



ICAO

Third Meeting of the Asia/Pacific Aerodrome Design and Operations Task Force (AP-ADO/TF/3)
Video Teleconference, 2 to 4 February 2022

Agenda Item 2: Planning, Design, Construction and Operation of Aerodromes

CONSTRUCTION GUIDELINE FOR HIGH ALTITUDE AIRPORTS

(Presented by China)

SUMMARY

This paper put forward problems generally faced by high altitude airports and the importance of drawing up a guideline about construction of high altitude airports. The draft of *Planning and Design Guidelines for Higher-Plateau Airports* (i.e., *Higher-Plateau Airports Guideline*) submitted by Civil Aviation Administration of China (CAAC) is discussed. CAAC invites members of the meeting to review the *Higher-Plateau Airports Guideline* and suggests the members of this meeting to compile the guideline about construction of high altitude airports.

1. INTRODUCTION

1.1 Compared with airports at lower altitudes, high altitude airports generally face with problems such as complex terrain, complex clearances, alpine hypoxia and ecological fragility, etc. Therefore, corresponding instructional items are supposed to solve or avoid these problems during the planning and construction of the high altitude airport. However, there are no specific guidelines or manuals about the construction of high altitude airports.

1.2 Many high altitude airports have been built on basis of the existed ICAO SARPs, however the characteristics of higher altitude airports has not taken into consideration by the extant ICAO SARPs. On one hand, the cost of programs which deployed ICAO SARPs is relatively high. On the other hand, the solutions to the problems in different high altitude airports are common, and these solutions can be summarized to guide the construction of the high altitude airports to be built. Therefore, it is necessary to compile the guideline about construction of high altitude airports.

1.3 Civil Aviation Administration of China (CAAC) has accomplished the draft of *Planning and Design Guidelines for Higher-Plateau Airports* (i.e., *Higher-Plateau Airports Guideline*) on basis of the prior construction experience of higher-plateau airports. In this guideline, higher-plateau airport is defined as the airport which locates in a place over 8,000 ft. (2,438 m). The *Higher-Plateau Airports Guideline* will be discussed below. CAAC welcome experts and engineers from all over the world to discuss information and difficulties with us.

2. DISCUSSION

Brief information of Higher-Plateau Airports Guideline

2.1 Based on the characteristics of higher-plateau area, the following principles are employed in the *Higher-Plateau Airports Guideline*: 1) The facilities can be integrated constructed if possible. Building higher-plateau airports faces difficulties such as complex topography, costly site formation, and harsh climate. Integrated construction of some facilities can save land and energy. For example, the office block and dormitory can be integrated constructed as a multiple-use building, etc. 2) Local conditions can be adapted. The characteristics of the local environment should be taken into consideration when making material selection, energy selection and other decisions. Programs are supposed to make full use of local resources, and avoid negative effects appropriately. 3) People orientation should be considered. As airport staff and passengers are the main users of the airport, their need for comfort in the harsh environment of higher-plateau areas should be considered carefully.

Some alternative solutions in the Higher-Plateau Airports Guideline

2.2 The guideline suggests that the airworthiness aircraft should be chosen according to the airworthiness altitude of the aircraft and the proposed operating airline fleet. Jet aircrafts with excellent performance in plateau areas, such as A330, A319, B737-800 and ARJ 21-700 etc., are recommended.

2.3 Traditional flight procedure is apt to be obstructed by obstacles. For higher-plateau airports with complex terrain, PBN flight procedure program is recommended to be employed. For higher-plateau airports with particularly complex terrain, RNP AR flight procedure programs are recommended to be deployed. Meanwhile, EMAS (Engineered Materials Arresting Systems) can be set at the end of the runway to improve safety margin.

2.4 Facing with the enormous amount of excavating and filling in higher-plateau area, the viaducts, reflection nets and other alternatives can be developed for site construction for filling and leveling up the flight zone.

2.5 For airports with low terrain at both ends of the runway, the guideline suggests that the length of the approach lighting system can be appropriately shortened in the condition of the site's meteorological conditions and operational efficiency to save investment. In addition, when it is difficult for installation of airfield lighting tower due to the complex terrain, the tower can be constructed by combining with trestle for the convenience of the maintenance.

2.6 Considering the alpine hypoxia and poor infrastructures higher-plateau airports, this guideline recommends that airports with an altitude higher than 4,000 m and far from the city can plan a reasonable-scale airport security base in the urban area or other low-altitude areas for airport staff and passengers. Airports with an altitude higher than 4,000 m can plan a certain proportion of aerobic activity areas such as sun rooms and ecological oxygen bars in the work area. Airports with an altitude of more than 3,000 m should supply oxygen to areas such as the office and life of airport staff, medical first aid, and mother and baby rooms in the terminals.

2.7 The content above discusses the principles and some alternative solutions in the *Higher-Plateau Airports Guideline*. These principles and alternative solutions, which are designed for higher-plateau airports specifically, can also be a reference for high altitude airports construction. CAAC will continue to research the extant construction experience and compile the guideline for high altitude airports in the near future.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) Review the *Planning and Design Guidelines for Higher-Plateau Airports* submitted by China.
- b) Set up a group to compile the guideline about construction of high altitude airports. China's representors volunteer to take the lead in this work.

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