

**54th CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGION**

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AGENDA ITEM 5: AVIATION AND ENVIRONMENT

**PLANNING AND CONSTRUCTION OF
BEIJING NEW AIRPORT AS A SPONGE AIRPORT**

(Presented by People's Republic of China)

SUMMARY

Beijing New Airport Project represents a significant landmark construction project in China. The project, with a land area of about 27.4 square kilometers, is planned to be built with 4 runways and a terminal building of 0.7 million square meters in this term. The airport that is expected to put into operation in 2019, will accommodate a passenger traffic of 72 million per year. An objective of building a sponge airport is proposed for the project, and a special design and planning is carried out for it. It aims to realize a runoff volume control rate of over 85% through varied measures of water infiltration, retention, storage, purification, utilization and drainage, and realize the goals of waterlogging prevention and control, reduction of total runoff volume and pollution, utilization of rainwater resource, protection of water environment, and scientific management of water resources.

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1. INTRODUCTION

1.1 Beijing New Airport is about 46 kilometers from Beijing's downtown area, 55 kilometers from Xiongan New Area and 26 kilometers from Langfang City. The project, with a land area of about 27.4 km², is planned to be built with 4 runways and a terminal building with an area of 0.7 million m² in this term. The airport that is expected to put into operation in 2019, will accommodate a passenger traffic of 72 million per year. In the long term (by 2040), 7 runways and a terminal building with an area of about 1.4 million m² will be built according to the standard of 100 million passenger traffic and 0.8 million aircraft movements per year. Some land is reserved for future expansion of the airport, which aims to increase passenger throughput traffic to 130 million and aircraft movements to 1.03 million by 2050. The new airport is positioned as another large international hub airport, in addition to existing hub of Beijing Capital International Airport.

1.2 A special research on green airport and environment protection was carried out in the Beijing New Airport project in the design phase. 100% green design will be adopted in all buildings and structures, which will have less resource consumption and environmental impact. The ratio of renewable energy utilization will reach 10% or above; generic vehicles for airside access will use clean energy. The ratio of clean energy vehicles to special vehicles shall be no less than 20%. More than 30% of parking space in the internal parking lots of resident units shall be equipped with recharging facilities. Passive energy saving design and energy-efficient equipment and systems will be used. General equipment with Level I energy efficiency will be selected. The ratio of green land will be no less than 30%, and the ratios of green construction land for office, business, living, hospital and education purposes no less than 30%, and that for industrial purpose no less than 10%. The index of local vegetation will be no less than 0.7. Methods such as roof planting and vertical greening will be used as necessary. The ratios of garbage classification and detoxification treatment will reach 100%. The entire construction area will reflect the idea of environment-friendly engineering.

1.3 Sponge city development is a new concept of urban construction and transformation raised by the Chinese government in recent years, which is a brand new pattern for urban development and operation. A sponge city means that a city could be as elastic as a sponge in adapting to environmental changes and responding to natural disasters. In such a city, it will store, filtrate and purify rainwater and "release" and utilize the water when needed. Sponge city construction follows rules such as ecological priority and integrates natural means and artificial measures. It is expected to realize rainwater storage, filtration and purification in urban areas to the greatest extent possible and promote rainwater resource utilization and ecological environment protection while guaranteeing urban drainage and flood control. An objective of building a sponge airport is proposed for the Beijing New Airport and special planning and designs for a pilot sponge airport construction is carried out.

2. DISCUSSION

2.1 Overall objective

2.1.1 Some major and comprehensive control targets include total runoff volume control, runoff pollution control, drainage and flood control, rainwater resource management, water environment protection, and a runoff volume control rate of over 85%. Besides, flood control and drainage safety shall be guaranteed, and the maximum economic benefits shall be realized. Comprehensive environmental and social benefits shall be maximized through multiple measures such as reduction of runoff pollution, utilization of rainwater resources, and protection of water environment.

2.2 Sponge measures and rainwater system design

2.2.1 Through varied measures of infiltration, retention, storage, purification, utilization and drainage and based on the characteristics of different function areas, the control targets and

control index of Beijing New Airport construction are clarified as total runoff volume control, runoff pollution control, drainage and flood control, rainwater resource management and water environment protection. Taking a comprehensive consideration of investment, pipeline depth, general pipeline layout and drainage safety, a rainwater system is developed comprising the origin, halfway and end controls, which could make a scientific and reasonable coordination of origin control system, minor drainage system and major drainage system. Grey infrastructure will be integrated with green, overland and underground infrastructure, with a total volume of water storage and regulation of over 2.7 million m³. From the perspective of performance review and evaluation for sponge city construction, the new airport will set a good example in hydro-ecology, water environment, water resources, water safety, system building and implementation, and visibility. The airport will realize 100% of rainwater and sewerage separation, a nontraditional water source utilization rate of 30%; an outdoor permeable area percentage of 40% (including not lower than 10% of outdoor permeable area percentage for fuel supply facilities), a water-saving apparatus utilization rate of 100%, and itemized measurement of water use according to functions of different architectures, etc.

2.3 Digital sponge rainwater management system

2.3.1 The digital sponge rainwater management system of Beijing New Airport is the first of such to adopt a digital model to simulate rainwater system and realize intelligent management and comprehensive utilization of rainwater by means of model prediction and remote control. Based on the model simulation results, the formula calculation-based rainwater pipe system will be examined to make sure whether it could satisfy the design standard, the risk of waterlogging caused by excessive rainfall to the new airport will be reviewed, and the capability of existing rainwater system to mitigate waterlogging risks will be improved. Thus, some countermeasures for waterlogging risks and emergency measures will be proposed as a scientific and reasonable guidance for the establishment of rainwater system program.

2.3.2 Digital modeling is one of the key elements of building a digital rainwater management system of Beijing New Airport.

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) build a digital sponge rainwater control center for the first time; and
- b) to promote the concept of sponge city building in the airport industry.

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