International Civil Aviation Organization

Sixth Meeting of the Asia/Pacific Aerodrome Design and Operations Task Force (AP-ADO/TF/6)

Langkawi, Malaysia, 18 - 21 February 2025

Agenda Item 4: Planning, Design and Construction of Aerodromes

ENSURING SAFETY AT A LIVE AERODROME DURING MEGA AIRFIELD EXPANSION PROJECT: EXPERIENCE FROM THE HONG KONG INTERNATIONAL AIRPORT THREE-RUNWAY SYSTEM PROJECT

(Presented by Hong Kong, China)

SUMMARY

The Hong Kong International Airport has recently undergone a mega airfield expansion, transforming the airport from a Two-Runway System to a Three-Runway System. In particular, the reconfiguration of the Centre Runway presented one of the most significant challenges to the Three-Runway System project, as the works areas were in close proximity to live aerodrome operations. This paper shares Hong Kong, China's experience in successfully ensuring safety of the live aerodrome during the airfield expansion project.

1. INTRODUCTION

1.1 On 28 November 2024, the Hong Kong International Airport (HKIA) officially transitioned from a Two-Runway System (2RS) to a Three-Runway System (3RS), marking a significant milestone in its development. This mega airfield expansion project lasted for eight years and involved several stages. The new North Runway (i.e. the third runway), associated taxiways and corresponding facilities were constructed north of the original airport island by reclamation since 2016 and commenced operations in 2022. The Centre Runway (i.e. the former North Runway under 2RS) was subsequently closed for reconfiguration. Reconfiguration works of the Centre Runway involved regrading and extending the runway, constructing new taxiway systems, and constructing and installing new facilities and equipment to support 3RS operations. During the reconfiguration works of the Centre Runway, the HKIA was operating under an Interim Two-Runway System (I-2RS) configuration (i.e. with the new North Runway and the South Runway in operation, see Figure 1) until the commissioning of 3RS (see Figure 2).

1.2 Among different stages of the 3RS project, the reconfiguration of the Centre Runway presented one of the most significant challenges, as the works areas were in close proximity to the parts of aerodrome with live operations. The Civil Aviation Department (CAD) of Hong Kong, China, the regulator which is responsible for overseeing aerodrome safety and security, had been working closely with the Airport Authority Hong Kong (AAHK), the aerodrome operator of the HKIA, from the early stages of the project to ensure that its construction and transition works were well planned ahead and carried out in a manner that would not compromise aerodrome safety and security. This paper shares the experience of Hong Kong, China in successfully ensuring safe aerodrome operation by managing the safety risks associated with the Centre Runway reconfiguration works of the 3RS project.

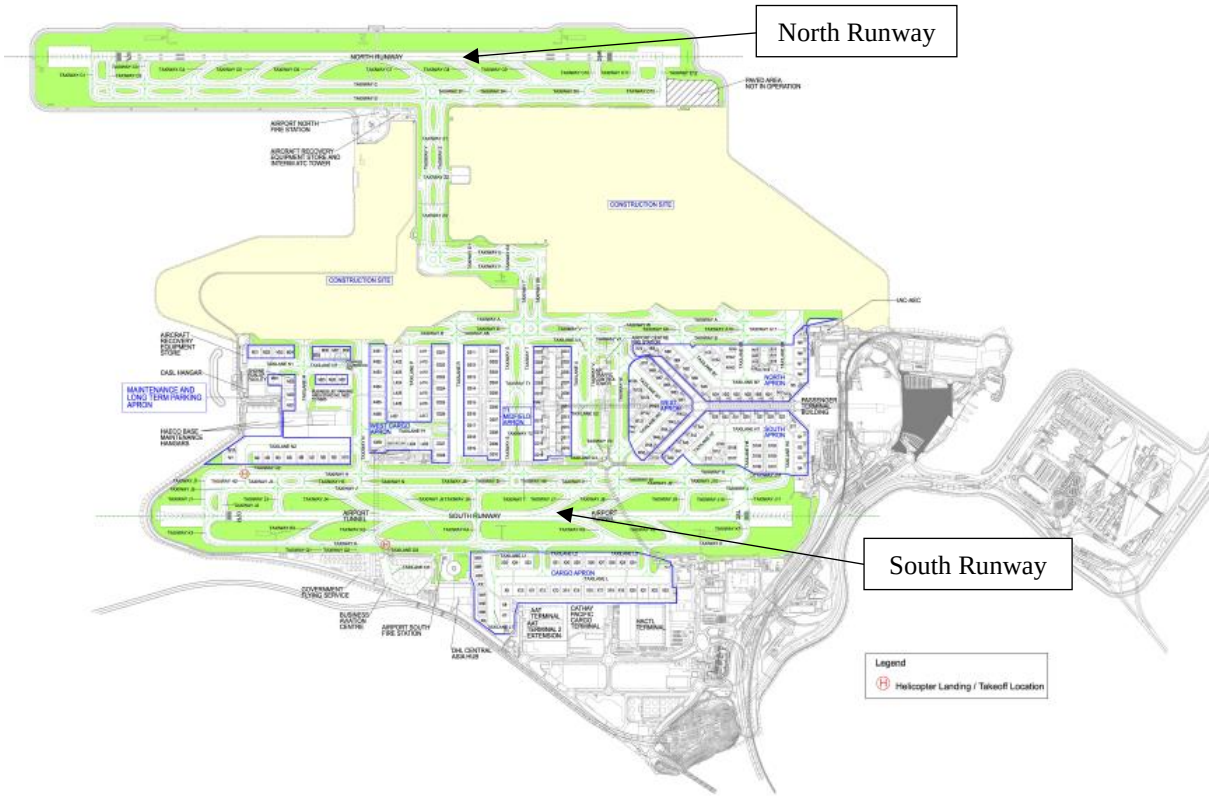

Figure 1 – Aerodrome Layout Plan of HKIA (I-2RS Stage)

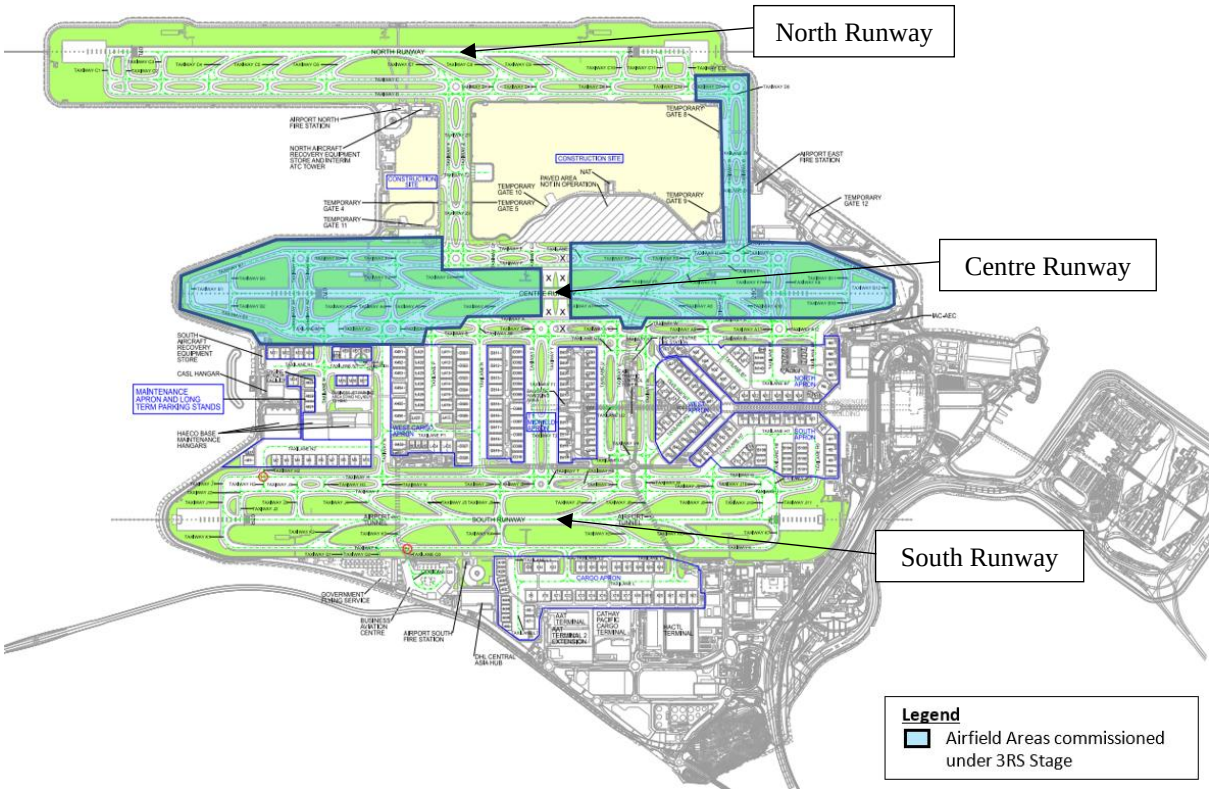

Figure 2 – Aerodrome Layout Plan of HKIA (3RS Stage)

2. DISCUSSION

2.1 In light of the complexity of the reconfiguration works of the Centre Runway and their close proximity to the parts of aerodrome with live operations, timely and comprehensive planning coordinated with all involved parties and stakeholders is of utmost importance in maintaining effective safety management over the construction activities, as well as to ensure that any potential hazards to live aerodrome operations could be identified and mitigated at an early stage. For this purpose, CAD and AAHK maintained close communication throughout an iterative process of submissions, comments and review meetings. AAHK, with regulatory advice from CAD, devised various measures in managing the safety risks to the live operations throughout various stages of construction. These measures included, among others, the following:-

i) Physical segregation between operational areas and non-operational areas;
ii) Provision of unambiguous visual aids;
iii) Advanced operational planning; and
iv) Close communication with stakeholders.

Physical Segregation between Operational Areas and Non-operational Areas

2.2 Providing physical segregation between the operational areas and non-operational areas is one of the most effective means to mitigate associated safety risks. Shortly after the closure of the Centre Runway and certain taxiway portions for reconfiguration works from July 2022, these areas became non-operational and were designated as landside, with security fences installed along the temporary airside-landside boundary. The designation of non-operational areas as landside facilitated the movement of construction materials and personnel in and out of the construction sites, while the security fences served as physical barriers, effectively minimising the possibility of disruptions to live aerodrome operations and preventing inadvertent aircraft access to the non-operational areas.

2.3 As the construction of the Centre Runway and associated taxiways were progressively completed, these areas were re-designated as airside from late July 2024. In line with this re-designation, the security fences used for delineating the temporary airside-landside boundary were progressively replaced by marker boards with unserviceability lights in the same alignment, which remained in place until shortly before the actual changeover from I-2RS to 3RS operations on 28 November 2024. This enabled the safe conduct of essential activities, including flight check of the Centre Runway scheduled during August – September 2024 and other preparatory activities such as runway surface friction runs, aircraft crash exercise, drills and operational trials before the planned commissioning of 3RS operations in November 2024. As a prudent measure for preventing unintended aircraft access from the operational areas to non-operational areas during the conduct of these activities, specific portions of marker boards and unserviceability lights were temporarily removed only if absolutely necessary to facilitate the respective activity before its commencement, and they had to be reinstated immediately after completion of the activity.

Provision of Unambiguous Visual Aids

2.4 The provision of unambiguous visual aids (see Figure 3) to airfield users is also essential to prevent inadvertent aircraft access to non-operational areas by enhancing situational awareness and eliminating any unnecessary sources of confusion for pilots and airport ground staff. Immediately after the closure of the Centre Runway and portions of taxiways for reconfiguration in July 2022, airfield ground lightings (AGLs), markings and movement area guidance signs (MAGS) which could lead airfield users from the operational areas into the non-operational areas were either obliterated or masked off. These AGLs, markings and MAGS within the operational areas were only gradually reinstated by AAHK days before the changeover from I-2RS to 3RS operations on 28 November 2024.

2.5 In addition, in accordance with Para 7.1.2 of ICAO Annex 14 Volume I, which states that *"a closed marking should be displayed on a temporarily closed runway or taxiway or portion thereof..."*, white closed runway markings were displayed on the pavement surface along the entire length of the closed Centre Runway under reconfiguration when the painting works for runway markings had commenced. For the closed taxiways, yellow closed taxiway markings were displayed at each junction of the taxiways under construction interfacing with the operational areas. To ensure that the closed Centre Runway would not be mistaken by pilots as an operational runway especially at night, during low-visibility operations and when AGL testing was underway, a flashing-white lighted cross was placed at each end of the closed runway at all times as an additional safeguarding measure.

2.6 In preparation for the flight check of the closed Centre Runway from August to September 2024, a comprehensive risk assessment was carried out in an early stage by AAHK and stakeholders, which identified a need to ensure the safety of runway-crossing operations during the flight check period due to the intersection of two live taxiways with the Centre Runway. To mitigate the risks, additional runway holding position markings and mandatory instruction markings for the closed Centre Runway were painted on the entry and exit points to the runway on the two live taxiways as a visual alert to pilots.

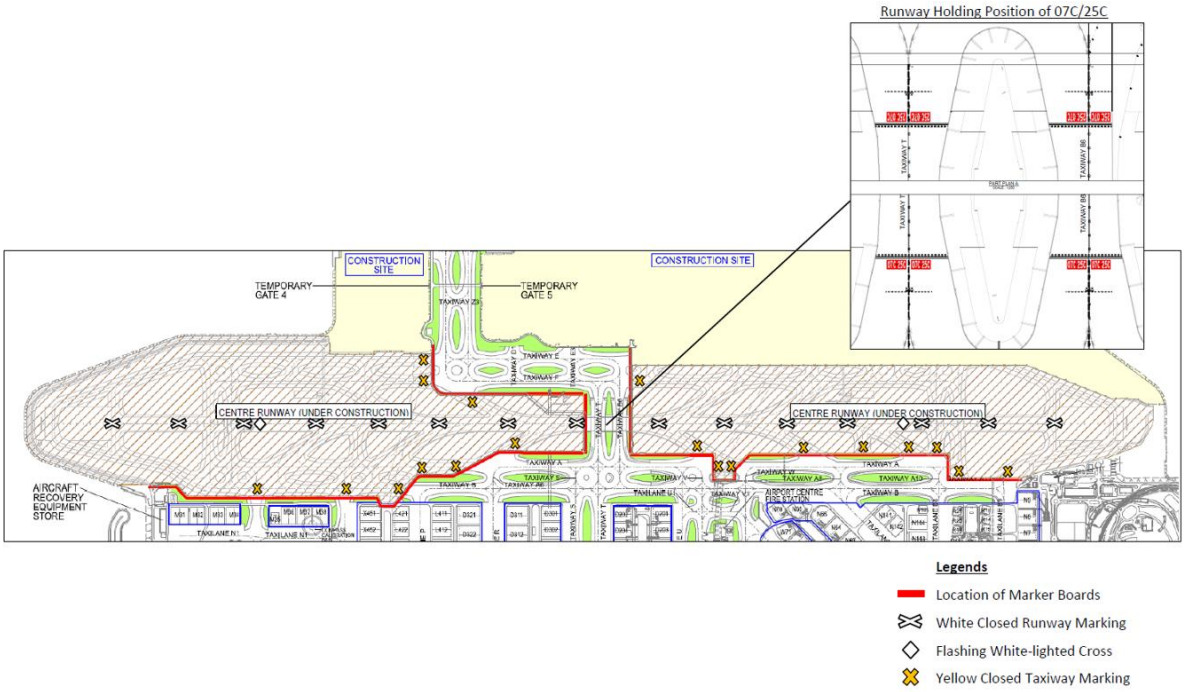

Figure 3 – Visual Aids for the Closed Centre Runway and Associated Taxiways from 31 July 2024 to 28 November 2024

Advanced Operational Planning

2.7 Advanced operational planning is also crucial in ensuring that possible conflicts between the construction works and aerodrome operations can be resolved at an early stage. As it was identified in an early stage that additional operational procedures had to be formulated to facilitate the flight check of the reconfigured Centre Runway between August and September 2024, CAD and AAHK held discussions on these procedures well before the commencement of flight check. This included, but was not limited to, aircraft holding and runway-crossing arrangements, removal and reinstatement of marker boards and visual aids, contingency plans and pre-/post-flight check inspections. All these procedures were incorporated into a Flight Check Operations Manual and the Manual was disseminated to all involved parties before the flight check to ensure that relevant procedural changes were well-communicated to the affected stakeholders.

2.8 Prior to HKIA's transition to 3RS operations, relevant manuals and operation procedures, including the Aerodrome Manual, Safety Management Manual, Emergency Procedures Manual and internal procedures etc., were reviewed and updated by AAHK in consultation with CAD. Aircraft taxiing drills were also carried out in the new aircraft manoeuvring areas before the commencement of 3RS operations to ensure that the aerodrome facilities are up to standard and ready for operations.

Close Communication with Stakeholders

2.9 Close communication with stakeholders at all stages of construction is vital to maintaining safe and efficient aerodrome operations. As part of the change management process of the project, AAHK engaged different airport stakeholders, including but not limited to airlines, ground handling agents, air traffic control, airport fire contingent, works contractors, from an early stage through various briefings, meetings and workshops. This ensured that all relevant stakeholders were well informed of the changes to the HKIA throughout the construction process. In consultation with CAD, AAHK had also conducted joint risk assessments from multiple perspectives with stakeholders prior to the commencement of planned works / activities in order to ensure that the potential risks to the safe operations to aircraft were identified, and corresponding mitigation measures were developed and implemented to keep the risks at an acceptable level.

2.10 Before the commencement of any new stage of the project and/or the implementation of major changes to the aerodrome (e.g. flight check, commissioning of 3RS), relevant information was promulgated to the airport community through appropriate means, including Aeronautical Information Publication (AIP) amendments, AIP Supplements, Aeronautical Information Circulars, Notice to Airmen and Airfield Circulars etc. This further enhanced transparency and ensured that different stakeholders were timely updated on the latest changes within the live aerodrome environment, allowing them to adjust their operations accordingly.

2.11 With the collaborative efforts from CAD, AAHK and all key stakeholders in effectively managing safety risks to the live aerodrome environment of the HKIA throughout the project, HKIA has successfully and smoothly transitioned from I-2RS to 3RS operations as planned on 28 November 2024, representing HKIA's achievement of a key milestone in this mega airfield expansion project.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the experience of Hong Kong, China in successfully ensuring safety at a live aerodrome during a mega airfield expansion project; and

b) share experiences in ensuring safety at a live aerodrome during airfield construction works.

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