



ICAO

The Fourth Meeting of the Aerodromes Operations and Planning Sub-Group (AOP/SG/4)

Video Teleconference, 10 to 13 November 2020

Agenda Item 4: Provision of AOP in the Asia/Pacific Region

- Planning & Design of Aerodromes

RAPID EXIT TAXIWAY DESIGN

(Presented by China)

SUMMARY

This paper examines a design issue with the rapid exit taxiway design as specified in ICAO Annex 14, Volume I and recommend way forward for States and aerodromes.

1. INTRODUCTION

1.1 This paper introduces the difference between Annex 14 and the Chinese aerodrome technical standards about rapid exit taxiway plane design and give advice about the operation and plane design through compare the difference between two standards.

2. DISCUSSION

The difference between ICAO and Chinese Specifications

2.1 ICAO Annex 14's specification of rapid exit taxiway:

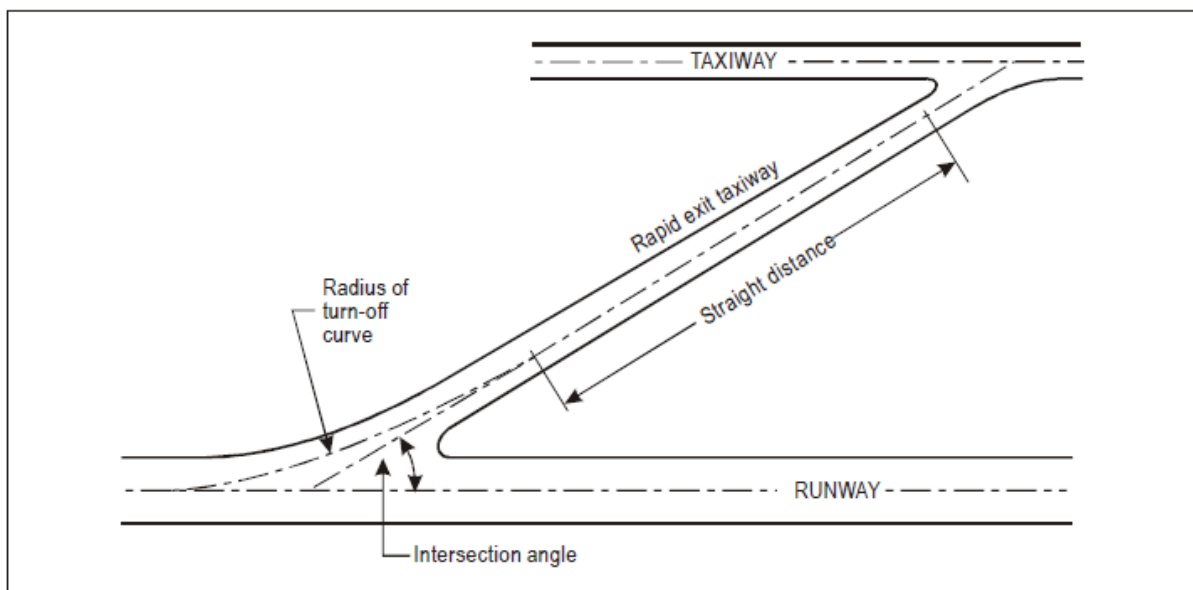


Figure 1: Annex 14's specification

2.2 Design of rapid exit taxiway according to the Chinese aerodrome technical standards:

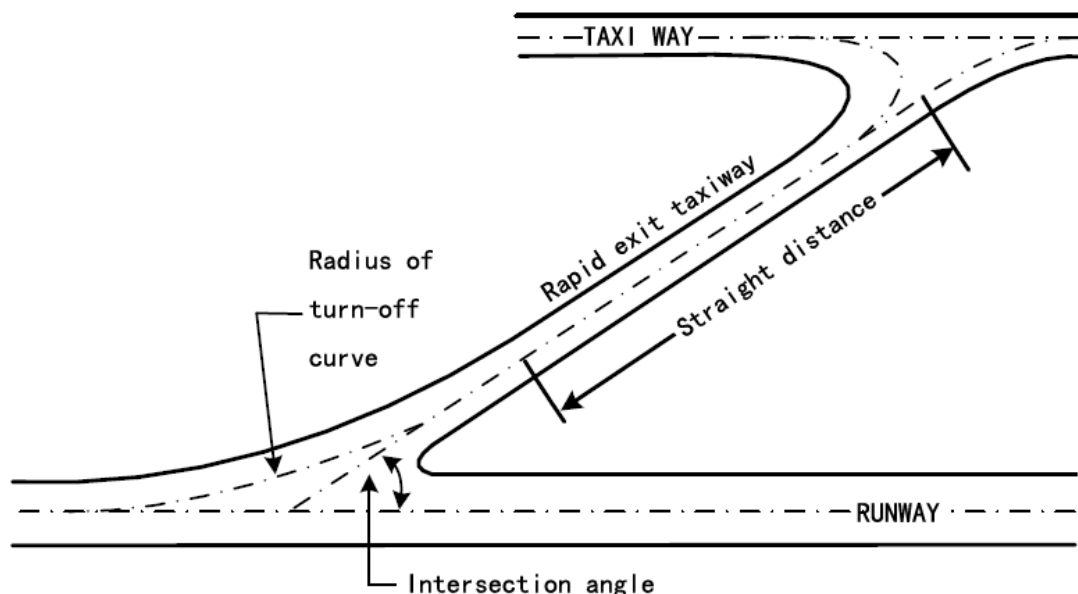


Figure 2: Chinese design of rapid exit taxiway

Analysis and Advice

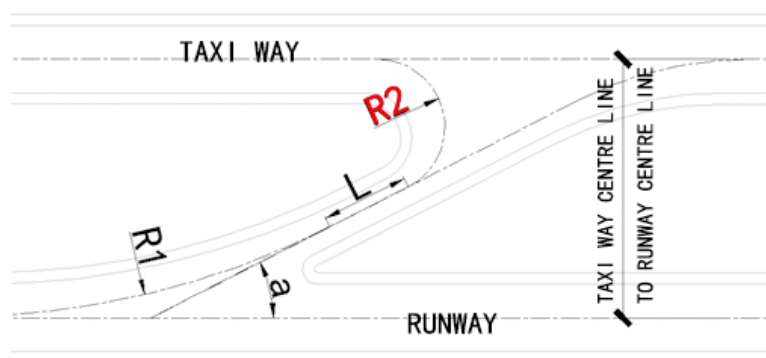


Figure 3: The difference between two specifications

2.3 There is only one difference between the two specifications: Chinese standard add a curve R2 at the end of the rapid exit taxiway. Compared with Annex 14, this curve could allow aircraft turn to the direction opposite to its landing. It will provide flexibility to controllers and pilots, and reduce the taxiing distance and time.

2.4 In most Chinese aerodromes this design is necessary, as usually there is only one full-length parallel taxiway between the runway and apron, and the apron footprint is very limited (especially in the early time of the airport). So if we do not add R2 to let the aircraft turn around the rapid exit taxiway would be useless.



Figure 4: Jinan airport (ICAO: ZSJJ)



Figure 5: Tianjin airport (ICAO: ZBTJ)

2.5

We can also see the same design in French and German aerodromes.



Figure 6: Berlin Brandenburg airport



Figure 7: Paris Charles de Gaulle airport

2.6 Based on the latest Annex 14 specifications, the minimum separation distance between the runway centre line and taxiway centre line has been reduced to 172.5 m for Code 4E [Ref.: Annex 14 Vol I Table 3-1]. However, the recommended intersection angle of a rapid exit taxiway with the runway is still 30 degrees [Ref.: Annex 14 Vol I Recommendation 3.9.18].

2.7 Under these conditions there is a new problem: The minimum turning radius of Code E airplane nose gear is 38 m, and that means in Figure 8 the minimum R2 is 38 m. The recommended radius of turn-off curve is at least 550 m where the code number is 3 or 4 [Ref.: Annex 14 Vol I Recommendation 3.9.15], and it means in Figure 8 R1 is at least 550 m. Then there is only 50.2 m for the straight distance, which fall short of 75 m as provided in ICAO Airport Design Manual (Doc 9157) Part 2, paragraph 1.3.19 and obviously not enough to let a code E airplane leave the runway at 93km/h stop at the end of it.

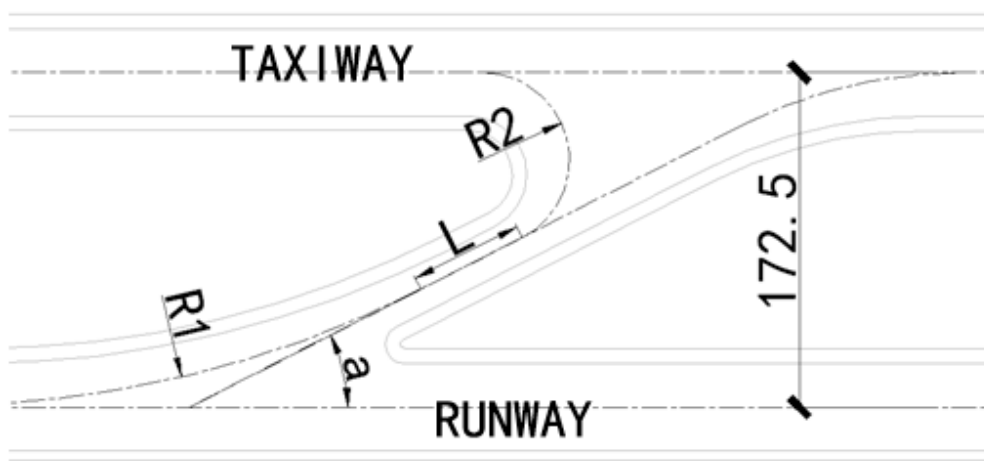


Figure 8

a=angle of the rapid exit taxiway (30 degrees is recommended)
R1=550m,
L=straight distance,
R2=38m;

2.8 Based on calculation and simulation, we found the Code E aircraft could not turn back until the angle is less than 26 degrees ($\alpha=26^\circ$, $R1=550m$, $L=99.87$, $R1=38m$). Indeed, China adopted 25 degrees in the latest design. When designing new rapid exit taxiways for Code E operations, States and aerodromes are recommended to:

- a) Adopt an angle smaller than 30 degrees as the intersection angle of rapid exit taxiway; and
- b) Use simulation software, communicate with pilots and draw experience from actual operations to determine the rapid exit taxiway design.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

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