shall be on lines at right angles to that axis. At intersections of runways, lights may be spaced irregularly or omitted, provided that adequate guidance remains available to the pilot.

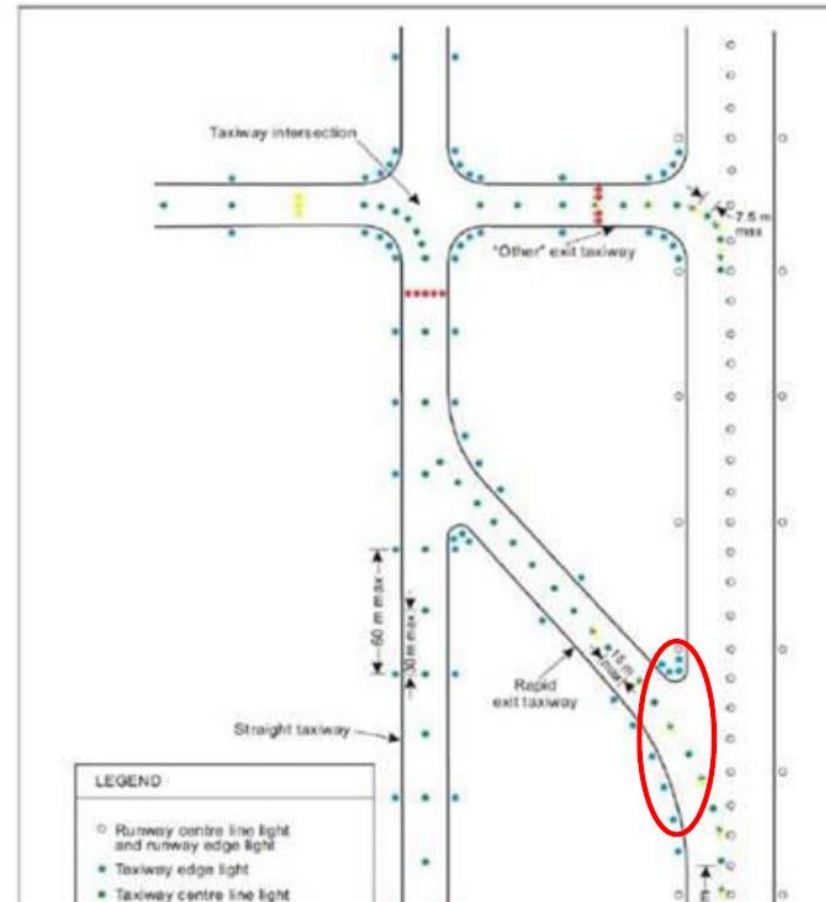
*Note.— The implementation of runway inset lights is a good operating practice to maintain adequate guidance to pilots in case of (multiple) intersections.*

# DP-03-Runway edge lights –Presented by Switzerland

## REVIEW ON OPTIONS OF STANDARDIZING THE APPROACH LIGHTING CIRCUIT DESIGN AGAINST THE SWITCH OVER TIME REQUIREMENTS TO ENSURE THE OPERATIONAL REQUIREMENTS ARE MET WITH RESPECT TO PRECISION APPROACH CAT II/III OPERATIONS

(Presented by India)

2.1 To eliminate the existing discrepancy in the current provisions of ICAO Annex 14 Volume I, it was proposed at VAWG/17 and ADOP-WG/4 that Figure 5-26 should be amended by adding a missing runway edge light at the position of the Rapid exit taxiway (RET) shown:



## SUMMARY

The current provisions in ICAO Annex 14 Vol. I regarding the application of runway side stripe markings leads to different ways in terms of the location of those markings. Most existing worldwide examples show an application over the entire runway length, as deduced from paragraph 5.2.7.3, while the current paragraph 5.2.7.1 requires those markings “between the thresholds only”.

In addition, the combination of the required number of stripes for threshold marking and the required width of the runway side stripe marking leads often to situations, where threshold marking and runway side stripe marking are adjoining or even overlapping each other. To ensure the necessity of adapting the overall width of the threshold marking in accordance with paragraph 5.2.4.6 in some cases, it is proposed to amend the paragraph accordingly.

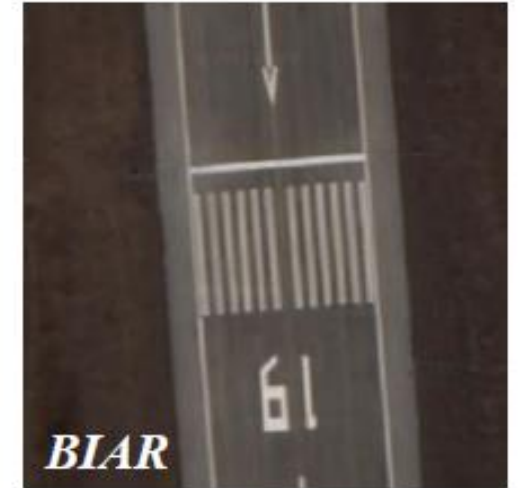
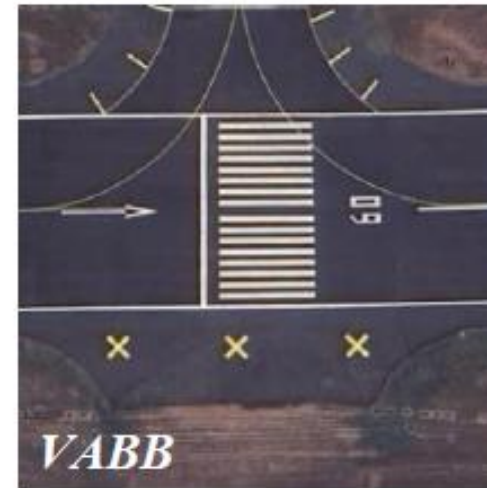
This discussion paper justifies the proposed amendments.

## Attachment D: Survey of Application and Location of Runway side stripe markings

*The runway side stripe markings are solid lines behind the threshold marking. (~80 % of all airports)*

*Examples:*

- *Mumbai (VABB) – India*
- *Akureyri (BIAR) – Iceland*
- *Zurich (LSZH) – Switzerland*
- *Aruba (TNCA) – Netherlands*
- *Lima (SPJC) – Peru*
- *Etc.*



# Considerations on the Location of Taxiing Guidance Signs

(Presented by Chang Hui, China)

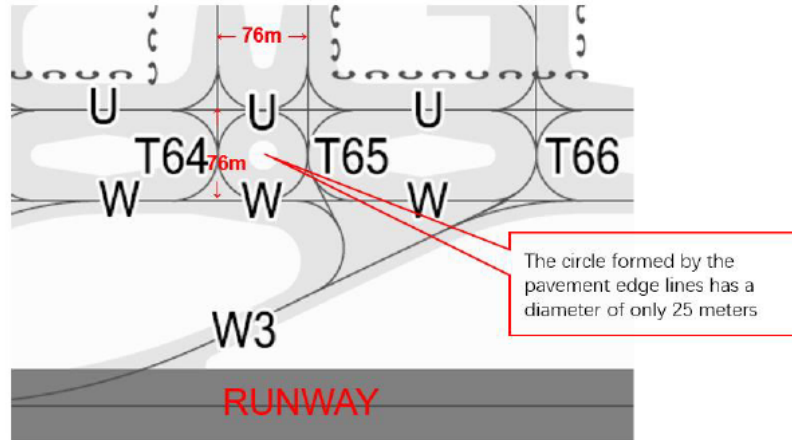


Figure 1 A Restricted Taxiway Layout

1.2 It is specified in Annex 14, Volume I, 5.4.1.3 that “the installed height of the sign shall not exceed the dimension shown in the appropriate column of Table 5-5” .

**Table 5-5. Location distances for taxiing guidance signs including runway exit signs**

Code number	Legend	Sign height (mm)		Perpendicular distance from defined taxiway pavement edge to near side of sign	Perpendicular distance from defined runway pavement edge to near side of sign
		Face (min.)	Installed (max.)		
1 or 2	200	300	700	5–11 m	3–10 m
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# Considerations on the Location of Taxiing Guidance Signs

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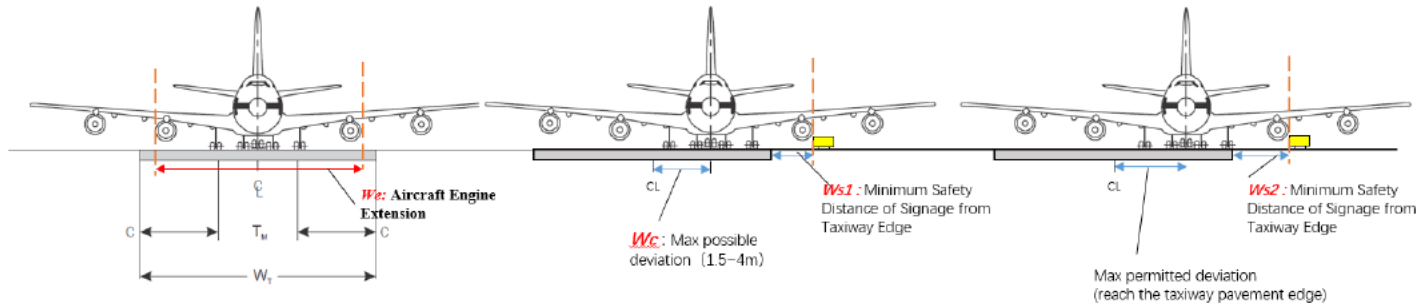
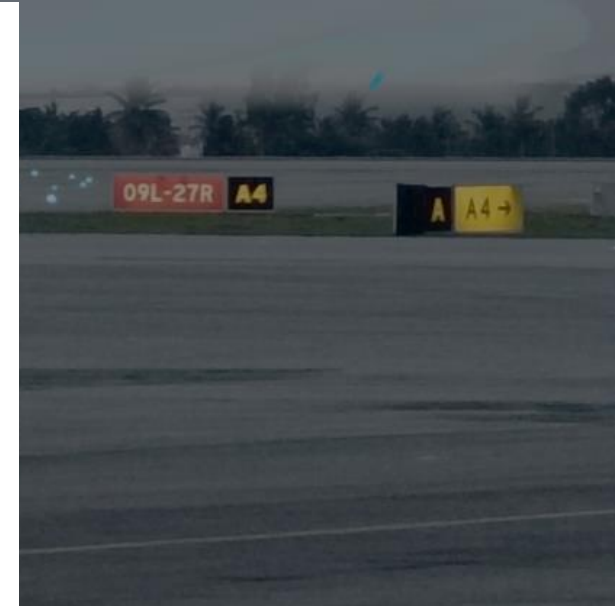


Figure 2 Aircraft Geometry and Signage Positioning Relationship Diagram

OMGWS ( $T_M, m$ )	Minimum Taxiway Width ( $W_t, m$ )	Safety Clearance ( $W_c, m$ )	Minimum Safety Distance of Signage from Taxiway Edge ( $W_s, m$ )		Notes
			$W_{s1}$ : Based on a possible lateral deviation of 1.5~4 m from the taxiway centreline	$W_{s2}$ : Based on the maximum lateral deviation permitted in actual operations	
<4.5	7.5	1.5	3.5	3.5	
4.5~6	10.5	2.25	3.5	3.5	
6~9	15	3	6.5	7.0	
9~15	23	4	6.5	7.5	Excludes A380
			9.5	10	A380



# Finalizing the Job Card on alternative apron taxiway and apron taxi lane markings and lightings



Current use



New planned infrastructure (wider overview is in Attachment C)

DP-07-

# Finalizing the Job Card on alternative apron taxiway and apron taxi lane markings and lightings



Current use



New planned infrastructure (wider overview is in Attachment C)

## LENGTH OF TOUCHDOWN ZONE LIGHTING

### *Location and characteristics*

**5.2.6.3** A touchdown zone marking shall consist of pairs of rectangular markings symmetrically disposed about the runway centre line with the number of such pairs related to the landing distance available and, where the marking is to be displayed at both the approach directions of a runway, the distance between the thresholds, as follows:

<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

# LENGTH OF TOUCHDOWN ZONE LIGHTING



**Touchdown Zone Markings**  
Runways 1,500m up to but not including 2,400m  
(A14, Vol.1, 5.2.6)



**Touchdown Zone Lighting**  
Runways over 1,800m  
(A14, Vol.1, 5.3.13)



## PROPOSALS FOR NEW SARPS PERTAINING TO VISUAL AIDS

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.

1.1 ICAO Annex 14, 5.3.9.7(b) states that “runway edge lights must display yellow over a section of 600 meters or one-third of the runway length, whichever is shorter, at the remote end of the runway from where the take-off run begins.” This provision has been interpreted differently by various airports and Civil Aviation Authorities (CAAs). Some stakeholders argue that yellow edge lights are unnecessary on runways used exclusively for landing, especially in the last one-third or 600 meters of the runway.

# Aeronautical information about the use of Light Emitting Diode (LED) technology in approach and runway lighting systems - Presented by Secretariat

## Appendix 2

### CONTENTS OF THE AERONAUTICAL INFORMATION PUBLICATION (AIP)

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#### AD 2.14 Approach and runway lighting

Detailed description of approach and runway lighting, including:

- 1) runway designator;
- 2) type, length and intensity of approach lighting system;
- 3) runway threshold lights, colour and wing bars;
- 4) type of visual approach slope indicator system;
- 5) length of runway touchdown zone lights;
- 6) length, spacing, colour and intensity of runway centre line lights;
- 7) length, spacing, colour and intensity of runway edge lights;
- 8) colour of runway end lights and wing bars;
- 9) length and colour of stopway lights; and
- 10) use of light emitting diode (LED) lights
- 11) remarks.

DP-11-

## Solar Airfield Ground Lighting- Presented by Ingrid, ANAC Brazil



*Figure 1 – Luminaire powered by a photovoltaic energy source.*



## Solar Airfield Ground Lighting- Presented by Ingrid, ANAC Brazil

Operating / Charging Condition	Discharge / Charge Rate	Time for 100% Charge or Discharge	Usable Operating Time (70%)
Maximum brightness (100%)	2.4% per hour (discharge)	~41.7 hours (full discharge)	~29.2 hours
Medium brightness (60%)	1.6% per hour (discharge)	~62.5 hours (full discharge)	~43.8 hours
Battery charging	7.1% per hour (charge)	~14 hours (full charge)	Not applicable

*Table 1 – Battery performance summary*

DP-12-

# Identifying A Temporarily Relocated Runway End During Reduced Length Runway Operations - (Presented by Mr. Brett Karran, Australia)

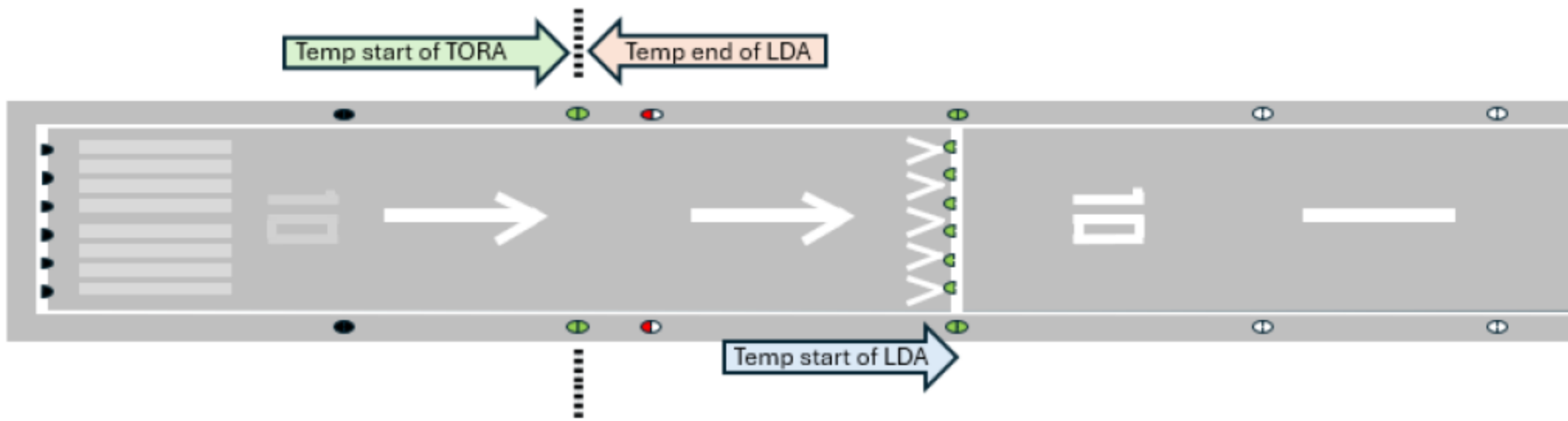
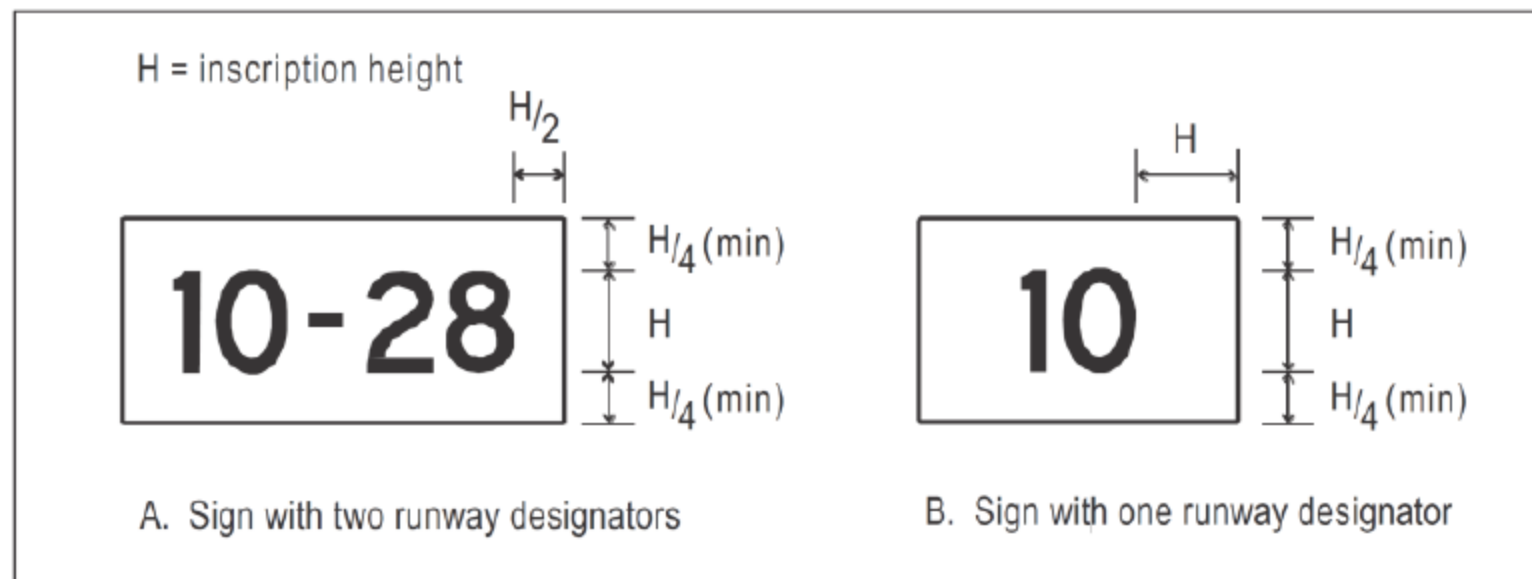


Figure 8 - Sample of temporary SOT / end LDA markers

# AIRFIELD GUIDANCE SIGN DIMENSIONS-Presented by Thomas Harboe

ICAO Annex 14 Volume 1 Appendix 4 Figure A4-4 illustrates the following:



*Explanatory Note to Figure A4-4: "H" stands for the inscription height.*

# Amendments to Obstacle protection surface to align with the new OLS provisions. (Presented by Holger & Matt, OLSTF)

**Table 5-3 Dimensions and slopes of the obstacle protection surface**

Surface dimensions	Runway type/code number							
	Non-instrument Code number				Instrument Code number			
	1	2	3	4	1	2	3	4
Length of inner edge	60 m	80 m <sup>a</sup>	150 m	150 m	150 m	150 m	300 m	300 m
Distance from the visual approach slope indicator system <sup>e</sup>	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m
Divergence (each side)	10%	10%	10%	10%	15%	15%	15%	15%
Total length	7 500 m	7 500 m <sup>b</sup>	15 000 m	15 000 m	7 500 m	7 500 m <sup>b</sup>	15 000 m	15 000 m
<i>Slope</i>								
a) T-VASIS and AT-VASIS	— <sup>c</sup>	1.9°	1.9°	1.9°	—	1.9°	1.9°	1.9°
b) PAPI <sup>d</sup>	—	A-0.57°	A-0.57°	A-0.57°	A-0.57°	A-0.57°	A-0.57°	A-0.57°
c) APAPI <sup>d</sup>	A-0.9°	A-0.9°	—	—	A-0.9°	A-0.9°	—	—

a. This length is to be increased to 100 m for a T-VASIS or AT-VASIS.  
 b. This length is to be increased to 15 000 m for a T-VASIS or AT-VASIS.  
 c. No slope has been specified if a system is unlikely to be used on runway type/code number indicated.  
 d. Angles as indicated in Figure 5-20.  
 e. D<sub>1</sub> is the distance of the visual approach slope indicator system from threshold prior to any displacement to remedy object penetration of the OPS (refer Figure 5-19). The start of the OPS is fixed to the visual approach slope indicator system location, such that displacement of the PAPI results in an equal displacement of the start of the OPS. See 5.3.5.46 e).

**Table 5-3. Dimensions and slopes of the obstacle protection surface — Non-instrument runways**

## Amendments to Obstacle protection surface to align with the new OLS provisions. (Presented by Holger & Matt, OLSTF)

**Table 5-4. Dimensions and slopes of obstacle protection surface — Instrument runways**

<b>Aeroplane design group</b>	<b>I</b>	<b>IIA-IIB</b>	<b>IIC</b>	<b>III</b>	<b>IV</b>	<b>V</b>
<b>Length of inner edge</b>	110 <sup>a</sup> m	125 m <sup>b</sup>	155 m <sup>c</sup>	175 m	185 m	200 m
<b>Distance from the visual approach slope indicator system</b>	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m	D <sub>1</sub> +60 m
<b>Divergence</b>	10%	10%	10%	10 %	10%	10%
<b>Length</b>	7 500 m <sup>d,f</sup>	7 500 m <sup>d,f</sup>	7 500 m <sup>d,f</sup>	7 500 m <sup>d,f</sup>	7 500 m <sup>d,f</sup>	7 500 m <sup>d,f</sup>
<b>Slope</b>						
<b>PAPI<sup>e</sup></b>	A-0.5°	A-0.5°	A-0.5°	A-0.5°	A-0.5°	A-0.5°
<b>a) APAPI<sup>e</sup></b>	A-0.83°	A-0.83°	—	—	—	—
<b>b)</b>						

<sup>a</sup> When the runway width is above 30 m, the inner width is increased to 125 m.

<sup>b</sup> When the runway width is above 30 m, the inner width is increased to 140 m.

<sup>c</sup> When the runway width is 30 m or less, the inner width is decreased to 140 m.

<sup>d</sup> D<sub>1</sub> is the distance of the visual approach slope indicator system from threshold prior to any displacement to remedy object penetration of the OPS (refer to Figure 5-19). The start of the OPS is fixed to the start of the visual approach slope indicator system location, such that displacement of the PAPI results in an equal displacement of the start of the OPS. See 5.3.5.26 (a).

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## Progress on Amendments to the Design Manual Related to Approach Light Bridges (Presented by Zheng Fei , Chang Hui, Li Chen, CAAC)



Thank you

