



WP - Intersection Take Off Holding Position Indicator - Concept

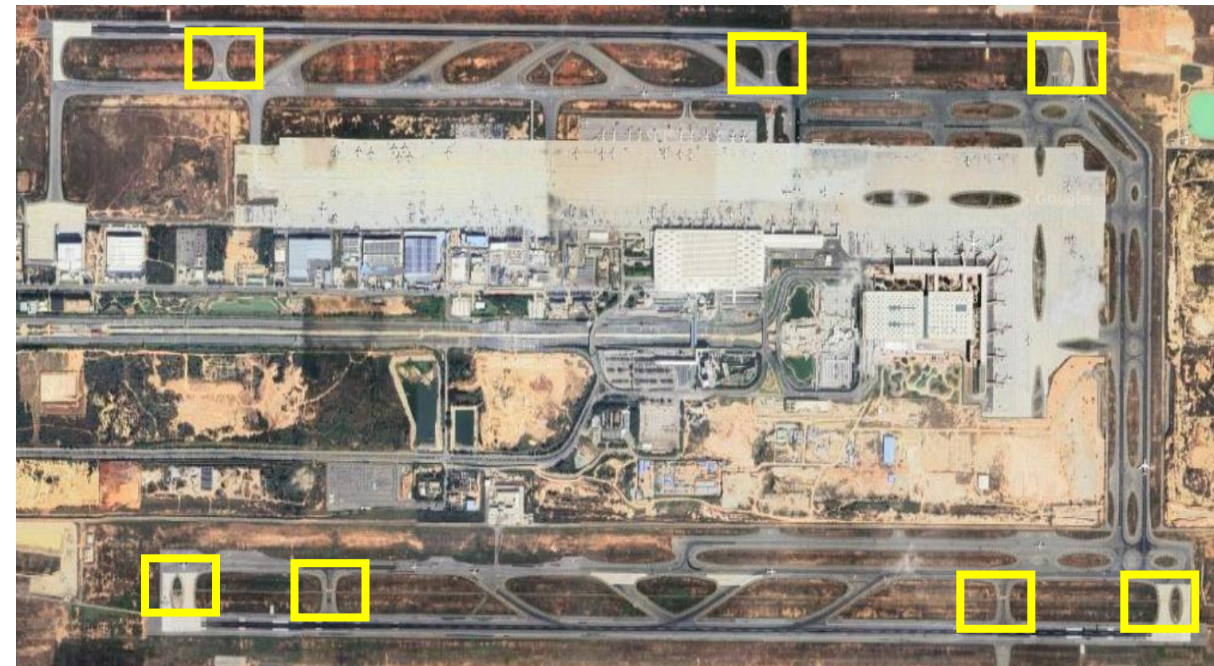
Presented By : Bangalore International Airport Limited, India

Introduction

- Intersection take-offs are a routine operational choice for many airports.
- Tool for capacity enhancement – Enhance throughput.
- Limited lateral separation between center lines of runway and parallel taxiway
- Potential wingtip/tail tip collision risks.

BLR AIP for Intersection

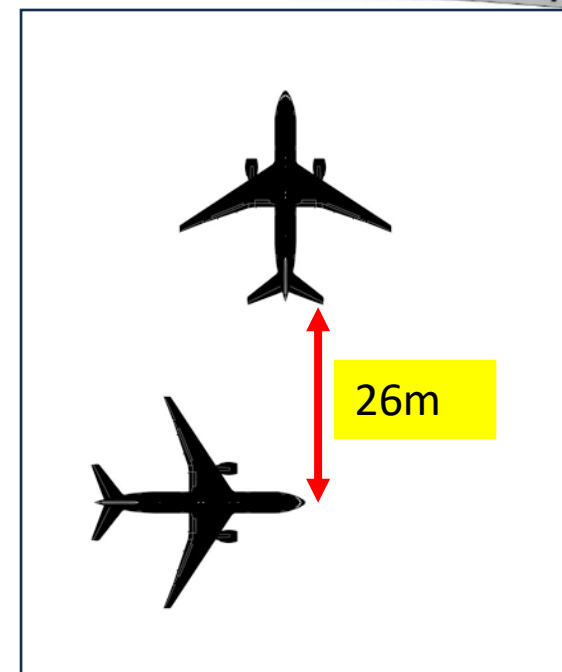
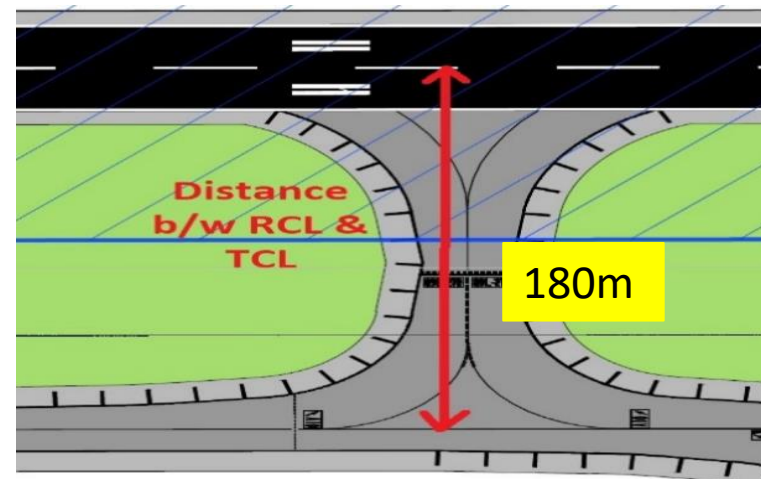
- No aircraft to cross behind Code D/E/F at RHP
- No Code D/E/F can cross behind Code C at RHP
- Only Code C can cross a Code C at RHP.



Problem Statement

Table 3-1. Taxiway minimum separation distances

Code Letter	Distance between taxiway centre line and runway centre line (metres)								Taxiway centre line to taxiway centre line (metres)	Taxiway other than aircraft stand taxilane, centre line to object (metres)	Aircraft stand taxiway centre line to aircraft stand taxilane centre line (metre)	Aircraft stand taxilane centre line to object (metres)
	Instrument runways Code number				Non-instrument runways Code number							
	1	2	3	4	1	2	3	4				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
A	77.5	77.5	-	-	37.5	47.5	-	-	23	15.5	19.5	12
B	82	82	152	-	42	52	87	-	32	20	28.5	16.5
C	88	88	158	158	48	58	93	93	44	26	40.5	22.5
D	-	-	166	166	-	-	101	101	63	37	59.5	33.5
E			172.5	172.5	-	-	107.5	107.5	76	43.5	72.5	40
F			180	180	-	-	115	115	91	51	87.5	47.5



Note 2: The distances in columns (2) to (9) **do not guarantee sufficient clearance behind a holding aeroplane to permit the passing of another aeroplane** on a parallel taxiway. Sufficient clearances may be ensured in such cases. See the ICAO Aerodrome Design Manual, Part 2.

Present Scenario

Distance RCL to RHP - **100m (code F)**

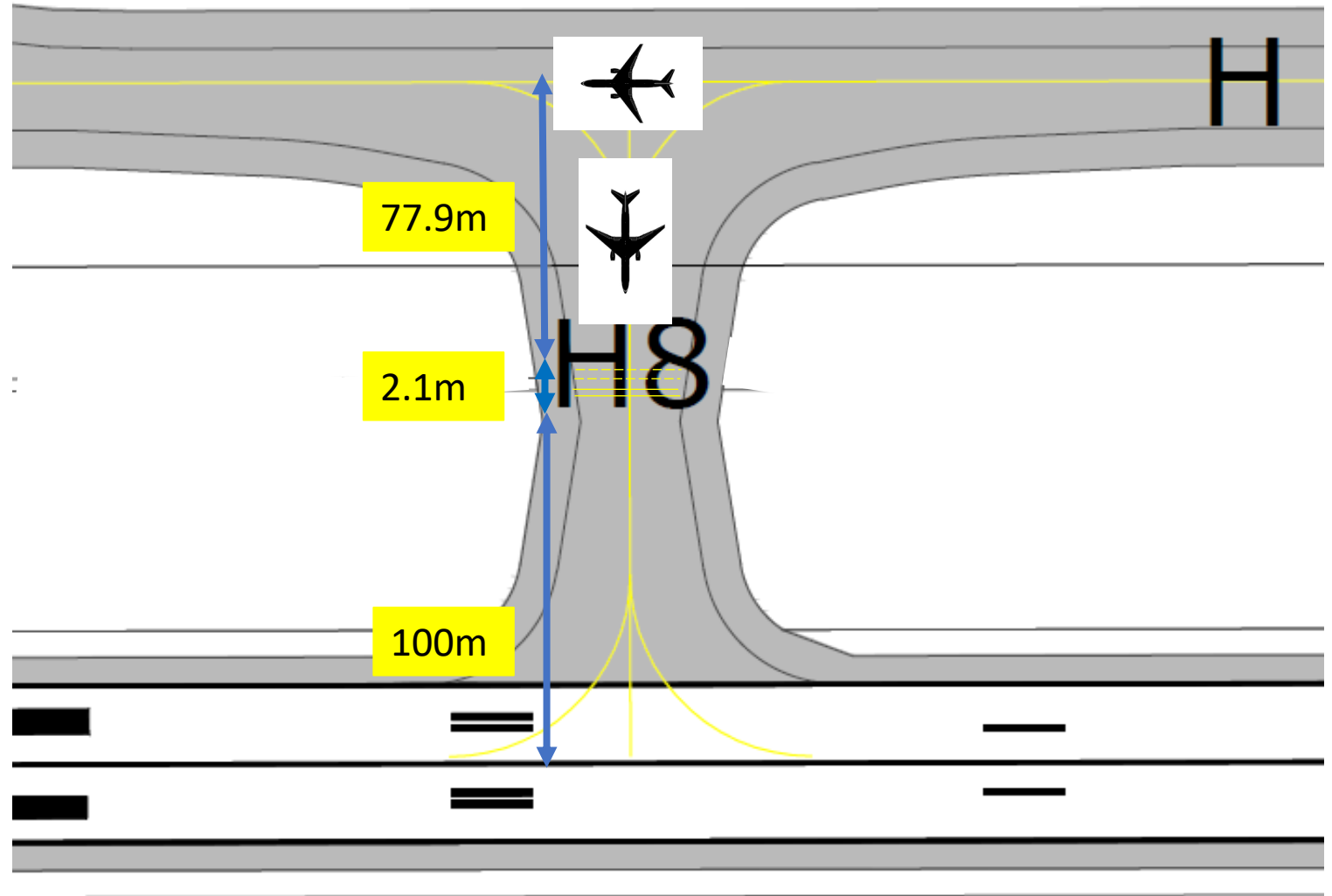
Width of RHP - **2.1m (Type 2)**

Remaining Distance - **77.9m**

Max Code C Length - **44.5m (A321)**

Separation - **26m**

Margin - 7.4m (Tail Tip to Wing Tip)



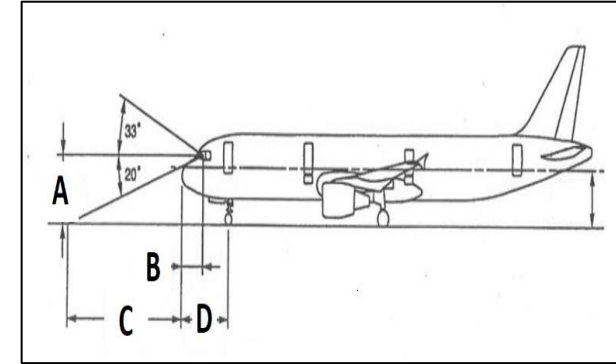
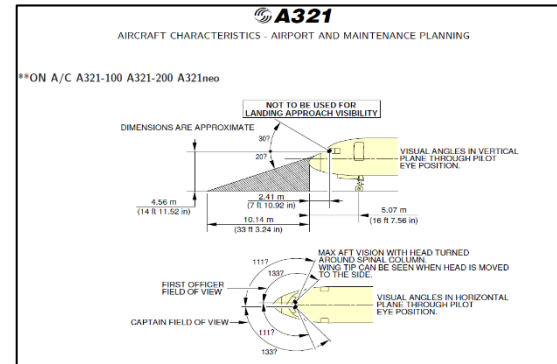
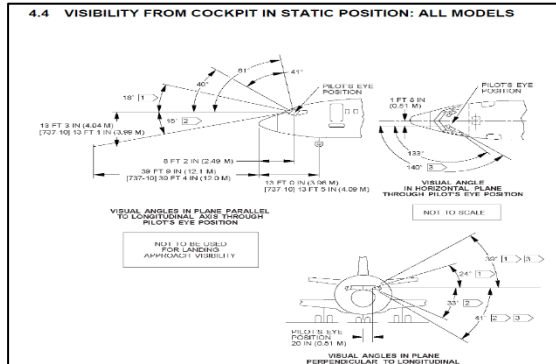
Present Scenario



Visual reference limitations (Marking & RGL – Day ; Stop bar & RGL - Night of pilots to align with the RHP and the mindset of pilots - required to see the RHP marking from where they stop to avoid potential runway incursion – Reduces the margin



Analysis



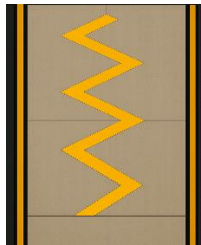
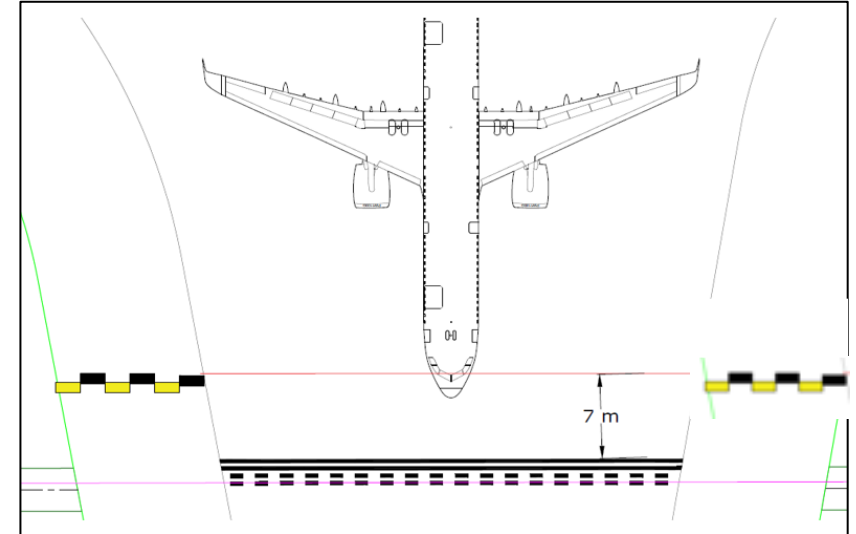
B738/739 – 14.59m

A320/321 – 12.55m

TYPE	LENGTH (M)	B (M)	C (M)	Length + C (M)	B+C (M)
A321	44.5	2.41	10.14	54.64	14.95
A320	37.6	2.40 5	10.14	47.74	14.945
B737-8-200	42.11	2.49	12.1	54.21	14.59
B737-8	39.47	2.49	11.46	50.93	13.95
ATR 72	27.166	2.18	5.17	32.336	7.35
ATR 42	22.670	2.18	5.976	28.646	8.156

Code Letter	RWY Code 3/4 (Remaining Distance – A321 Effective Lenth – RHP width)
C	68 – 54.64 - 2.1 = 11.26
D	76 – 54.64 - 2.1 = 19.26
E	82.5 – 54.64 - 2.1 = 25.76
F	80 – 54.64 - 2.1 = 23.26

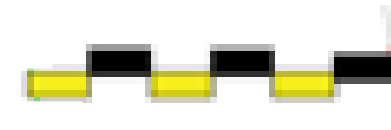
Proposal (Markings)



Sample -1

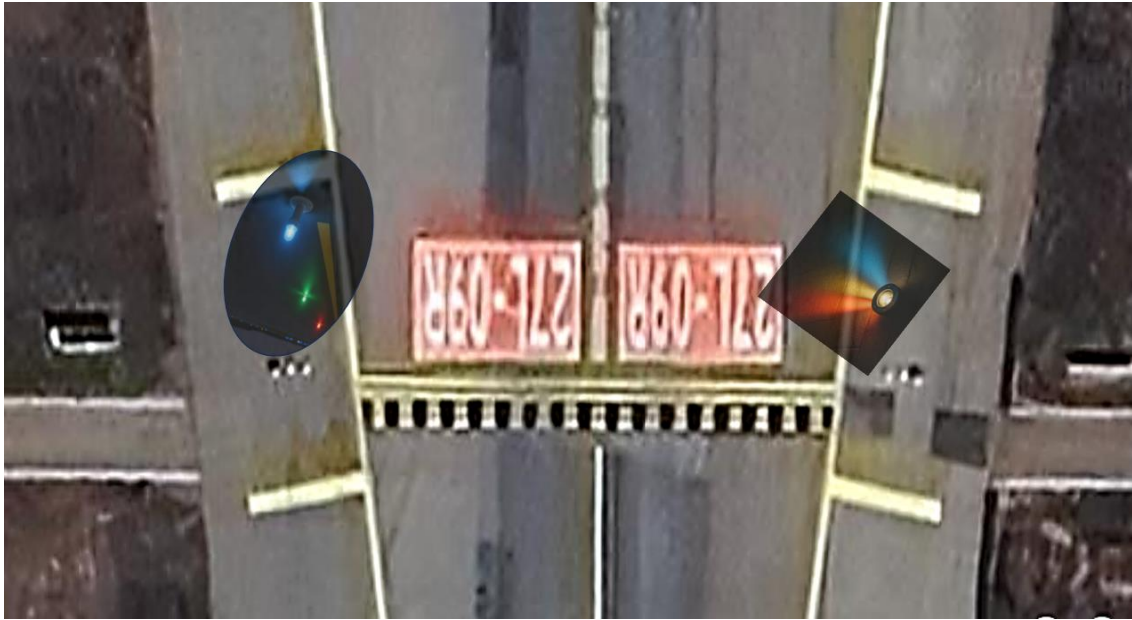


Sample -2



Sample -3

Proposal (Lights & Sign)



Sample -1



Sample -2



Sample -1

Advantages

Intersection Take-Off Holding Position Indicator (ITOHPI)

- **Improved Wingtip Clearance Awareness:** Enhances the Pilot-in-Command's ability to accurately assess lateral clearance, reducing the risk of wingtip conflicts.
- **Reduced Air Traffic Controller Workload:** Provides clear and intuitive visual cues, minimizing the need for repeated verbal instructions and enhancing controller efficiency.
- **Optimized Runway Utilization:** Supports efficient runway occupancy and throughput without compromising safety margins.
- **Compliance with ICAO Safety Objectives:** Aligns with ICAO's strategic goals for runway incursion prevention and strengthens the implementation of Aerodrome Safety Management Systems (SMS).

Conclusion

- **Conduct a pilot trial of the ITOHPI system at selected intersection points.**
- **Submit the operational results to ICAO APAC Office for regional review and respective states for review.**
- **Explore adaptation and scalability at other Code 4 aerodromes with similar layouts.**
- **Based on acceptance, recommend changes to ICAO SARPS.**

THANK YOU

Bangalore International Airport Limited